

## **Other Edgewood Areas Study Area**

**Record of Decision  
Remedial Action at the Wright Creek  
Investigation Area (EAOE08 and EAOE51)**

**Final, May 2011**

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**U.S. Army Garrison  
Aberdeen Proving Ground, Maryland**

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<b>13. SUPPLEMENTARY NOTES</b>					
<b>14. ABSTRACT</b>  The Wright Creek Investigation Area (WCIA) (approx. 495 acres) lies on the Gunpowder Neck Peninsula along the Gunpowder River within Aberdeen Proving Ground, Maryland. Contained within the WCIA are the northern portion of Cluster 8 (G-Field), the eastern and northern portions of Cluster 51 (K-Field), and the majority of F-Field. This Record of Decision provides a summary of the remedial alternatives considered during the detailed analysis in the Focused Feasibility Study and identifies a selected remedy for the entire WCIA. The Selected Remedy for the WCIA is Land Use Controls to prevent future residential land use (i.e., housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land use).					
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**RECORD OF DECISION**

**REMEDIAL ACTION AT THE  
WRIGHT CREEK INVESTIGATION AREA  
(EAOE08 AND EAOE51)  
OTHER EDGEWOOD AREAS STUDY AREA  
ABERDEEN PROVING GROUND, MARYLAND**

**SUBMITTED BY:**

**ENVIRONMENTAL DIVISION  
DIRECTORATE OF PUBLIC WORKS  
U.S. ARMY GARRISON ABERDEEN PROVING GROUND  
EDGEWOOD, MARYLAND 21010**

**May 2011**

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## ACRONYMS AND ABBREVIATIONS

AEDB-R	Army Environmental Database – Restoration
AOC	area of concern
APG	Aberdeen Proving Ground
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BRAC	Base Realignment and Closure
BTAG	Biological Technical Assistance Group
C08-SD	Cluster 8 sediment
C08-SS	Cluster 8 surface soil
C08-SW	Cluster 8 surface water
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
COMAR	Code of Maryland Regulations
CSM	Conceptual Site Model
DDD	4,4'-dichlorodiphenyldichloroethane
DDE	4,4'-dichlorodiphenyldichloroethene
DDT	4,4'-dichlorodiphenyltrichloroethane
DDTr	DDT + DDE + DDD
DPT	direct push technology
EA	EA Engineering, Science, and Technology, Inc.
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
GIS	Geographic Information System
GP	General Physics Corporation
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IRP	Installation Restoration Program
LECR	lifetime excess cancer risk
LUC	land use control

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MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
msl	mean sea level
µg/kg	micrograms per kilogram
µg/L	micrograms per Liter
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OEA	Other Edgewood Areas
OEA-GF	Other Edgewood Areas G-Field
O&M	operation & maintenance
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RAB	Restoration Advisory Board
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RFA	RCRA Facility Assessment
RI	remedial investigation
ROD	record of decision
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TRV	toxicity reference value
USAEC	U.S. Army Environmental Command (formerly the U.S. Army Environmental Center)
USAEHA	U.S. Army Environmental Hygiene Agency (now the U.S. Army Center for Health Promotion and Preventative Medicine [USACHPPM])
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency (now the U.S. Army Environmental Command)
USEPA	U.S. Environmental Protection Agency

UST	underground storage tank
UXO	unexploded ordnance
VOC	volatile organic compound
WCIA	Wright Creek Investigation Area
WC-SD	Wright Creek sediment
WC-SS	Wright Creek surface soil
WC-SW	Wright Creek surface water
WGF-	G-Field well designation

**RECORD OF DECISION**  
**REMEDIAL ACTION AT THE WRIGHT CREEK INVESTIGATION AREA**  
**(EAOE08 AND EAOE51)**  
**OTHER EDGEWOOD AREAS STUDY AREA**  
**ABERDEEN PROVING GROUND, MARYLAND**

**May 2011**

**PART 1: DECLARATION**

**1 SITE NAME AND LOCATION**

The Wright Creek Investigation Area (WCIA), located within the Edgewood Area of Aberdeen Proving Ground (APG), Maryland has been designated for Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) response action to address the impact of historical waste management practices. The WCIA lies in the northern portion of the Other Edgewood Areas (OEA) Study Area, along the Gunpowder River. Included in the WCIA are open space/undeveloped areas, the military test ranges G-Field, K-Field, and portions of F-Field and 12 sites. U.S. Army CERCLA response actions are tracked in the Army Environmental Database–Restoration (AEDB-R). The 12 WCIA sites and corresponding AEDB-R Numbers are:

**AEDB-R No. EAOE08 Sites:**

- K-Field Training Area 1
- G-Field Real Time Analytical Platform Garage
- G-Field Bunker Sites
- G-Field Container Dump Site
- G-Field Impact Area North
- “Goat Yard” Storage Area
- Marsh Dump Sites
- Building E1421 Former Supply Well and Associated Holding Tank
- G-Field Former Drum Disposal Site
- G-Field Wastewater Treatment System
- G-Field Weapons Assembly Plant

**AEDB-R No. EAOE51 Sites:**

- K-Field Pistol Range

CERCLA activities at APG are being conducted under a Federal Facility Agreement (FFA) signed on March 27, 1990. The U.S. Environmental Protection Agency (USEPA) Superfund Site Identification Number is MD 2210020036. This Record of Decision (ROD) is listed under OU-25 in USEPA’s database.

## 2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the remedy selected by the U.S. Army and the USEPA Region III to address the WCIA within the Edgewood Area. The Selected Remedy for the WCIA is Land Use Controls (LUCs). The Selected Remedy was chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for the WCIA.

The State of Maryland concurs with the selected remedy.

## ASSESSMENT OF THE SITES

Potential exists for risk to human health if no remedial action is undertaken.

Field investigations identified only sporadic and isolated detections of contaminants within the WCIA. However, various metals are present in surface media at concentrations higher than background. These constituents do not pose unacceptable risk to future military/industrial workers or the ecosystem. However, the investigation data, while sufficient to evaluate risk to military/industrial receptors and the environment, are not sufficient to evaluate risk for residential land use. Therefore, without further collection of data, the WCIA would not be suitable for unlimited use and unrestricted exposure (e.g., housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land use). Consequently, an active remedial action for the entire WCIA is not warranted based on projected future land use (industrial/military). Instead, LUCs preventing future residential land use are warranted for the entire WCIA.

The response action selected in this ROD is necessary to protect the public health or welfare, or the environment from actual or threatened releases of hazardous substances into the environment.

## 3 DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy for the WCIA is LUCs. The detailed approach and methodology will be specified in an LUC Remedial Design (RD) document.

- Land-Use Controls: As mentioned previously, the current and planned future use of the WCIA is for military/industrial activities. LUCs will be implemented at the WCIA to prevent future residential land use (i.e., housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land use) until further sampling conducted at a spacing designed to assess risks associated with unlimited use of and unrestricted exposure to the site demonstrates that there are no unacceptable human health risks. Because the potential presence of unexploded ordnance (UXO) will still exist at the WCIA, existing Installation safety procedures and policies related to UXO would be followed for any soil disturbances at the WCIA. This is to ensure adequate protection of workers and military personnel at the WCIA. The site map on Figure 6 shows the boundaries where the LUC objectives will be applied and maintained.
- Five-Year Reviews: CERCLA 121(c) five-year reviews will be conducted to confirm the long-term effectiveness of the remedial response. Five-year reviews will be

conducted in accordance with Office of Solid Waste and Emergency Response (OSWER) Directives 9355.7-03B-P and 9234.2-25, or their most current revision or replacement.

The RD will be submitted consistent with the RD schedule provisions of the FFA and will specify the details of LUC implementation and maintenance (including periodic inspections).

The U.S. Army will be responsible for implementing, maintaining and enforcing the LUCs described in this ROD and the subsequent RD. As part of the U.S. Army's inspection and reporting responsibilities, periodic reviews of the restrictions and objectives outlined above will be undertaken and a review report will be submitted to USEPA and MDE. The LUCs will include implementation through the APG Master Planning System with Geographic Information System (GIS) support. As set forth in this ROD, the U.S. Army will not modify or terminate LUCs or implementing actions without prior approval of USEPA, after conferring with MDE. The U.S. Army will seek prior concurrence before taking an action that would disrupt the effectiveness of the LUCs.

If the U.S. Army transfers property in the areas addressed by this ROD, the U.S. Army will place a deed notification in the local property record that describes the restrictions on site activities and states that this notification is filed with the appropriate agencies, so that current and future property owners will be aware of these restrictions. Specific deed notification language and the appropriate agencies will be identified in the approved RD. While the U.S. Army retains ultimate responsibility for LUC enforcement, the Army may require the transferee or lessee in cooperation with other stakeholders to assume responsibility for LUC 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 U.S. 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 U.S. Army's right and responsibility to enforce the LUCs.

The selected remedial response is protective of human health and the environment. A cost summary is presented below:

#### Cost Summary

Capital Cost	\$11,500
Annual Operation and Maintenance (O&M) Costs	\$3,050
CERCLA Five-Year Review	\$15,000
Total Present Worth Costs	\$193,000
Operations & Maintenance (O&M) Time Frame	30 Years
Time to Achieve RAOs	6 Months

#### **4 STATUTORY DETERMINATIONS**

This remedial response meets the requirements of CERCLA Section 121 and, to the extent practicable, the NCP. The Selected Remedy is protective of human health and the environment; provides long- and short-term effectiveness; and complies with all Applicable or Relevant and Appropriate Requirements (ARARs), is cost-effective, and utilizes permanent solutions to the maximum extent practicable.

Because this selected remedy will result in hazardous substances, pollutants or contaminants remaining on site at levels that do not allow for unlimited use and unrestricted exposure, the entire WCIA will be included in the consolidated five-year CERCLA remedy reviews of the Edgewood Area's National Priorities List (NPL) sites, to ensure that the remedy is, continues to be, or will be, protective of human health and the environment.

#### **5 DATA CERTIFICATION CHECKLIST**

The following information is included in the Decision Summary, Part 2 of this ROD. Additional information can be found in the Administrative Record file.

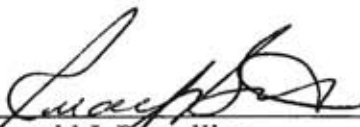
- Chemicals of concern (COCs) and their respective concentrations (Decision Summary, Section 5).
- Baseline risk represented by the COCs (Decision Summary, Section 7).
- The absence of source materials constituting principal threats (Decision Summary, Section 11).
- Current and reasonably anticipated future land use assumptions and potential land uses that will be available as a result of the Selected Response Actions (Decision Summary, Section 6).
- Estimated capital, O&M, and total present worth costs, and the number of years over which the response cost estimates are projected (Decision Summary, Section 9).
- Key factor(s) that led to selecting the remedial response (i.e., describes how the Selected Response Actions provide the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Decision Summary, Section 10).


## 6 AUTHORIZING SIGNATURES

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

  
\_\_\_\_\_  
Orlando W. Ortiz  
Colonel, MI  
Garrison Commander

  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ronald J. Borsellino  
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**

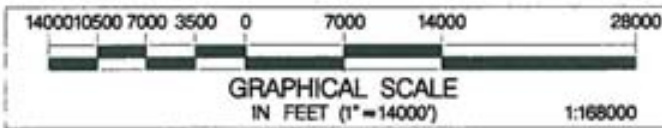
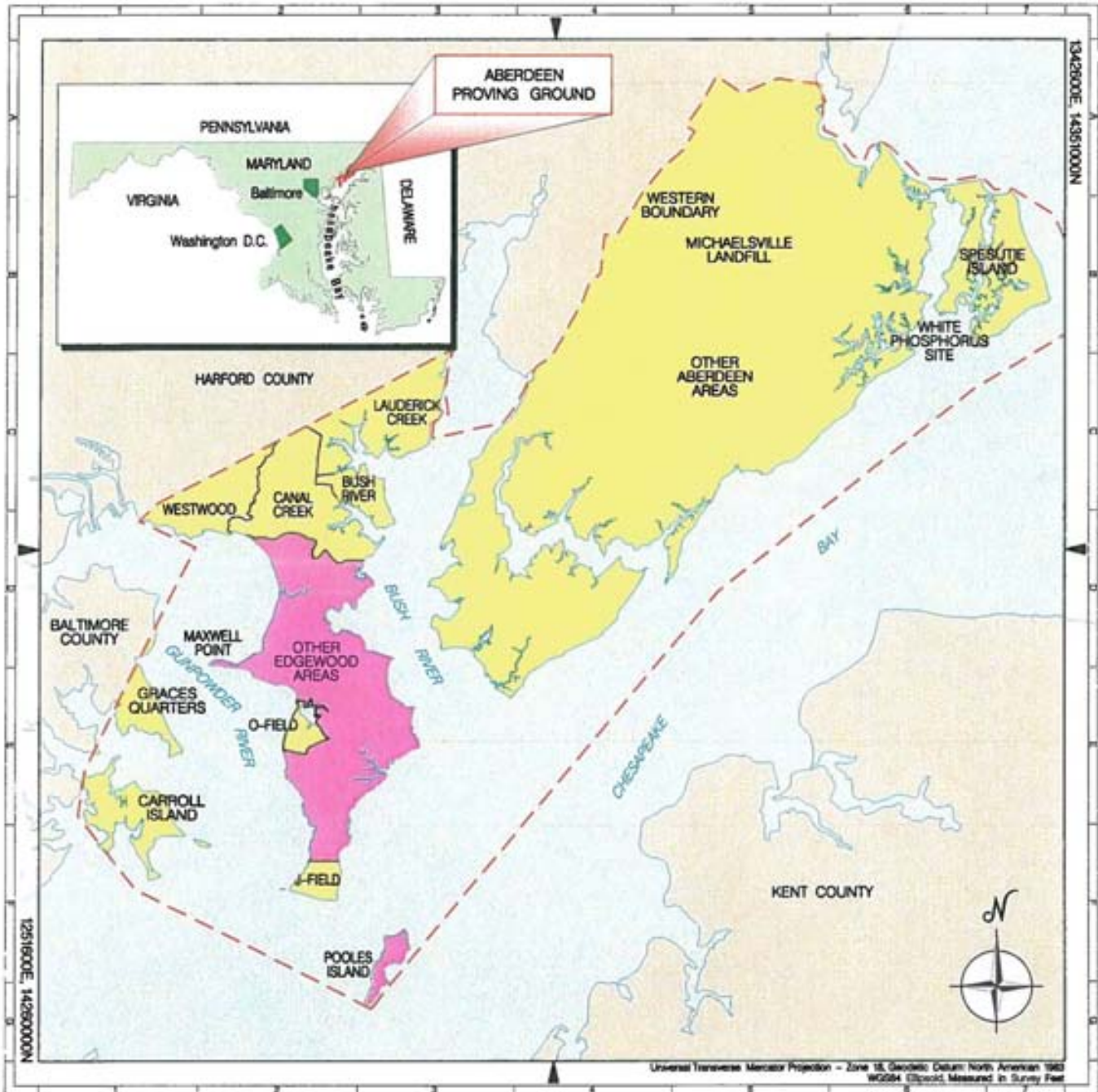
APG is an approximately 72,500-acre Army installation located in southern Harford and southeastern Baltimore counties, on the western shore of the upper Chesapeake Bay (Figure 1). The installation is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder Falls State Park, the Crane Power Plant, and residential areas; and to the north by the City of Aberdeen and the towns of Edgewood, Joppatowne, Magnolia, and Perryman. The Bush River divides APG into two areas: the Edgewood Area to the west and the Aberdeen Area to the east. OEA is in the Edgewood Area part of the APG NPL Site, USEPA Superfund Site Identification Number MD 2210020036. The site owner and lead agency is the U.S. Department of the Army, with USEPA as the lead regulatory agency and MDE as the supporting regulatory agency.

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 materiel. The Edgewood Area (formerly Edgewood Arsenal) was appropriated by presidential proclamation in 1917 and has since been a site of laboratory research; field testing of chemical materiel and munitions; pilot-scale manufacturing; production-scale chemical agent manufacturing and related test, storage and disposal operations (U.S. Army Toxic and Hazardous Materials Agency [USATHAMA], 1983).

The OEA lies in the southern portion of the Edgewood Area of APG on the Gunpowder Neck peninsula (Figure 1). The OEA consists of military test ranges and Pooles Island, located south of the peninsula in the Chesapeake Bay. The total land area of the OEA is approximately 5,068 acres. The WCIA lies within the northern portion of OEA along the Gunpowder River (Figure 2). Included within the 495-acre parcel are military test ranges G-Field, K-Field, and portions of F-Field (Figure 3). As early as 1918, these range fields have been used for military testing and training activities, including use as impact areas for mortar and artillery ordnance.

### **2 SITE HISTORY AND ENFORCEMENT ACTIVITIES**

During 1984 and 1985, APG was evaluated as a potential NPL site. In 1985, the Edgewood Area of APG was proposed for inclusion on the NPL; it was listed in 1990. In 1986, between the time of the proposed listing and the final listing, a Resource Conservation and Recovery Act (RCRA) corrective action permit (MD3-21-002-1355) was issued by the USEPA Region III to address solid waste management units (SWMUs) in the Edgewood and Aberdeen areas of APG. As required by the RCRA permit, the U.S. Army Environmental Hygiene Agency (USAEHA) performed a RCRA Facility Assessment (RFA) for the Edgewood Area. The RFA identified sites in the Edgewood



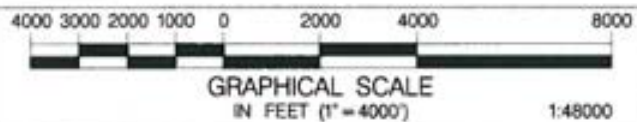
**LEGEND**

Aberdeen Proving Ground	Other Edgewood Areas
Water	Installation Boundary

500 Edgewood Road, Suite 110 (410) 676-8835  
Edgewood, MD 21040 www.gpworldwide.com

TITLE:  
**OTHER EDGEWOOD AREAS IN ABERDEEN PROVING GROUND**

CARTOGRAPHER: B. JOYCE	APPROVED BY: J. SCHAEFER	DATE: 01-13-2011	FIGURE: 1
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**LEGEND**

- Roads
- Wetlands
- Investigation Area
- Water
- Wright Creek Investigation Area
- Cluster Locations



500 Edgewood Rd., Suite 110  
Edgewood, MD 21040

(410) 676-8835  
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TITLE:

**WRIGHT CREEK INVESTIGATION AREA  
WITHIN OTHER EDGEWOOD AREAS**

CARTOGRAPHER:

B. JOYCE

APPROVED BY:

J. SCHAEFER

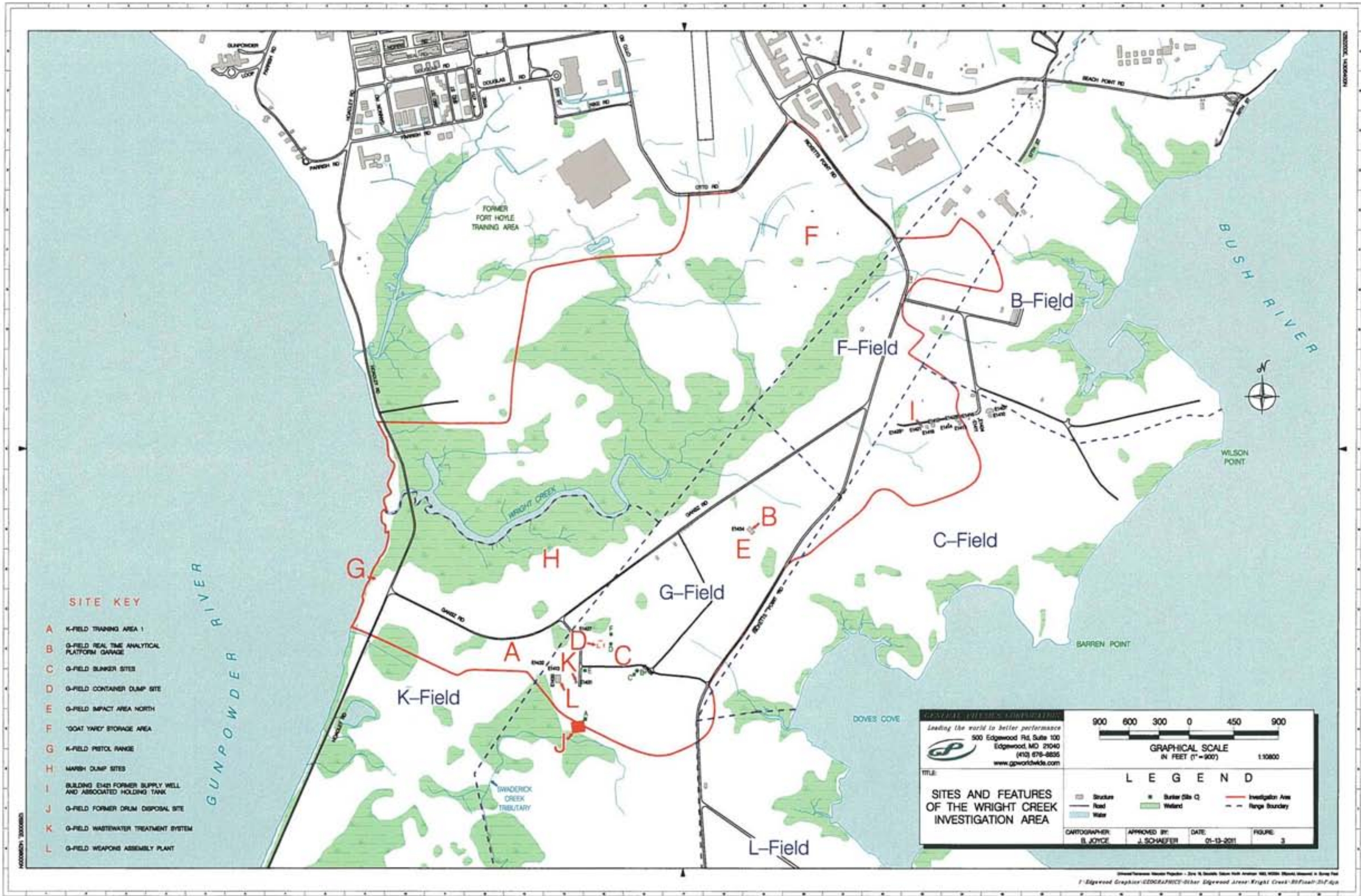
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Area that were either SWMUs or areas of concern (AOCs) for potential contamination (USAEHA, 1989). After the final NPL listing of the Edgewood Area in 1990, further investigations were conducted in accordance with CERCLA under the 1990 FFA with USEPA.

The FFA identified specific Study Areas within the Edgewood Area including Canal Creek, O-Field, J-Field, Carroll Island, Graces Quarters, Westwood, Lauderick Creek, and the Bush River Study Areas. The Edgewood Area SWMUs and AOCs not specifically listed above were grouped and designated the OEA.

In 1991, the Generic Work Plan for RI work at the Edgewood Area was published and initially divided known potential source areas in the OEA into 31 "clusters" of sites by geographic area. Because of the very large size of the OEA and the need for an integrated approach, a Strategic Work Plan developed in 1999 organized the 31 OEA clusters by watershed/drainage basins into eight Investigation Areas. In 2009, the U.S. Army Environmental Command (USAEC) reduced the number of OEA clusters to 27. Clusters 43 and 52 (within the Swaderick-Watson Creek Investigation Area) and Clusters 45 and 49 (within the Coopers Creek Investigation Area) were removed from the list of AEDB-R sites requiring investigation under the CERCLA program because of their use as ranges with no documented history or evidence of disposal practices or use of hazardous materials at the sites. The WCIA contains two clusters of sites numbered 8 and 51 and includes only the Wright Creek drainage basin.

Field investigations to support the WCIA RI were conducted in several phases from 1996 to 2008. Activities included historical document and aerial photograph reviews, installation of wells to monitor the groundwater, and the sampling of groundwater, surface water, sediment, and soil.

### **3 PUBLIC/COMMUNITY INVOLVEMENT**

CERCLA Sections 113 (k) (2) (B) and 117, the NCP, and Department of Defense and Army policy require the involvement of the local community as early as possible and throughout the Installation Restoration Program (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 Army, regulatory agency and local community members. Progress of the WCIA RI has been discussed annually at RAB meetings since 1996. Remedial alternatives for the WCIA were initially briefed during the June 2009 RAB meeting. The WCIA Focused Feasibility Study (FFS) (General Physics [GP], 2010b) was finalized in July 2010.

The Proposed Plan for the WCIA was made available to the public on August 4, 2010. The Administrative Record, which contains the information used to select the remedial response, may be found at the Aberdeen and Edgewood branches 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* and *The Cecil Whig* on August 4, 2010, and *Kent County News*, *The Avenue News*, and *East County Times* on August 5, 2010. A public meeting was held on August 17, 2010. The public comment



period was held from August 4 to September 2, 2010. 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**

This ROD addresses the final response action for surface media (i.e., soil, surface water, and sediment) within the WCIA. Based on available groundwater data collected during the RI, there is no evidence of groundwater plumes or contributing sources of contamination within WCIA groundwater. Thus, constituents in groundwater did not warrant additional evaluation or risk assessment, and a response action addressing WCIA groundwater is not necessary. Final remedial response actions for the remaining seven OEA Investigation Areas (i.e., Gun Club Creek, Doves Cove, Western Shore, Coopers Creek, Swaderick-Watson Creek, Maxwell Point, and Boone Creek Investigation Areas) are being evaluated, proposed, and implemented under separate FFS, Proposed Plan, and ROD documents.

The Army is selecting LUCs for the WCIA at this time to prevent future residential land use (i.e., housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land use). For the WCIA, no additional response action will be taken. The WCIA will remain "as is", with no containment, removal, treatment, or other mitigating measures. Because the potential presence of UXO will still exist at the WCIA, existing Installation safety procedures and policies related to UXO will be followed for any soil disturbances at the WCIA in the future. This is to ensure adequate protection of workers and military personnel at the WCIA. Since RI sampling was conducted at a spacing designed for industrial land use, additional sampling would be necessary if the land were to be used for residential use. LUCs, as described above, will be implemented unless and until further sampling conducted at a spacing designed to assess risks associated with residential land use indicates that there are no unacceptable human health risks.

The Selected Remedy for the WCIA is protective of human health and the environment and is effective in the long- and short-term.

#### **5 SITE CHARACTERISTICS**

The WCIA lies on the western shore of the Gunpowder Neck Peninsula, and includes the Wright Creek drainage basin (approximately 495 acres). The topography of the WCIA is characterized by a few broad hills with surface elevations up to 35 feet above mean sea level (msl) adjacent to low lying areas less than 10 feet above msl. The land surface slopes down to the wetlands surrounding Wright Creek to the north; the Gunpowder River to the west; and a tributary of Swaderick Creek to the southwest. Wright Creek is near mean sea level. The eastern boundary of the Investigation Area is bounded by Ricketts Point Road and near a crest of hills. Therefore, there is limited surface run off to the east towards the Doves Cove Investigation Area. Surface water runoff flows generally to the west toward Wright Creek and the Gunpowder River. Surface water and sediment samples were collected mostly downgradient of the site and along Wright Creek to assess potential contaminant migration pathways. Selected surface soil samples were

also collected in drainage swales near the sites.

The WCIA consists primarily of three habitat types. Approximately 49 percent of the area is mowed and developed fields, while approximately 34 percent of the area consists of mixed hardwood canopy with woody vegetation understory (with an area containing saplings). Freshwater marshes make up the remaining 17 percent of the area. The forested areas represent a transition area between the oak-pine and oak-chestnut forest regions of the eastern United States, and consist of a variety of deciduous species characteristic of these regions. The wetlands are dominated by estuarine and palustrine emergent wetlands. The shoreline of the Investigation Area has been impacted by erosion caused by storms and hurricanes.

The forest, field and wetland habitats at the WCIA support a variety of wildlife and vegetation. Currently, there are no known occurrences of endangered flora or fauna species in the WCIA. Bald eagles, previously listed under Federal protection status as threatened, are known to forage in and around the WCIA. The closest known active nesting area is within the Doves Cove Investigation Area on the shoreline of the Bush River, approximately 1,300 feet east of the WCIA.

Tulip, oak, maple, sweet gum and pine trees dominate secondary growth forest vegetation at the WCIA. Typical forest species of the area include red fox, gray squirrel, white-tailed deer, woodpecker, crows and a variety of songbirds. Shrubs and native grasses are found in the open fields. Field species include field mice, voles, cottontail rabbits, bobwhites, mourning doves, killdeer, hawks and songbirds.

Wetland plants common to the palustrine emergent areas include phragmites, cattails and rushes. Estuarine emergent species include phragmites, cordgrass, three squares, and rushes. Wetland species include muskrats, turtles, snakes, great blue herons, puddle and diving ducks, and a variety of shorebirds, including spotted sandpiper, and rails. Estuarine fish that are expected to live in Wright Creek and the Gunpowder River include largemouth and striped bass, carp, white and yellow perch, bluefish, catfish, sunfish, Atlantic silverside, and eels (ICF, 1997).

Surface soil in the WCIA mainly consists of silts with varying amounts of very fine to fine-grained sand and clay. Surface soil and sediments in the vicinity of marshes, low-lying floodplain areas, and the shorelines adjacent to Wright Creek contain abundant organics. The soil includes peat, organic-silt, and organic clay with varying sand content. Sediments, which are present along the WCIA shoreline adjacent to the Gunpowder River, are silty-sand, sand, and gravelly sands.

The WCIA lies within Harford County, Maryland. Harford County spans two physiographic provinces, the Piedmont and Atlantic Coastal Plain. The Piedmont contains crystalline basement rocks of Precambrian (more than 570 million years ago) and early Paleozoic age. In the Coastal Plain, unconsolidated sedimentary strata consisting of clay, silt, sand and gravel of Cretaceous, Tertiary and Quaternary age (144 million years ago to recent) unconformably overlie the crystalline rocks. The division between these provinces is known as the Fall Line. APG lies southeast of the Fall Line in

the Coastal Plain. The WCIA lies on unconsolidated sediment of the Atlantic Coastal Plain which was deposited by actions of streams, rivers, and seas, and forms a wedge-shaped body that thickens southeastward. This sediment crops out at APG and comprises three stratigraphic units. From oldest to youngest, the units are the Potomac Group of early Cretaceous age (97.5 to 146 million years old), the Talbot Formation of Pleistocene age (approximately 10,000 years old to 2 million years old), and Holocene (i.e., less than 11,500 years old) alluvium. A major unconformity occurs between the Pleistocene and Cretaceous sediments. Missing from the geologic record are sediments deposited during the Upper Cretaceous and Lower Neogene Periods (i.e., 97.5 to 2 million years old). Removal of these sediments from the APG area was probably due to erosion by earlier Susquehanna River systems during the Lower Neogene or Early Pleistocene Periods. The Potomac Group is undifferentiated in Harford County and consists of sand and gravel interbedded with multicolored clay. The Talbot Formation is extremely variable because of the changing thickness of clay and sand facies and the presence of clay interbeds in gravelly sand facies. Alluvial deposits occur adjacent to and within drainage ways and topographic lows.

The surficial (water table) aquifer underlying the WCIA does not qualify as a source or potential source of drinking water, based on hydraulic parameters under both Federal and State aquifer classifications. The surficial aquifer is currently not used as an industrial water supply. Groundwater for the WCIA is not addressed in the risk assessments conducted for the Investigation Area. Based on available groundwater data collected during the RI, the USEPA and MDE have concurred that there is no evidence of groundwater plumes or contributing sources of contamination within WCIA groundwater.

The vadose (unsaturated) zone or depth to groundwater within the WCIA ranges from 5 to 20 feet below grade and contains clay and silty clay with interbedded silt and silty sand lenses. The individual silt and sand lenses range from 1 to 5 feet thick. The groundwater-bearing unit ranges in thickness from 7 feet thick in the upper portion to 10 to 15 feet thick in the lower portion. The specific sediments that comprise the groundwater bearing units include mainly silty-sand and well-sorted sands in the upper portion and silty sands in the lower portion. A continuous semi-permeable layer, consisting of small scale interfingering beds of silt, sandy-silt, and silty sand, divides the groundwater-bearing units into an upper and lower portion which thickens to the northeast direction. This semi-permeable layer averages approximately 2 to 5 feet thick. A dense, silty-clay unit encountered during direct push technology activities and drilling lies immediately below the groundwater-bearing units and appears to be a confining unit. In general, high groundwater levels occur near topographically elevated areas where the shallow groundwater received recharge. Groundwater flows to lower areas towards the Wright Creek to the northwest; the Gunpowder River to the west; and to a tributary of Swaderick Creek to the southwest. The average groundwater gradient in the predominant northwest direction was 0.01. Groundwater then discharges through the sediment to the surface water of the Creeks and the Gunpowder River.

Field investigations to support the WCIA RI were conducted in several phases from 1996 to 2008 (GP, 2010a). Activities included historical document and aerial photograph reviews, installation of wells to monitor groundwater, and environmental media (i.e.,

groundwater, surface water, sediment, and surface soil) sampling to identify the nature and extent of contamination. RI samples were analyzed for Target Analyte List inorganics and Target Compound List volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and pesticides/polychlorinated biphenyls (PCBs), explosive-related compounds, chemical agent degradation products, general chemical constituents and physical properties, and radiological parameters.

The following Section 5.1 provides discussions of primary sources and release mechanisms, and secondary sources and release mechanisms for the WCIA sites.

## **5.1 Conceptual Site Model for WCIA**

A Conceptual Site Model (CSM) is an integrated representation of the physical and environmental characteristics of a site, as well as the complete, potentially complete, and incomplete exposure pathways between sources of contaminants at a site and potential human and environmental receptors. For a potential risk to be associated with a contaminant release, a complete pathway from the source to a receptor must exist, and the receptor must be present when the contamination arrives or still exists. In addition, the CSM documents when an uncertainty is or is not significant, i.e., illustrates why data collection activities are or are not needed to support the decision-making process. The CSMs developed for the WCIA are based on the data that are presented in the RI documentation and contain detailed analytical data for all of the environmental media samples taken in the characterization of the WCIA. The RI document is available in the Administrative Record.

### ***Primary Sources and Release Mechanisms***

The primary sources that had been suspected and evaluated in the RI for the WCIA included testing, training, and firing activities, waste dumping, material storage sites, a wastewater treatment system, and weapons assembly.

Primary release mechanisms for contaminant transport at the WCIA sites were: (a) shoreline erosion with potential for release of constituents to Gunpowder River sediment and surface water, and (b) spillage/deposition to surface soil and leaching of constituents from waste to adjacent or underlying soil, then infiltration of contamination through the vadose zone to the groundwater.

### ***Secondary Sources and Release Mechanisms***

Secondary sources include surface and subsurface soil in the WCIA. Secondary release mechanisms include volatilization/dust generation, biotic uptake, stormwater runoff and erosion and sediment transport during precipitation events, and leaching for subsurface soil. The secondary route of migration is water runoff causing erosion of soil and/or sediment, and transport to marshes or Wright Creek, and eventually into Gunpowder River.

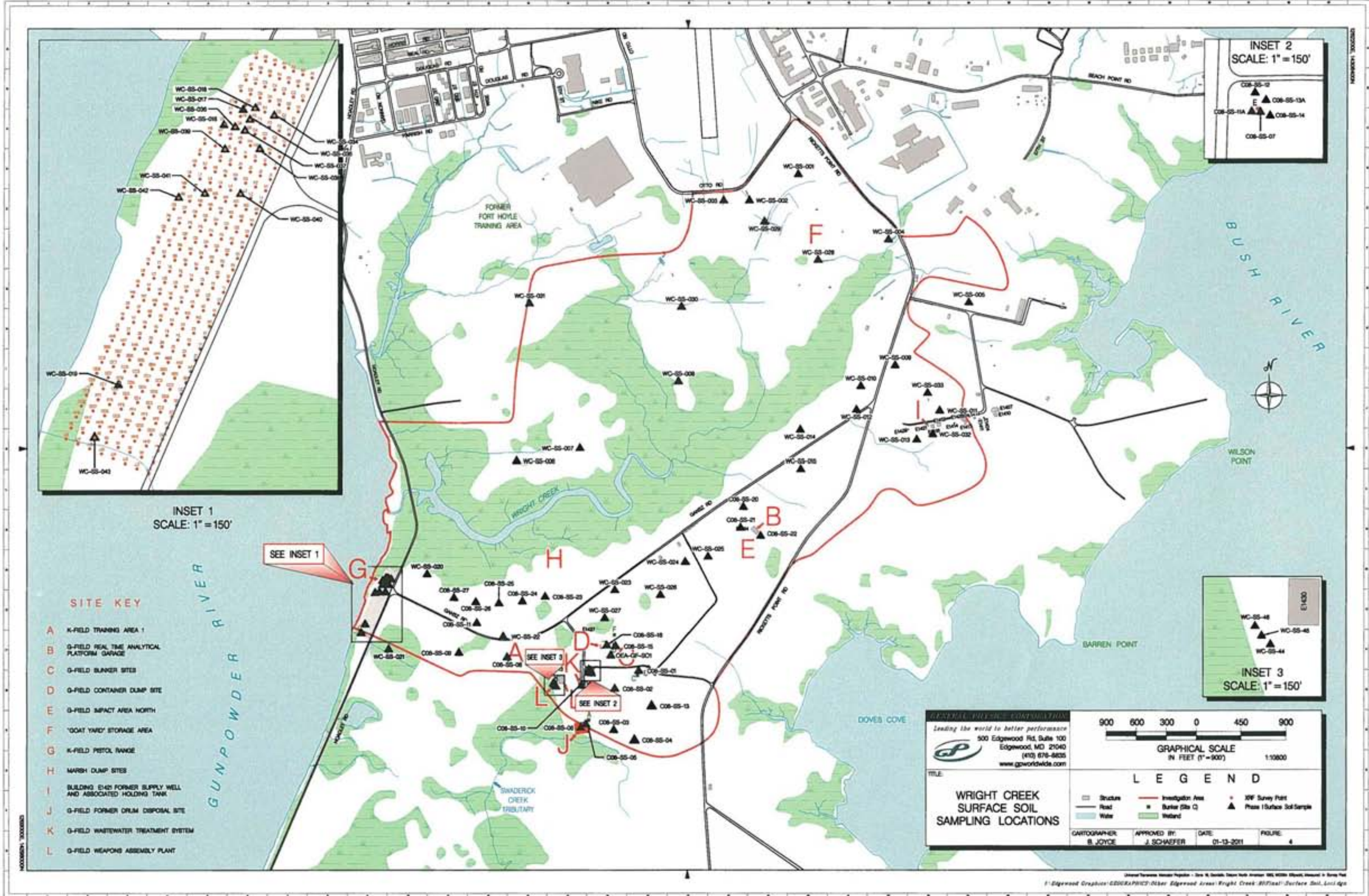
### **RI Data Summary**

During the RI, groundwater samples were obtained from 16 monitoring wells and 52 direct push technology (DPT) locations within the WCIA. Along with 73 surface soil samples, a total of 37 sediment samples and 31 surface water samples were collected at the WCIA to evaluate the potential for historical waste management activities to impact aquatic media. Although contaminants were detected throughout the WCIA in various surface media and groundwater, none exhibited a consistent and elevated pattern to distinguish any source(s) or pattern(s) of migration within the WCIA.

Explosive-related compounds (e.g., nitrobenzenes and nitrotoluenes) and chemical agent degradation products (e.g., p-chlorophenylmethylsulfone and thiodiglycol) were detected in WCIA samples, but none of the concentrations exceeded any available RI comparison criteria. Metals and pesticides were the primary constituents detected in excess of RI comparison criteria. A few VOCs were also detected at low level concentrations, but most were either below Maximum Contaminant Levels (MCLs) or Regional Screening Levels (RSLs), or qualified as "J" (estimated value below the reporting limit) or "B" (detected in laboratory blanks) by the validators.

The results of two rounds of groundwater monitoring well samples (32 samples) and 114 DPT samples indicated only three organic compounds exceeded primary MCLs (i.e., bis(2-ethylhexyl) phthalate, carbon tetrachloride and trichloroethene) and only three inorganic compounds (i.e., aluminum, iron, and manganese) exceeded secondary MCLs in monitoring wells. None of the organic compound concentrations were duplicated or had increased concentrations during the sampling rounds. The sporadic and isolated detections of low-level chlorinated VOC concentrations (maximum of 17 micrograms per liter [ $\mu\text{g/L}$ ]) in groundwater at G-Field well WGF-6, -7, and -9 occurred at 20 feet below ground surface, indicating there is no potential for vapor intrusion into current or future buildings. The DPT groundwater samples surrounding these wells did not contain contaminants and did not reveal any contaminant sources or migration. The vast majority of the inorganic samples were not detected in the filtered (dissolved) samples. The majority of the elevated total aluminum, iron, and manganese concentrations all had corresponding elevated total dissolved solids, indicating the samples were turbid from fine-grained material within the wells. In addition, all three metals were below the RSLs for tapwater and total iron was detected below reference (background) values. Based on these results, there is no evidence of a groundwater plume or continuing source of contamination within WCIA groundwater. Both USEPA Region III and MDE agreed with this conclusion and indicated there is no need for a groundwater evaluation in the human health risk assessment.

The following is a brief but comprehensive overview of historical use and an assessment of contamination for the potential source areas at each site within the WCIA. The sites are grouped within their respective cluster and AEDB-R number. Figures 4 and 5 depict the RI soil and surface water/sediment sampling locations associated with the WCIA.



**INSET 2**  
SCALE: 1" = 150'

COB-SS-12  
E  
COB-SS-13A  
COB-SS-14  
COB-SS-07

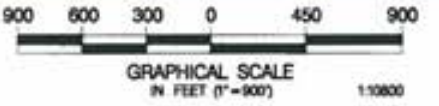
**INSET 1**  
SCALE: 1" = 150'

**INSET 3**  
SCALE: 1" = 150'

WC-SS-48  
WC-SS-49  
WC-SS-44

**SITE KEY**

- A K-FIELD TRAINING AREA 1
- B G-FIELD REAL TIME ANALYTICAL PLATFORM GARAGE
- C G-FIELD BUNKER SITES
- D G-FIELD CONTAINER DUMP SITE
- E G-FIELD IMPACT AREA NORTH
- F 'GOAT YARD' STORAGE AREA
- G K-FIELD PISTOL RANGE
- H MARSH DUMP SITES
- I BUILDING E1421 FORMER SUPPLY WELL AND ASSOCIATED HOLDING TANK
- J G-FIELD FORMER DRUM DISPOSAL SITE
- K G-FIELD WASTEWATER TREATMENT SYSTEM
- L G-FIELD WEAPONS ASSEMBLY PLANT

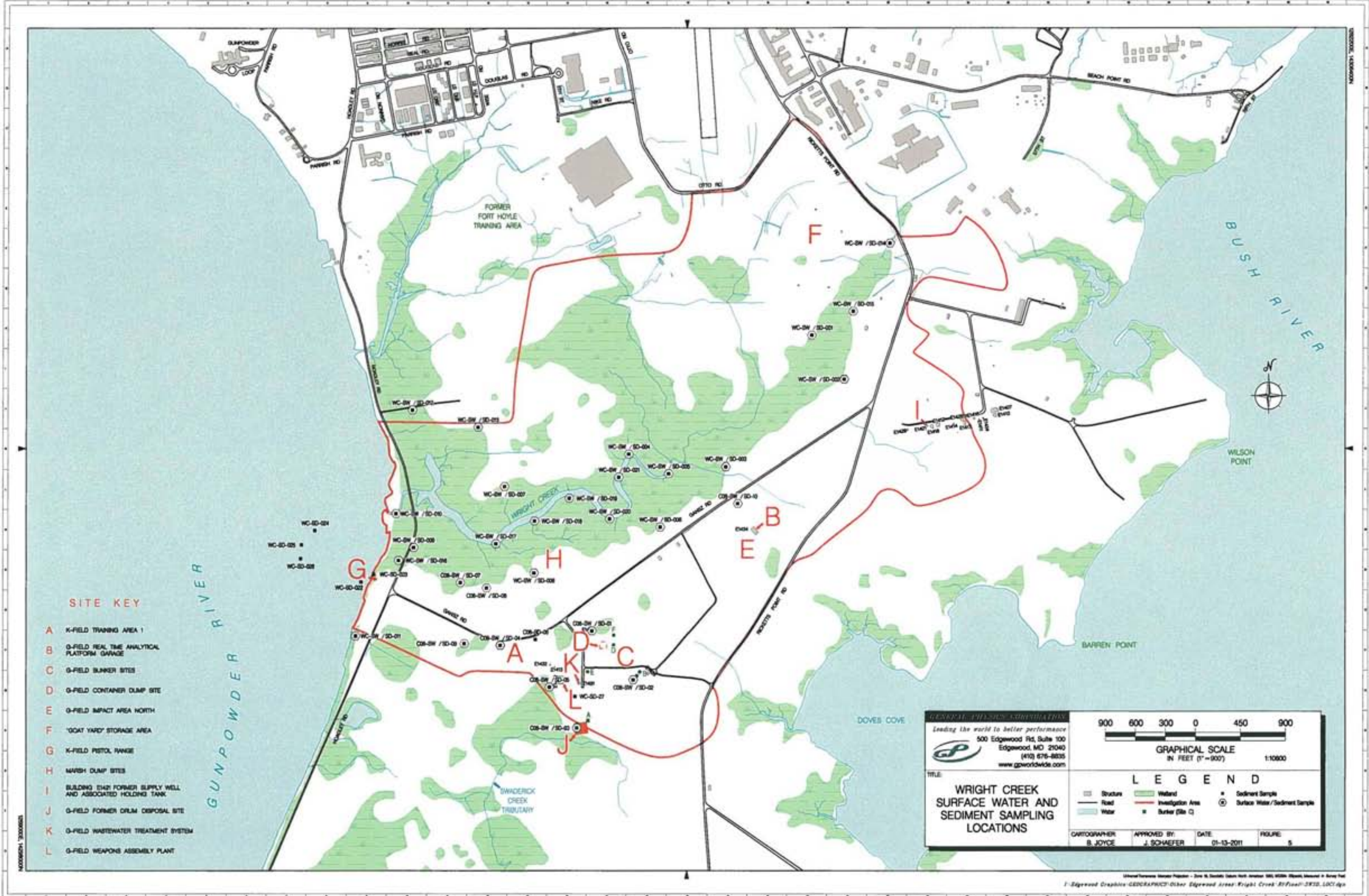


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**LEGEND**

- Structure
- Road
- Water
- Investigation Area
- Bunker (Site C)
- Island
- XRF Survey Point
- Phase I Surface Soil Sample

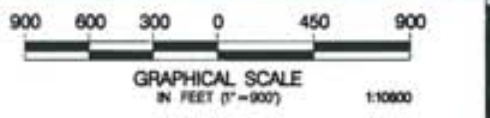
GEOGRAPHER: B. JOYCE    APPROVED BY: J. SCHAEFER    DATE: 01-13-2011    FIGURE: 4



**SITE KEY**

- A K-FIELD TRAINING AREA 1
- B G-FIELD REAL TIME ANALYTICAL PLATFORM GARAGE
- C G-FIELD BUNKER SITES
- D G-FIELD CONTAINER DUMP SITE
- E G-FIELD IMPACT AREA NORTH
- F "OAK YARD" STORAGE AREA
- G K-FIELD PISTOL RANGE
- H MARSH DUMP SITES
- I BUILDING 2142 FORMER SUPPLY WELL AND ASSOCIATED HOLDING TANK
- J G-FIELD FORMER DRUM DISPOSAL SITE
- K G-FIELD WASTEWATER TREATMENT SYSTEM
- L G-FIELD WEAPONS ASSEMBLY PLANT

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**WRIGHT CREEK SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS**

LEGEND		

CARTOGRAPHER	APPROVED BY	DATE	FIGURE
B. JOYCE	J. SCHAEFER	01-13-2011	5

Universal Transverse Mercator Projection - Zone 18, Datum: North American 83, WGS 84, UTM, Measured in Meter Feet
   
 1-Edgewood Graphics GEOGRAPHICS-0188 Edgewood Area- Wright Creek 01/13/2011-01/13/2011

### AEDB-R No. EAOE08 Sites

**K-Field Training Area I (Figure 3 Site A):** The K-Field Training Area lies south of Gansz Road and Wright Creek, adjacent to the former K-Field Pistol Range. The U.S. Army used portions of the site centered in and on areas cleared of trees, for various types of chemical warfare training. Review of historical aerial photography indicates use of the area immediately south of Gansz Road and west of Building E1430 as early as 1941, continuing at least into the early 1960s. The site contains a small trench or open pit, probably dug with a bulldozer, immediately south of Gansz Road. This trench, appearing in aerial photographs taken in 1957, may have been used for chemical agent decontamination training activities. Small piles of slag lie near the trench. Field investigations completed at the training area found additional, larger excavations near the trench, which appear to be seasonal wetlands. Foxholes related to range activities have been observed in the area during field inspections.

Based on the site surface soil samples, the highest metal concentrations were aluminum at 17,500 milligram per kilogram (mg/kg) (background of 19,500 mg/kg) and barium at 137 mg/kg (background of 111 mg/kg), and iron at 33,100 mg/kg (background of 21,700 mg/kg) from C08-SS-09; and copper at 29.4 mg/kg (background of 19.3 mg/kg) and iron at 34,300 mg/kg at C08-SS-08. These metal concentrations in surface soil slightly exceed background values. Thioldiglycol was detected at 2,400 microgram per kilogram ( $\mu\text{g}/\text{kg}$ ) in WC-SS-021. In surface water location C08-SW-09 during round 2, 11 total metal concentrations exceeded background, but the dissolved surface water results, round 1 surface water results, and corresponding sediment results did not contain elevated metals. One explosive-related compound 3-nitrotoluene was detected in the round 1 sample at C08-SW-04; however, the corresponding sediment sample did not contain explosive-related compounds or other elevated compounds. As described above, there are only a limited amount of chemical detections from past contaminant releases or training activities that have been identified.

**G-Field Real Time Analytical Platform Garage (Figure 3 Site B):** The G-Field Real Time Analytical Platform Garage (referred to previously as the G-Field Decontamination Facility or Building E1434) is located 2,400 feet northeast of the Weapons Assembly Plant between Gansz Road and Ricketts Point Road in the northeastern portion of Cluster 8.

During construction of Building E1434 in the early 1990s, large quantities of UXO were discovered at the site. The nature and condition of ordnance items indicated that the materials were from impact at the site and items that had been discarded and buried in shallow excavations. The site may have been used as a firing point for the former Fort Hoyle (located adjacent to the northern boundary of the WCIA, within the OEA Gun Club Creek Investigation Area) training operations, with unserviceable and excess ordnance materials disposed of near the firing position. The Fort Hoyle and G-Field range activities were performed largely using ordnance with smoke and tear gas fills, with less extensive use of toxic chemical ordnance/agents such as mustard and phosgene. The ordnance materials found at the site were consistent with historical operations; most items found or removed had white phosphorus or other smoke fills. However, during RI activities a high confidence mustard Livens projectile was recovered from the Training



#### Areas.

Based on the site surface soil samples, only the SVOC bis(2-ethylhexylphthalate was detected at 53 µg/kg in C08-SS-20. This compound does not have Biological Technical Assistance Group (BTAG) screening criteria, but an RSL industrial value of 120,000 µg/kg. Down gradient surface water sample C08-SW-10 in round 1 contained delta-BHC at 0.026 µg/kg, which is below the BTAG criteria of 141 µg/kg. No explosive-related compounds or chemical agent degradation compounds were detected. No chemical detections from past contaminant releases, UXO, or training activities have been identified.

**G-Field Bunker Sites (Figure 3 Site C):** The G-Field Bunkers are located in the eastern portion of Cluster 8 just west of Ricketts Point Road. Six bunkers, designated "A" through "F", were constructed for testing or training purposes in G-Field. Bunker A is located adjacent to the former G-Field Drum Disposal Site, south of the G-Field Weapons Assembly Plant E1430. Bunker A is a concrete structure measuring eight feet by eight feet and is partially collapsed. Around the perimeter of the structure are trenches, mounds, and areas of disturbed soil. This area measures 57 feet by 25 feet. Historical engineering plans from 1943 give the construction details of four bunkers (two are Bunkers D and E) and a site location map of the bunkers. The notation "present bunker" was located in the area of Bunker A. From this information it is assumed that the construction of Bunker A predates 1943.

Bunkers B and C are concrete pillbox structures and are 50 feet apart in distance. Bunkers B and C measure eight feet by eight feet, stand roughly 3.6 feet above ground surface, and extend at least two feet below ground surface (bgs). Bunker B, which is farthest east, is partially collapsed. UXO items and vacuum tubes have been observed inside Bunker B. During site visits to Bunker C, two to three feet of standing water has been observed inside the bunker.

Bunker D is located to the east of the G-Field Bomb Casing Dump Site. Historical engineering plans dated August 3, 1943 depicted Bunker D as a Japanese style Type B Log Bunker. Bunker D collapsed and a mound of soil measuring 28 feet by 34 feet remained until potentially contaminated material was recently removed. Two logs were partially visible through the soil on the surface.

Bunker E was located to the east of the G-Field Weapons Assembly Plant and was also known as the G-Field Drum and Trench Site. Bunker E was a drum-lined Japanese style Type A bunker. The Bunker was formed by approximately 20 soil-filled drums in the upright position, one tier in height. The depth of the inside trench was approximately 3 to 3.5 feet bgs and measured approximately 43 feet by 50 feet. During site characterization activities in February 2007, the drums were removed and Bunker E was graded to ground level.

Bunker F was an earthen bunker located approximately 150 feet north of Bunker D and measured 10 feet by 20 feet. Bunker F collapsed and information is scarce regarding its construction. It is assumed that Bunker F was constructed after 1943 since it was not identified on the map detailing the locations of Bunkers D and E.

Based on site surface soil results, the pesticide endosulfan sulfate was detected. The highest endosulfan sulfate detection was 14 µg/kg at C08-SS-13A in Bunker E. There is no BTAG criteria for endosulfan sulfate. Mercury concentrations (highest at 0.21 mg/Kg at C08-SS-01 near Bunker C) were above BTAG criteria (0.058 µg/kg), but below background (1.2 µg/kg). Down gradient surface soils at WC-SS-023, -026, and -027, and surface water and sediment at C08-SW/SD-02 in Bunker C did not contain contaminants above criteria. No explosive-related compounds or chemical agent degradation compounds were detected. No chemical detections from past contaminant releases, UXO, or training activities have been identified.

**G-Field Container Dump Site (Figure 3 Site D):** The G-Field Container Dump Site (formerly referred to as the G-Field Bomb Casing Disposal Site) was located in central G-Field, south of Wright Creek and Gansz Road and northeast of the G-Field Weapons Assembly Plant. Identified during field investigations, this site contained 15 to 20 deteriorating 25-gallon metal containers (possibly holding containers for munitions) scattered on the ground surface. Rocket pieces were also observed to be mixed in with the containers. There is no specific information concerning the use of this site for disposal; however, this material may be associated with the historical testing activities at the G-Field Impact Area to the north or operations at the Weapons Assembly Plant. During site characterization activities in October 2007, the containers and rocket pieces were removed from the site.

Surface soil sample OEA-GF-SO1 taken beneath several of the metal containers contained cadmium at 3.2 mg/kg (BTAG value of 0.36 mg/kg and background of 1.4 mg/kg) and zinc at 496 mg/kg (BTAG value of 46 mg/kg and background of 81.9 mg/kg). Although the cadmium and zinc levels in this soil sample were above RI screening criteria, the levels were not above the screening toxicity levels. Therefore, the metals were not retained as chemicals of potential concern (COPCs) in the risk assessment process. The highest heptachlor epoxide detection was 0.27 µg/kg at C08-SS-16. The BTAG value for heptachlor epoxide is 100 µg/kg. Down gradient surface water sample C08-SW-01 in round 2 contained total mercury at 0.27 µg/L (BTAG value of 0.026 µg/L and background of 0.66 µg/L). The corresponding sediment sample C08-SD-01 did not contain elevated mercury or other metals. No explosive-related compounds or chemical agent degradation compounds were detected.

**G-Field Impact Area North (Figure 3 Site E):** The northern portion of the G-Field Impact Area lies south of Wright Creek, between Gansz and Ricketts Point Roads. The U.S. Army used the G-Field area primarily as an impact area since World War I, mostly for test programs, with some training. Much of the training that occurred in the area during WWI would have involved the use of chemical warfare agents. Munitions fired into the area would have been primarily high explosive, smoke, riot control, and incendiary types, but some lethal agent-filled munitions may have been fired into the area during the 1920s and 1930s.

Surface soil sample WC-SS-015 contained diethyl phthalate at 920 µg/kg (no BTAG criteria and background of 260 µg/kg), and copper at 35.1 mg/kg (BTAG value of 28 mg/kg and background of 19.3 mg/kg). Other surface soil samples WC-SS-010, -012, -014, -013, -023,

--024, -025, -026, and -027 did not contain contaminants above criteria. Down gradient surface water samples WC-SW-002, -003, and -006 contained seven elevated total metals concentrations, which are attributed to elevated turbidity. The majority of the filtered samples did not contain elevated dissolved metals. The corresponding sediment samples did not contain elevated metal concentrations.

**"Goat Yard" Storage Area (Figure 3 Site F):** The "Goat Yard" Storage Area is located within the northeastern portion of the WCIA. The storage area, accessible by Ricketts Point Road, consists of 13 bunkers, with nine bunkers (labeled E3460, E3462, E3464, E3466, E3468, E3470, E3472, E3474, and E3476) forming a circle around an inner circle of four bunkers (E3480, E3482, E3484, and E3486). The Edgewood Area RFA describes the bunkers as magazine igloos built in 1942 (USAEHA, 1989). Little documentation exists regarding the types of materials stored within these structures. These bunkers would have been used to store explosives, chemical agents, and possibly chemical warfare materiel in support of field range testing and training activities. Chemical releases at this site would have occurred near entryways to the bunker where material handling operations were conducted.

Surface soil sample WC-SS-002 contained eight SVOCs, which were predominantly polycyclic aromatic hydrocarbons (PAHs). Surface soil samples WC-SS-001, -003, and -029 did not contain SVOCs, and samples WC-SS-004 and -028 did not contain contaminants above criteria. Thiodiglycol was detected at 2,970 µg/kg in WC-SS-003. Nitrobenzene was detected at 67 µg/kg in WC-SS-001.

**Marsh Dump Areas (Figure 3 Site H):** Small areas of waste lie within the marshes bordering Wright Creek. These sites are small-scale (less than 10 feet square) and likely the result of past range activities, including training and testing associated with G- and K-Field ordnance impact areas. The Marsh Dump Sites were likely used for shallow burial or surface dumping of small quantities of junk (e.g., drums, cans, etc.) and possibly chemical warfare materiel and ordnance.

Five surface soil samples (C08-SS-23, -24, -25, -26, and -27) were collected near these dump sites. Sample C08-SS-24 contained diethyl phthalate at 87 µg/kg and di-n-butylphthalate at 81.7 µg/kg. Both of these compounds do not have BTAG criteria and the background value for diethyl phthalate is 260 µg/kg. During one sampling round, p-chloromethylsulfone was detected in surface water at C08-SW-07 and -08. Thiodiglycol was detected in sediment at C08-SD-07 and -08. Up gradient surface soil samples did not contain these compounds. Sample C08-SS-23 contained aluminum at 19,500 mg/kg (background of 19,500 mg/kg), arsenic at 6.32 mg/kg (background of 7.6 mg/kg), and lead at 134 mg/kg (background of 60.1 mg/kg). Down gradient surface water samples (C08-SW-07, C08-SW-08, and WC-SW-008) contained total lead above background (19.7 µg/L). The highest total lead concentration was 88.1 µg/L at WC-SW-09. These total lead concentrations are attributed to turbidity because of elevated total dissolved solids and total suspended solids, and no dissolved lead was detected. Only one sediment sampling location (C08-SD-07) contained lead at 162 mg/kg with its corresponding surface water sample (C08-SW-07) of total lead at 34.9 µg/L during one round.

**Building E1421 Former Supply Well and Associated Holding Tank (EAOE08 – Figure 3 Site I):** There is an old supply well located within Building E1421. Access to water in this well is restricted by the presence of a rusted metal impeller pump system. The last date of use is unknown, but suspected as over 20 years ago. A records review identified the well to be 196 feet deep, which would mean that it would be receiving groundwater in a confined aquifer that is unrelated to the groundwater-bearing sands identified in the WCIA. The Army plans to keep the well for possible future needs. If the well is no longer needed, MDE approval will be obtained and the well will be properly abandoned in accordance with Code of Maryland Regulations.

**G-Field Former Drum Disposal Site (Figure 3 Site J):** The G-Field Drum Disposal Site lies on the western edge of central G-Field, approximately 400 feet southeast of Building 1430. The site contained a concrete pad or demolished building floor that was approximately 12 feet wide and 25 feet long, with the long dimension oriented along a northeast-southwest line. The concrete is covered by a layer of dirt and decayed leaves, approximately one to two inches thick. The remains of a small, in-ground block structure, which was possibly a bunker, was located about 50 feet northeast of the concrete pad.

A shallow water-filled depression about one foot wide extended southwest from the west corner of the concrete pad to a point about 40 feet from the pad. This shallow depression was most likely an excavated feature from previous site use.

The RFA reported that approximately 50 drums were found within 50 feet of the concrete pad. Ten more drums were found about 100 feet south of the pad at the edge of a low-lying wet area that contained areas of standing water during wet periods. One to two dozen additional drums were found within a couple hundred yards of the concrete pad. The 55-gallon drums were severely corroded. Most of the drums had one end cut out, some had bulging ends, and some had holes that appeared to have been made by bullets or shrapnel. None of the drums contained chemical material or visible residue of chemical material, although a few contained a gravel mixture that did not appear to have originated at the site.

The age of the site is unknown, but interviews with personnel working at the G-Field Munitions Assembly Plant (during preparation of the RFA in 1989) indicated that the drum site was at least 20 years old. The nature of the site suggested it probably dated from World War II. The original use of the site with the concrete pad is unknown, although G-Field was mainly used as an impact area for test programs and some training. The drums may have been abandoned after test or training activities, or may have been hauled to the site for disposal or use in bunker construction that did not occur. In September 1992, a removal action was completed at the G-Field Drum Disposal Site to remove the drums.

Composite soil samples were collected at the site after completion of the 1992 Removal Action. The composite soil samples did not contain chemical warfare material and results indicated elevated beryllium with the highest concentration at 0.699 mg/kg. Two surface soil samples (C08-SS-05 and -06) were collected. Neither of the soil results contained elevated beryllium. The highest beryllium concentration was 0.34 mg/kg, which was below

the background value of 1.9 mg/kg and BTAG value of 21 mg/kg. The removal of the decomposed drums has eliminated any source of contamination. No impacts were detected in two surface soil samples and the down gradient surface water and sediment sample.

**G-Field Wastewater Treatment System (Figure 3 Site K):** The Wastewater Treatment System is located between the G-Field Weapons Assembly Plant and the G-Field Drum Disposal Site, south of Gansz Road. It served the support buildings of the G-Field Weapons Assembly Plant, although not the assembly plant, receiving wastewater from showers, toilets, sinks, a floor drain, and steam condensate. All the wastewater except the steam condensate was processed through the septic system. The system, no longer active, includes a 750-gallon septic tank and a subsurface discharge line that terminates at a headwall approximately 100 feet south of the septic tank.

Surface soil sample C08-SS-10 contained the pesticide endrin aldehyde at 1.4 µg/kg (no criteria) and heptachlor epoxide at 1.4 µg/kg (BTAG value of 100 µg/kg). A wastewater sample collected from the septic tank and sediment sample downgradient of the headwall did not contain contaminants above criteria.

**G-Field Weapons Assembly Plant (Figure 3 Site L):** The G-Field Weapons Assembly Plant is located in west-central G-Field, south of Wright Creek and Gansz Road, and is still an active facility. This facility is a small, active plant constructed in 1955 where munitions such as rockets and projectiles were assembled for later use in testing programs. The Plant Complex includes the Assembly Plant Building (Building E1430); a boiler, shower, and change house (Building E1431); a small shelter (Building E1432); and, several conex containers. The conex containers in the Building E1430 vicinity were used for munitions storage, but are not presently in service.

At one time, an x-ray machine<sup>1</sup> was used at the G-Field Weapons Assembly Plant to inspect munitions. During the mid- to late-1970s, the x-ray machine was stored at the end of the paved road leading to Building E1431. The x-ray machine leaked coolant fluid onto the ground at this location while waiting for pickup and disposal, not while in use. The quantity which leaked to the soil was approximately 10-20 gallons extending over a year's time. The type of coolant fluid used in the x-ray machine is not known and not radioactive, but given the time period it is likely that it contained PCBs. Potentially contaminated soil was not removed when the machine left the location. At the present time, there is no visible oil in the surface soil at the site. The x-ray machine is no longer used, nor stored, at the G-Field Weapons Assembly Plant. A fuel oil underground storage tank (UST) was located a short distance southeast of E1431. During the mid- or late-1970s, the fuel oil UST at Building 1431 developed a leak. The quantity of fuel oil released is unknown, but the soil around the tank was saturated with fuel oil. The fuel oil apparently migrated through the soil and into a surface drainage ditch immediately southwest of E1431. In the 1970s, the tank was removed and replaced. Approximately 20 cubic yards of soil containing fuel oil were also removed. The RFA reported an oil sheen in the drainage ditch, probably from continued minor seepage. In 1995, the replacement UST was removed.

<sup>1</sup> An x-ray machine does not contain radioactive material. The vacuum tube in an X-ray machine produces electromagnetic energy only when electronically turned on.

Small quantities of gasoline and diesel fuel were also stored in small cans for use in forklifts and mowers. The RFA reported that, at that time, no solvents were stored or used at the G-Field Weapons Assembly Plant. Past work at the G-Field Weapons Assembly Plant has involved very small amounts of solvents such as acetone and gun bore cleaner. There was no visual evidence of hazardous constituent release to the environment at the plant during previous site inspections. The historical use of small amounts of solvents at the plant is not likely to have generated liquid solvent waste. The only waste would have been rags used in cleaning activities, which were probably taken off-site along with other solid wastes generated by the facility.

Subsequent surface and subsurface soil samples collected at the location of the former x-ray machine in 1994 did not detect any PCBs. Located southeast of the Weapons Assembly Plant, the PCB aroclor 1260 was only detected in sediment sample C08-SD-05 at 9.3 µg/kg (BTAG value of 59.8 µg/kg and RSL industrial soil value of 1,400 µg/kg). The associated surface water samples and subsequent soil samples up gradient from this location did not contain PCBs. In the 1970s, a leaking fuel oil tank and contaminated soil was removed and replaced. In 1995, this replacement fuel tank was removed and an aboveground fuel storage tank was installed. There was no visible evidence of contaminated soil in 1998 or 2008.

#### AEDB-R No. EAOE51 Sites

**K-Field Pistol Range (Figure 3 Site G):** The K-Field Pistol Range lies along the Gunpowder River shoreline, south of Wright Creek and adjacent to the intersection of Hoadley and Gansz Roads. The range was established during World War II (circa 1940s) for training and recreational purposes, and was probably used until the 1960s or early 1970s. The firing at the range was oriented toward the Gunpowder River, with the designated target zone extending more than a mile into the river. Operations at the K-Field Pistol Range would have generated no wastes other than general refuse by the persons using the range. Expended rounds would have impacted in the Gunpowder River and in the soil in the range. Small quantities of gun cleaning materials with solvents would have been handled at the site. The site is flat and open with a small cluster of trees in the northern portion. Some of the site is underlain by concrete, and support buildings associated with the former range have been removed. Shoreline erosion has been observed at the site.

An x-ray fluorescence soil screening survey identified elevated metal concentrations in the northern part of the site and 12 surface soil samples were collected in this area. At WC-SS-018, 10 PAHs were detected, and six of the concentrations were detected above BTAG criteria and background values. Twenty feet south of WC-SS-018, sample WC-SS-035 contained the PAH chrysene above BTAG criteria and background values. The highest DDT compounds were also detected above criteria in surface soil sample WC-SS-018 and WC-SS-035. Sample WC-SS-018 also contained thiodiglycol at 1,100 µg/kg. Lead concentrations also exceeded the BTAG screening value and background in surface soil at five locations (WC-SS-018, -035, -037, -038, and -040) (maximum detected concentration of 743 mg/kg). Also within the northern area surface soil, barium at two locations exceeded background values, while copper at three locations and zinc at two locations exceeded BTAG criteria and background values. Down gradient sediment

samples did not detect contaminants above criteria. No spent bullets or ammunition rounds were discovered. The sampling results indicate that localized PAH, DDT<sub>r</sub>, and metal contamination lies within the northern portion of the K-Field Pistol Range within less than ¼ acre area.

### Unnumbered Sites

**Northeastern G-Field and F-Field Testing and Training Areas:** F- and G-Fields are located at the northern end of the OEA (Figure 3), southeast of the plant and laboratory areas of the Edgewood Area of APG. F-Field encompasses the intersection of Gansz and Ricketts Point Road, and includes areas south of Beach Point Road. The northeastern portion of G-Field is adjacent to Ricketts Point Road, immediately east of the upper reaches of Wright Creek. A small portion of northeastern G-Field also lies between Gansz and Ricketts Point Roads. F-Field was used extensively in the early-1920s, and possibly as early as World War I. Aerial photographs suggest that F-Field was used as a firing point for short range artillery and mortar fire into G-Field. F-Field was also used as a training area for troops in the 1920s and 1930s. From the World War II era through the early 1970s, F-Field was used primarily for flame-thrower testing.

Six surface soil samples (WC-SS-009, -011, -012, -015, -032, and -033) within C-, F-, and G-Fields contained thiodiglycol ranging from 1,100 to 3,970 µg/kg. Down gradient surface water and sediment samples WC-SW/SD-002, -003, and -006 did not contain thiodiglycol. No explosive-related compounds were detected.

## 6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

The U.S. Army currently uses the Edgewood Area for military/industrial land use activities. According to the APG Real Property Master Plan, current and planned future use of the WCIA is military/industrial.

APG lies adjacent to the Chesapeake Bay, approximately 20 miles northeast of Baltimore, Maryland, with most of the installation lying within Harford County. Major rail and road corridors run through southern Harford County. Major road corridors include U.S. Interstate 95, U.S. Route 40, Maryland Route 7, and Maryland Route 24. Extensive passenger and cargo rail traffic travels on the Amtrak and Conrail lines that run northeast to southwest along the APG installation boundary.

Land use surrounding APG is a mix of commercial and residential use, but also includes some agricultural use. Industry is most concentrated along Route 40. Primary population centers within eight miles of the Edgewood Area include the communities of Joppatowne/Magnolia (population 11,391); Edgewood (population 23,378); and Bel Air (population 75,523). Smaller communities surrounding the Edgewood Area include Abingdon, Belcamp, Chase, and Van Bibber. The 2009 population of Harford County was 242,514 ([www.census.gov](http://www.census.gov)).

APG has substantial workforce and military-residential populations. The APG workforce numbers approximately 18,000 people and is projected to reach approximately 22,000 by 2012. Approximately 2,000 military dependents reside at APG. In the Edgewood Area, the

workforce and residential areas are concentrated in the northern portion of the facility. As part of the "APG 2012 Transformation" Program, improvements will be made to infrastructure, facilities, and services at APG over the next few years. Several facilities, including the new U.S. Army Medical Research Institute of Chemical Defense Campus, are being constructed within the Edgewood Area as part of this program and in response to Base Realignment and Closure (BRAC) activities. Enhanced use leasing options are also being considered for parcels adjacent to the northern boundary of the Edgewood Area, by the Maryland Department of Transportation and Northeast Maryland Waste Disposal Authority. Currently, there are no plans for BRAC development within the WCIA.

Recreational activities on the Edgewood Area include hunting, trapping, shoreline fishing and crabbing, boating, sports and picnicing. Recreational sites are used by active and retired military personnel and families, as well as civilians. The water areas of the Gunpowder and Bush Rivers adjacent to the Gunpowder Neck are used extensively by recreational boaters. Numerous boat ramps and marinas provide access to the Gunpowder and Bush Rivers. The waters of APG support both commercial and recreational fishing. Boat traffic within the installation boundaries is restricted by range control during firing exercises and enforced by APG patrol boats. There are no designated recreational areas within the WCIA. The Army has posted no trespassing signs on shorelines informing potential trespassers of UXO dangers. Access to the area is limited to properly cleared personnel or individuals in an escorted capacity. A wide variety of physical security countermeasures, including barrier systems, sensors and random patrols by law enforcement personnel, are in place to prevent unauthorized access.

## **7 SUMMARY OF SITE RISKS**

### **7.1 Human Health**

The purpose of the Human Health Risk Assessment (HHRA) is to determine whether exposure to site-related contaminants could adversely affect human health. The HHRA estimates risks the site would pose under current or potential future use conditions if no remedial action were taken. The risk is expressed as the lifetime excess cancer risk (LECR) for carcinogens, and Hazard Index (HI) for non-cancer adverse health effects.

The HHRA was performed for both current and anticipated future land-use scenarios (i.e., military/industrial) at the WCIA. Since APG is an active military installation, site workers (maintenance and commercial), construction (excavation) workers, and potential trespassers (adolescent) were evaluated as people who may reasonably be exposed to site contaminants. Hypothetical future resident scenarios (adult and child) were evaluated for planning purposes only. Since RI data quality objectives were developed based on future military/industrial land usage, the number and spatial distribution of environmental samples while appropriate for that land use, are not sufficient to conclude that there are not unidentified hot spot areas that could pose risk to hypothetical future residents.

Evaluated receptor exposure routes included ingestion and absorption through the skin of chemical contaminants present in area surface soil, sediment, and surface water, along with inhalation of chemical contaminants present in area surface soil. Using receptor



exposure routes, exposure point concentrations, and chemical toxicity data, LECRs for carcinogenic chemicals and HI values for chemicals having non-carcinogenic effects were estimated. The acceptable range for the LECR is from  $1E-06$  to  $1E-04$ . An LECR of  $1E-06$  represents the probability that one person will contract cancer as a result of exposure to site related contaminants in a population of one million people exposed. An LECR of  $1E-04$  represents the probability that one person in ten thousand exposed individuals will contract cancer as a result of exposure to site-related contaminants.

A Hazard Quotient (HQ) is derived for each contaminant by comparing the anticipated level of exposure or dose to a receptor to the reference dose for that exposure scenario at which no adverse health effects occur. The HQs for all contaminants affecting a given exposure route or organ are summed to give the HI. The estimated non-cancer HI values are then compared to a value of 1.0 to determine whether any non-cancer effects are anticipated from exposure to site contaminants. An HI value above 1.0 indicates a potential for adverse health effects.

Conclusions from the *Baseline Human Health Risk Assessment for the Wright Creek Investigation Area* (EA Engineering & Science [EA], 2008a) for exposure to site-wide surface soil, sediment, and surface water under current and future land use conditions are provided in Tables 1 and 2.

Under current and future land-use conditions, the cumulative LECR for adolescent trespassers based on exposures to surface soil, sediment, and surface water is  $1.9E-06$ . The carcinogenic risk for exposure to surface soil is  $2.5E-07$ , for exposure to surface water is  $1.6E-07$ , and for exposure to sediment is  $1.5E-06$ . The cumulative non-cancer HI for the adolescent trespasser is 0.1. The total non-cancer HI for the adolescent trespasser exposure to surface soil is 0.01, for exposure to surface water is 0.08, and for exposure to sediment is 0.04.

For the maintenance worker, the cumulative LECR is  $7.1E-07$  under current and future land-use conditions based on exposures to surface soil, sediment, and surface water. The carcinogenic risk for exposure to surface soil is  $2.4E-07$ , for exposure to surface water is  $7.7E-08$ , and for exposure to sediment is  $3.9E-07$ . The cumulative non-cancer HI for the maintenance worker is 0.03. The total non-cancer HI for exposure to surface soil is 0.006, for exposure to surface water is 0.02, and for exposure to sediment is 0.04.

Under future land-use conditions, the cumulative LECR for commercial workers based on exposure to surface soil is  $1.2E-06$ . The cumulative non-cancer HI for the commercial worker is 0.03. The cumulative LECR and HI for the construction worker (based on exposure to surface soil) under future-land use conditions are  $3.4E-07$  and 0.3, respectively.

For the hypothetical future resident (adult and child combined), the cumulative LECR from exposure to surface soil, surface water, and sediment is  $1.7E-05$ . The hypothetical future resident exposure to surface soil, surface water, and sediment carcinogenic risk are  $1.5E-05$ ,  $6.1E-07$ , and  $1.8E-06$ , respectively. The cumulative non-cancer HI for the hypothetical future resident child is 1.6. The total non-cancer HI for exposure to surface

**Table 1. Summary of Risks Associated with Exposures in the WCIA Under Current and Future Land Use Conditions**

Adolescent Trespasser Receptor/Pathway	Cancer Risk (LECR)	Predominant Chemicals	Non-Cancer (HI)	Predominant Chemicals
<b>Surface Soil:</b>				
Incidental Ingestion	1.4E-07	Arsenic	<1 (1.4E-02)	Iron
Dermal Contact	1.1E-07	Benzo[a]pyrene	<1 (5.9E-04)	Arsenic
Inhalation	4.4E-10	Chromium	<1 (1E-04)	Manganese
<b>Total</b>	<b>2.5E-07</b>		<b>&lt;1 (1.5E-02)</b>	
<b>Surface Water:</b>				
Incidental Ingestion	1.3E-07	Arsenic	<1 (3.4E-02)	Iron
Dermal Contact	2.6E-08	Arsenic	<1 (4.2E-02)	Vanadium
Inhalation	--	NA	--	NA
<b>Total</b>	<b>1.6E-07</b>		<b>&lt;1 (7.6E-02)</b>	
<b>Sediment:</b>				
Incidental Ingestion	2.3E-07	Arsenic	<1 (1.5E-02)	Iron
Dermal Contact	1.3E-06	Arsenic	<1 (2.4E-02)	Arsenic
Inhalation	--	NA	--	NA
<b>Total</b>	<b>1.5E-06</b>		<b>&lt;1 (4.0E-02)</b>	
<b>Total Risk/Hazard Index Across All Media and All Exposure Routes</b>	<b>1.9E-06</b>		<b>&lt;1 (1.3E-01)</b>	

NA Not applicable

**Table 1. Summary of Risks Associated with Exposures in the WCIA Under Current and Future Land Use Conditions (continued)**

Maintenance Worker Receptor/Pathway	Cancer Risk (LECR)	Predominant Chemicals	Non-Cancer (HI)	Predominant Chemicals
<b>Surface Soil:</b>				
Incidental Ingestion	1.7E-07	Arsenic	<1 (5.4E-03)	Iron
Dermal Contact	6.7E-08	Arsenic	<1 (4.2E-04)	Arsenic
Inhalation	5.1E-10	Arsenic	--	NA
<b>Total</b>	<b>2.4E-07</b>		<b>&lt;1 (5.9E-03)</b>	
<b>Surface Water:</b>				
Incidental Ingestion	5.2E-08	Arsenic	<1 (4.2E-03)	Iron
Dermal Contact	2.5E-08	Arsenic	<1 (1.3E-02)	Vanadium
Inhalation	--	NA	--	NA
<b>Total</b>	<b>7.7E-08</b>		<b>&lt;1 (1.7E-02)</b>	
<b>Sediment:</b>				
Incidental Ingestion	2.2E-07	Arsenic	<1 (1.4E-03)	Arsenic
Dermal Contact	1.7E-07	Arsenic	<1 (1.1E-03)	Arsenic
Inhalation	--	NA	--	NA
<b>Total</b>	<b>3.9E-07</b>		<b>&lt;1 (4.0E-02)</b>	
<b>Total Risk/Hazard Index Across All Media and All Exposure Routes</b>	<b>7.1E-07</b>		<b>&lt;1 (2.5E-02)</b>	

NA Not applicable

**Table 2. Summary of Risks Associated with Exposures in the WCIA  
 Under Future Land Use Conditions**

Commercial Worker Receptor/Pathway	Cancer Risk (LECR)	Predominant Chemicals	Non-Cancer (HI)	Predominant Chemicals
<b>Surface Soil:</b>				
Incidental Ingestion	8.4E-07	Arsenic	<1 (2.7E-02)	Iron
Dermal Contact	3.3E-07	Arsenic	<1 (2.1E-03)	Arsenic
Inhalation	8.6E-10	Arsenic	--	NA
<i>Total</i>	<i>1.2E-06</i>		<i>&lt;1(2.9E-02)</i>	
<b>Total Risk/Hazard Index Across All Media and All Exposure Routes</b>	<i>1.2E-06</i>		<i>&lt;1 (2.9E-02)</i>	

NA Not applicable

**Table 2. Summary of Risks Associated with Exposures in the WCIA  
 Under Future Land Use Conditions (continued)**

Construction Worker Receptor/Pathway	Cancer Risk (LECR)	Predominant Chemicals	Non-Cancer (HI)	Predominant Chemicals
<b>Surface Soil:</b>				
Incidental Ingestion	3.2E-07	Arsenic	<1 (2.6E-01)	Iron
Dermal Contact	2.0E-08	Arsenic	<1 (3.1E-03)	Arsenic
Inhalation	2.0E-10	Arsenic	--	NA
<i>Total</i>	<i>3.4E-07</i>		<i>&lt;1(2.6E-01)</i>	
<b>Total Risk/Hazard Index Across All Media and All Exposure Routes</b>	<i>3.4E-07</i>		<i>&lt;1 (2.6E-01)</i>	

NA Not applicable

**Table 2. Summary of Risks Associated with Exposures in the WCIA  
 Under Future Land Use Conditions (continued)**

Resident (Adult & Child) Receptor/Pathway	Cancer Risk (LECR)	Predominant Chemicals	Non- Cancer (HI)	Predominant Chemicals
<b>Surface Soil (Child):</b>				
Incidental Ingestion	8.5E-06	Arsenic	1.1	Iron
Dermal Contact	1.6E-06	Benzo[a]pyrene	<1 (1.2E-02)	Arsenic
Inhalation	2.2E-08	Chromium, Total	<1 (6.9E-03)	Manganese
<b>Total for Child</b>	<b>1.0E-05</b>		<b>1.2</b>	
<b>Surface Soil (Adult):</b>				
Incidental Ingestion	3.7E-06	Arsenic	<1 (1.2E-01)	Iron
Dermal Contact	9.9E-07	Benzo[a]pyrene	<1 (1.8E-03)	Vanadium
Inhalation	4.5E-08	Chromium, Total	<1 (3.5E-03)	Manganese
<b>Total for Adult</b>	<b>4.6E-06</b>		<b>&lt;1 (1.3E-01)</b>	
<b>Surface Soil (Adult + Child):</b>				
Incidental Ingestion	1.2E-05	Arsenic		
Dermal Contact	2.6E-06	Benzo[a]pyrene		
Inhalation	6.8E-08	Chromium, Total		
<b>Total for Adult + Child</b>	<b>1.5E-05</b>			
<b>Total Risk Across Surface Soil</b>	<b>1.5E-05</b>			
<b>Surface Water (Child):</b>				
Incidental Ingestion	1.2E-07	Arsenic	<1 (4.1E-02)	Iron
Dermal Contact	1.2E-07	Arsenic	<1 (2.5E-01)	Vanadium
Inhalation	--	NA	--	NA
<b>Total for Child</b>	<b>2.4E-07</b>		<b>&lt;1 (2.9E-01)</b>	
<b>Surface Water (Adult):</b>				
Incidental Ingestion	1.0E-07	Arsenic	<1 (8.7E-03)	Iron
Dermal Contact	2.7E-07	Arsenic	<1 (1.5E-01)	Vanadium
Inhalation	--	NA	--	NA
<b>Total for Adult</b>	<b>3.8E-07</b>		<b>&lt;1 (1.6E-01)</b>	
<b>Surface Water (Adult + Child):</b>				
Incidental Ingestion	2.2E-07	Arsenic		
Dermal Contact	3.9E-07	Arsenic		
Inhalation	--	NA		
<b>Total for Adult + Child</b>	<b>6.1E-07</b>			
<b>Total Risk Across Surface Water</b>	<b>6.1E-07</b>			
<b>Sediment (Child):</b>				
Incidental Ingestion	1.0E-06	Arsenic	<1 (9.0E-02)	Iron
Dermal Contact	2.6E-07	Arsenic	<1 (6.7E-03)	Arsenic
Inhalation	--	NA	--	NA
<b>Total for Child</b>	<b>1.3E-06</b>		<b>&lt;1 (9.7E-02)</b>	
<b>Sediment (Adult):</b>				
Incidental Ingestion	4.4E-07	Arsenic	<1 (9.7E-03)	Iron
Dermal Contact	1.0E-07	Arsenic	<1 (6.8E-04)	Arsenic
Inhalation	--	NA	--	NA
<b>Total for Adult</b>	<b>5.4E-07</b>		<b>&lt;1 (1.0E-02)</b>	
<b>Sediment (Adult + Child):</b>				
Incidental Ingestion	1.5E-06	Arsenic		
Dermal Contact	3.6E-07	Arsenic		
Inhalation	--	NA		
<b>Total for Adult + Child</b>	<b>1.8E-06</b>			
<b>Total Risk Across Sediment</b>	<b>1.8E-06</b>			
<b>Total Risk/Hazard Index Across All Media and All Exposure Routes</b>	<b>1.7E-05</b>		<b>1.6 (Child) &lt;1 (2.9E-01) (Adult)</b>	

soil is 1.2 (primarily due to exposure to iron), for exposure to surface water is 0.3 and for exposure to sediment is 0.1. No target organ-specific HI exceeds 1.0. Therefore, there are no non-cancer risk concerns for the hypothetical future resident child. The cumulative non-cancer HI for the hypothetical future resident adult is 0.3. The total non-cancer HI for exposure to surface soil is 0.1, for exposure to surface water is 0.2, and for exposure to sediment is 0.01.

For the WCIA, the calculated risks for all receptors (i.e., current/future adolescent trespasser, current/future maintenance worker, future construction worker, future commercial worker, and future resident adult and child) are within, or below, the established risk thresholds for carcinogens (1E-06 to 1E-04) and did not exceed the non-cancer HI threshold of 1.0 with respect to any target organ. There are no carcinogenic or non-carcinogenic risk concerns for any of the receptors. Lead modeling indicated that lead was not a concern in surface soil; however, there were elevated concentrations of lead in marsh surface water when compared to the lead drinking water action level. Therefore, the HHRA concluded that there were no concerns for potential receptors exposure to surface soil, surface water, and sediment at the WCIA, with the exception of marsh surface water if used as a drinking water source (EA, 2008a).

After the HHRA was finalized in early 2008, additional site characterization of potentially contaminated material was conducted at the WCIA. Sampling included the collection of one sediment sample to assess the potential for contamination at the discharge point for the G-Field Wastewater Treatment System (Figure 3, Site K), three surface soil samples to assess the potential for PCB contamination downgradient of the G-Field Weapons Assembly Plant (Figure 3, Site L), one soil sample from beneath a pile of munition-related debris at the G-Field Container Dump Site (Figure 3, Site D), and one soil sample from the G-Field Bunker Site "E" (Figure 3, Site C). A risk-based screening was conducted by comparing the maximum detected chemical concentrations in the surface soils to USEPA residential and industrial soil RSLs. Sediment concentrations were compared to the RSLs increased by a factor of ten to account for reduced sediment exposures. In accordance with USEPA guidance, RSL values used were those at a carcinogenic risk level of 1E-06 and a HQ of 0.1. Maximum detections of aluminum, arsenic, iron, and manganese exceeded the screening values and were identified as COPCs for residential exposures to surface soil. Only arsenic was identified as a COPC for industrial exposures to soil. For sediment, there were no COPCs identified. Streamlined risk estimates were then calculated. For both residential and industrial receptors, the HIs were below the target of 1.0. Carcinogenic risks were within the USEPA's established risk thresholds (1E-06 to 1E-04). Based on these results, the conclusions of the HHRA for the WCIA remain unchanged and no further risk evaluation is warranted based on projected future land use (industrial) (EA, 2008c).

## 7.2 Environment

The *Screening-Level Ecological Risk Assessment and Baseline Risk Assessment Problem Formulation for the Wright Creek Investigation Area* (EA, 2008b), evaluated all soil, sediment, and surface water samples in the WCIA as one data grouping in the ecological

risk assessment. The following potential receptors and exposure routes were identified for WCIA surface soil, sediment and surface water:

- Terrestrial Plants – direct contact (root uptake)
- Terrestrial Invertebrates (earthworms) – dermal contact and ingestion
- Small Herbivorous Mammals (meadow vole) – ingestion
- Invertebrate-Eating Birds (American robin) – ingestion
- Invertebrate-Eating Mammal (short-tailed shrew) – ingestion
- Higher Trophic Level Predatory Birds (red-tailed hawk) – ingestion
- Higher Trophic Level Predatory Mammals (red fox) – ingestion
- Benthic and Aquatic Organisms (multiple species) – direct contact with, respiration of, and ingestion of sediment and surface water
- Aquatic Organism-Eating Birds (great blue heron) – ingestion
- Aquatic Organism-Eating Mammals (mink) – ingestion

COPCs were selected based on a screening comparison of on-site concentrations to Region III Ecological Soil Screening Levels and BTAG values. Exposure concentrations for the COPCs were then compared to Toxicity Reference Values (TRVs).

No significant risk to ecological receptors was identified for the WCIA. The Baseline Risk Assessment Problem Formulation, Step 3, concluded that on-site concentrations of chemicals are unlikely to affect the assessment endpoints identified in Steps 1 and 2, the Screening-Level Ecological Risk Assessment, and that site-wide populations of the receptors of concern at the WCIA are unlikely to be at risk from on-site chemical exposures. No COPCs were retained for further investigation; however, the risk assessors noted that lead associated with historic small arms firing activities is present at elevated concentrations at the K-Field Pistol Range. The risk assessment also stated that although individual terrestrial plants and invertebrate-eating birds are potentially at risk from lead at the K-Field Pistol Range, the elevated concentrations in this limited area are unlikely to drive risks to the site wide populations of these receptors.

Therefore, Steps 1-3 of the ecological risk assessment process provided enough information to warrant no further assessment of potential ecological risks at the WCIA and to determine that completion of Steps 4-7 was not necessary.

## 8 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 by reducing the concentration level of contamination.

The RAO for the WCIA is to prevent unacceptable risk to future residential receptors through exposure to site-related contaminants.

## 9 DESCRIPTION OF ALTERNATIVES

A summary description of remedial alternatives evaluated during the FFS is presented below. For the WCIA, only one remedial alternative (Alternative 2 – LUCs) was developed and retained for further evaluation and comparison with the No Action alternative (Alternative 1), given the limited hypothetical risk posed by the WCIA, the well-defined future use of the sites, and the ability of the Army to control access to the WCIA. For purposes of cost comparison, project duration of 30 years is assumed for both alternatives. However, LUCs are expected to be maintained in perpetuity or until contaminant levels are reduced to levels that allow for unlimited use and unrestricted exposure.

### 9.1 Alternative 1: No Action

The NCP requires consideration of “No Action”, as a baseline with which to compare other alternatives (40 Code of Federal Regulations 300.430(e)(6)). Under this alternative, no active remedial measures would be taken to control risks to hypothetical future residents; treat or remove wastes; or reduce the toxicity, mobility, or volume of contaminated media. LUCs would not be implemented and existing restrictions may not continue.

<i>Estimated Capital Cost:</i>	<i>\$0</i>
<i>CERCLA Five-Year Review:</i>	<i>\$0</i>
<i>Estimated Total Present Worth Cost:</i>	<i>\$0</i>
<i>Estimated O&amp;M Timeframe:</i>	<i>None</i>
<i>Estimated Time to Achieve RAOs:</i>	<i>Will not achieve</i>

### 9.2 Alternative 2: LUCs

This alternative involves implementation of LUCs that would be used to limit exposure to those areas where contaminant levels would not allow for unrestricted use. Modifications would be made to the Installation Master Plan and GIS Overlay Maps in order to prevent housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land uses within the entire WCIA.

Because the potential presence of UXO will still exist at the WCIA, existing Installation safety procedures and policies related to UXO would be followed for any soil disturbances at the WCIA in the future. This is to ensure adequate protection of workers and military personnel at the WCIA. CERCLA 121(c) Five-Year Reviews would also be

performed to evaluate the long-term effectiveness of the remedy. LUCs, as described above, will be implemented at the WCIA unless and until further sampling conducted at a spacing designed to assess risks associated with residential land use indicates that there are no unacceptable human risks associated with unlimited use of and unrestricted exposure to the site.

<i>Estimated Capital Cost:</i>	<i>\$11,500</i>
<i>Estimated O&amp;M Cost:</i>	<i>\$3,050</i>
<i>CERCLA Five-Year Review:</i>	<i>\$15,000</i>
<i>Estimated Total Present Worth Cost:</i>	<i>\$193,000</i>
<i>Estimated O&amp;M/LTM Timeframe:</i>	<i>30 Years</i>
<i>Estimated Time to Achieve RAOs:</i>	<i>6 Months</i>

## **10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**

The following is a comparative analysis of the remedial alternatives considered for the WCIA. The potential performance of each alternative was evaluated in terms of the evaluation criteria required by the NCP. The nine criteria are categorized into one of three groups: threshold criteria, primary balancing criteria, and modifying criteria (Table 3).

### **10.1 Overall Protection of Human Health and the Environment**

The "LUCs" (Alternative 2) does, and "No Action" (Alternative 1) does not, prevent future residential exposure to contaminants present at the site. The ecological risk assessment identified no unacceptable current or future ecological risks. Since Alternative 1 does not meet this threshold criterion it is not considered further in this evaluation.

### **10.2 Compliance with Applicable or Relevant and Appropriate Requirements**

No chemical-, location-, or action-specific ARARs are associated with the implementation of Alternative 2.

### **10.3 Long-Term Effectiveness and Permanence**

Alternative 2 would provide adequate long-term effectiveness in protecting human health. However, LUCs require ongoing maintenance and enforcement to remain effective.

### **10.4 Reduction of Toxicity, Mobility, or Volume through Treatment**

Alternative 2 does not provide for reduction of toxicity, mobility or volume through treatment because no wastes or contaminated media were identified that required treatment.



**Table 3. Remedial Alternative Evaluation Criteria**

Threshold Criteria:

- *Overall Protection of Human Health and the Environment* refers to whether a remedy provides adequate protection against harmful effects. It calls for consideration of how human health or environmental risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- *Compliance with Applicable or Relevant and Appropriate Requirements* addresses whether a remedy meets all the applicable or relevant and appropriate requirements of federal and state environmental statutes.

Primary Balancing Criteria:

- *Long-Term Effectiveness and Permanence* refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment after cleanup goals have been met.
- *Reduction of Toxicity, Mobility, or Volume through Treatment* refers to the effectiveness of the treatment technologies in reducing the toxicity, mobility, or volume of contaminants.
- *Short-Term Effectiveness* refers to the speed with which the remedy achieves protection and to the remedy's potential during construction and implementation to have adverse effects on human health and the environment.
- *Implementability* refers to the technical and administrative feasibility of a remedy, including the availability of required materials and services.
- *Cost* includes capital expenditures and operation and maintenance costs.

Modifying Criteria:

- *State Acceptance* indicates whether the state concurs with, opposes, or has no comment on the preferred alternative based on its review of the RI/FS Reports, Proposed Plan, and public comments.
- *Community Acceptance* is documented in the ROD following consideration of public comments on the Proposed Plan.

## **10.5 Short-Term Effectiveness**

Alternative 2 does not involve construction activities that endanger public communities or remedial workers, or adversely impact the environment. The RAO would be achieved quickly upon implementation of LUCs.

## **10.6 Implementability**

Alternative 2 does not depend on difficult to obtain equipment, services or technical specialists; therefore, it is technically and administratively feasible.

## **10.7 Cost**

The estimated cost for Alternative 2 is \$193,000.

## **10.8 State Acceptance**

State representatives have reviewed the alternatives in the Proposed Plan for remedial action at the WCIA. Based on a thorough review of the remedial response alternatives and public comments, MDE concurs with Alternative 2.

## **10.9 Community Acceptance**

A summary transcript of the Public Meeting held on August 17, 2010, is available in the Administrative Record. Responses to written comments received from the community are presented in Part 3 of this document.

## **10.10 Summary of Comparative Analysis of Alternatives**

Alternative 2 will effectively control potential risk of exposure as a stand-alone response.

## **11 PRINCIPAL THREAT WASTES**

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. Materials remaining at the WCIA would not constitute a principal threat waste.

## **12 SELECTED REMEDY**

### **12.1 Description of the Selected Remedy**

The Selected Remedy for the WCIA is Alternative 2: LUCs. The Selected Remedy also includes Five-Year Reviews. The detailed approach and methodology will be specified in the LUC RD.

- Land-Use Controls: LUCs will be implemented at the WCIA to prevent site activities that would result in unacceptable exposure. This LUC will prevent housing, elementary and secondary schools, child care facilities, playgrounds, and other

residential land use within the entire WCIA. The extent of the WCIA within which residential land use will be restricted is identified in Figure 6.

- Five-Year Reviews: CERCLA 121(c) five-year reviews will be conducted to ensure the selected remedy remains protective. Five-year reviews will be conducted in accordance with OSWER Directives 9355.7-03B-P and 9234.2-25, or their most current revision or replacement.
- The RD will be submitted consistent with the RD schedule provisions of the FFA and will include the details of LUC implementation and maintenance (including periodic inspections).

## 12.2 LUC Remedial Design

The LUC RD will describe the details of LUC implementation and maintenance, including periodic inspections. The LUCs will include implementation through the APG Master Planning system with GIS support.

The U.S. Army will be responsible for implementation, maintenance, periodic inspection, reporting on and enforcement of LUCs in accordance with the RD and this ROD. Although the U.S. Army may transfer these responsibilities to another party by contract, property transfer agreement, or through other means, the U.S. Army will remain responsible for:

- conducting CERCLA Section 121(c) five year reviews;
- notifying USEPA and MDE and/or local government representatives of any known LUC deficiencies or violations;
- obtaining access to the property to conduct periodic inspections and any necessary response; and
- ensuring that the LUC objectives are met to protect the integrity of the selected remedy.

As set forth in the RD, the U.S. Army will not modify or terminate LUCs or implementing actions without prior approval of USEPA, after conferring with MDE. The U.S. Army will seek prior concurrence with USEPA and MDE before taking an action that would disrupt the effectiveness of the LUCs.

If the U.S. Army transfers property in the areas addressed by this ROD, the U.S. Army will ensure that the restrictions on site activities are included in the deed to the property recorded in the local property records and that notification of the restrictions in the deed is filed with the appropriate agencies, so that current and future property owners will be aware of these restrictions. At the earliest possible time, but no later than 60 days prior to leasing or transferring Army-owned property under this LUC to another agency, person, or entity (including federal to federal transfers) the Army will provide notice to USEPA and MDE of such intended lease or transfer. Specific deed restriction language and the appropriate agencies will be identified in the approved RD. While the U.S. Army



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maintains ultimate responsibility for LUC enforcement, the Army may require the transferee or lessee in cooperation with other stakeholders to assume responsibility for LUC 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 U.S. 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 U.S. Army's right and responsibility to enforce the LUCs.

### **12.3 Summary of the Rationale for the Selected Remedy**

The Selected Remedy will result in hazardous substances, pollutants or contaminants remaining on site at levels that do not allow for unlimited use and unrestricted exposure. Therefore, LUCs will be implemented to prevent development and use of the WCIA for future residential land usage that would result in unacceptable exposure. These sites will be included in the periodic CERCLA Section 121(c) remedy reviews of the Edgewood Area's NPL sites.

The Selected Remedy for the WCIA is protective of human health through prevention of housing, elementary and secondary schools, child care facilities, playgrounds, and other residential usage. No unacceptable risks were identified for human health from COCs under an industrial land-use scenario. In addition, chemicals in surface media do not appear to pose unacceptable risk to ecological receptors (EA, 2008b). Because the potential presence of UXO will still exist at the WCIA, existing Installation safety procedures and policies related to UXO would be followed for any soil disturbances at the WCIA. This is to ensure adequate protection of workers and military personnel at the WCIA. This remedy is dependent on LUCs to provide long-term effectiveness and permanence. It will not result in reduction of toxicity, mobility, or volume through treatment.

There are no ARARs associated with LUCs for the WCIA. The remedy would be implemented quickly and easily, and be effective in the short-term.

### **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 response. This is an engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost (USEPA, 1999; USEPA, 2000). The estimated cost for LUCs at the WCIA includes total

capital cost, annual O&M costs and present worth over a 30-year period. The detailed costs are provided in Table 4, and summarized below:

Cost Summary

Capital Cost	\$11,500
Annual O&M Costs	\$3,050
CERCLA Five-Year Review	\$15,000
Total Present Worth Costs	\$193,000
O&M Time Frame	30 Years
Time to Achieve RAOs	6 Months

### 12.5 Expected Outcomes of Selected Remedy

LUCs to prevent housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land use will effectively control potential risk of unacceptable exposures upon implementation.

### 12.6 Performance Standards for the Selected Remedy

The following remedial performance standard was established for the WCIA remedy:

- There shall be no development or use of WCIA property for housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land use (See Figure 6).

## 13 STATUTORY DETERMINATIONS

### 13.1 Protection of Human Health and the Environment

Potential exists for risk to human health if no remedial action is undertaken. This remedial response meets the requirements of CERCLA Section 121 and, to the extent practicable, the NCP. The Selected Remedy (LUCs) for the WCIA is protective of human health through preventing future residential usages. Chemicals in surface media do not appear to pose unacceptable risk to ecological receptors (EA, 2008b).

The RAO will be achieved upon implementation of the Selected Remedy.

### 13.2 Compliance with Applicable or Relevant and Appropriate Requirements

There are no ARARs associated with LUCs.

### 13.3 Cost-Effectiveness

The Selected Remedy (LUCs) for the WCIA is considered to be cost effective. LUCs preventing future residential land usage will be implemented without performing extensive and expensive sampling and analysis and risk assessment work to precisely define risk to hypothetical future residents.

**Table 4. Detailed Costs for the Selected Remedy**

ITEM	UNITS	NUMBER	UNIT COST	TOTAL
<b>CAPITAL COSTS<sup>1</sup></b>				
Work Plans - not required				
<b>Access and Land Use Restrictions</b>				
Notice Restrictions	Lump Sum	1	10,000.00	10,000.00
<b>SUBTOTAL</b>				<b>\$10,000.00</b>
SUPERVISION AND ADMIN @5%				\$500.00
CONTINGENCY @ 10%				\$1,000.00
<b>TOTAL CAPITAL COST</b>				<b>\$11,500.00</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Administrative Actions</b>				
5-Year Review <sup>2</sup>	Report	1	\$3,000.00	\$3,000.00
Institutional Controls/Oversight	Lump Sum	0.2	\$5,000.00	\$1,000.00
<b>Long-Term Monitoring/Maintenance</b>				
Site Inspections	Lump Sum	1	\$1,500.00	\$1,500.00
<b>SUBTOTAL</b>				<b>\$5,500.00</b>
CONTINGENCY @ 10%				\$550.00
<b>TOTAL O&amp;M COSTS</b>				<b>\$6,050.00</b>
<b>PRESENT WORTH (30 YEARS)</b>				<b>\$193,000.00</b>

<sup>1</sup> Costs do not assume permit requirements.

<sup>2</sup> Costs incurred once every 5 years, therefore, the report cost was reported as 1/5 total costs on an annual basis.



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

The Selected Remedy is a permanent solution, albeit requiring ongoing O&M in the form of inspections.

### **13.5 Preference for Treatment as a Principal Element**

The Selected Remedy does not employ treatment to reduce toxicity, mobility or volume of hazardous substances, pollutants or contaminants and, therefore, does not satisfy the statutory preference for remedies that employ treatment as a principal element. The LUC remedy eliminates the principal risks at the WCIA through prohibition of future residential land use that would result in unacceptable exposure.

### **13.6 CERCLA 121(c) Five-Year Review Requirement**

Hazardous substances, pollutants, or contaminants will remain on site at levels that do not allow for unlimited use and unrestricted exposure. Therefore, five-year reviews will be performed for the WCIA as required by CERCLA and the NCP. Five-year reviews will be conducted in accordance with OSWER Directives 9355.7-03B-P and 9234.2-25, or their most current revision or replacement.

## **14 DOCUMENTATION OF SIGNIFICANT CHANGES**

No significant changes were made to the Proposed Remedial Action Plan since it was provided to the public for review and comment.

### **PART 3: RESPONSIVENESS SUMMARY**

The purpose of the Responsiveness Summary is to provide a summary of the public's comments, concerns and questions about the Edgewood Area Proposed Plan for Wright Creek Investigation Area, and the Army's responses to these concerns.

APG held a public meeting on August 17, 2010 to formally present the Proposed Plan and response actions and to answer questions and receive comments. The summary transcript of this meeting is part of the Administrative Record for the Edgewood Area. 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 response actions for the WCIA.

#### **1 OVERVIEW**

At the time of the public comment period, the U.S. Army and USEPA had endorsed the Selected Remedy (LUCs) for the WCIA to protect human health and the environment.

Based on a thorough review of the remedial response alternatives and public comments, MDE concurs 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 WCIA were as follow:

- APG began discussing alternatives for the WCIA with the RAB in June 2009.
- APG released the WCIA Proposed Plan for public comment on August 4, 2010. Copies were available to the public through APG's administrative record locations at the Edgewood and Aberdeen branches of Harford County Library and Miller Library at Washington College in Kent County.
- A 30-day public comment period on the Proposed Plan ran from August 4 to September 2, 2010.
- 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 News*, *The Cecil Whig*, *East County Times* and *Kent County News*. A sample newspaper advertisement announcing the public comment period and the public meeting is provided on Figure 7.

Figure 7 – Sample Newspaper Advertisement

<b>U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR THE OTHER EDGEWOOD AREAS STUDY AREA WRIGHT CREEK INVESTIGATION AREA</b>	
<i>The U.S. Army at Aberdeen Proving Ground (APG) invites the public to comment on its Proposed Plan for the Wright Creek Investigation Area in the Other Edgewood Areas Study Area.</i>	
<p style="text-align: center;"><b>FACT SHEET</b></p> <p>APG has prepared a fact sheet on the proposed plan which includes a comment form that can be returned to APG.</p> <p>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.</p>	<p style="text-align: center;"><b>WRITTEN COMMENTS</b></p> <p>The 30-day public comment period on the proposed action extends from August 4 to September 2, 2010. Written comments, postmarked by September 2, 2010, should be sent to:</p> <p><b>Mr. Ken Stachiw</b>                  Directorate of Public Works, Program Mgr.                  ATTN: IMNE-APG-PWE                  Bldg. E5771 / Magnolia Road                  Aberdeen Proving Ground, MD 21010; or</p> <p><b>Ms. Yasmine Yap-Deffler</b>                  U.S. Environmental Protection Agency,                  Region III,                  1650 Arch Street (3HS13)                  Philadelphia, PA 19103-2029; or</p> <p><b>Ms. Peg Nemoff</b>                  Maryland Department of the Environment                  Federal Facilities Division                  Hazardous Waste Program                  1800 Washington Boulevard, Suite 645                  Baltimore, MD 21230-1719</p>
<p style="text-align: center;"><b>PUBLIC MEETING</b></p> <p>APG invites the public to attend a meeting on:</p> <p><b>DATE:</b> Tuesday, August 17, 2010</p> <p><b>TIME:</b> 6:30 p.m. - informal poster/                  information session                  7:15 p.m. - presentation</p> <p><b>PLACE:</b> Richlin Ballroom                  1700 Van Bibber Road                  Edgewood, MD 21040</p> <p>The meeting location is wheelchair accessible, and an interpreter for the hearing impaired is available with 72-hours advance notice (call 800-APG-9998).</p>	
<b>PROPOSED ACTION</b>	
<p>APG has prepared a Proposed Plan to address the Wright Creek Investigation Area (WCIA) located in the Other Edgewood Areas (OEA) Study Area in the Edgewood Area of Aberdeen Proving Ground. The preferred alternative is Land Use Controls (LUCs).</p>	
<b>ALTERNATIVES EVALUATED</b>	
<p><b>Alternative A: No Action.</b> The National Oil and Hazardous Substances Pollution Contingency Plan (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 hypothetical future residents; treat or remove wastes; or reduce the toxicity, mobility, or volume of contaminated media. LUCs would not be implemented and existing restrictions would not continue. The Army would conduct Five-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: \$46,000</p> <p><b>Alternative B: LUCs.</b> The LUC alternative would be used to limit exposure to those areas where contaminant levels would not allow for unrestricted use. Modifications would be made to the Installation Master Plan and Geographical Information System (GIS) Overlay Maps in order to prevent housing, elementary and secondary schools, child care facilities, playgrounds, and other residential land uses. Because the potential presence of Unexploded Ordnance (UXO) will still exist at the WCIA, existing Installation safety procedures and policies related to UXO will be followed for any soil disturbances at the WCIA in the future. This is to ensure adequate protection of workers and military personnel at the WCIA. Five-Year Reviews would also be performed to evaluate the long-term effectiveness of the remedy. Cost: \$104,500</p>	
<b>Based on analysis of the alternatives, APG prefers Alternative B, LUCs.</b>	
<p>The preferred alternative may be modified or new alternatives may be developed based on public input. The final alternatives 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 Focused Feasibility Study 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 the Harford County Library and Miller Library at Washington College in Kent County (410-778-7292).</p>	

- On August 17, 2010, APG held a public meeting at the Richlin Ballroom in Edgewood, Maryland. Representatives of the Army, USEPA, and MDE were present at the meeting. APG representatives presented information on the WCIA and on the proposed response action.

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

Comments raised during the public comment period are summarized below. The comments are categorized by source.

#### COMMENTS FROM QUESTIONNAIRE INCLUDED WITH FACT SHEET

As part of its fact sheet on the Proposed Plan, APG included a questionnaire that residents could return with their comments. APG received 13 forms; only 8 forms had a comment. The alternatives preferred by individuals returning comment forms were:

- 2 Alternative A (1) – No Action
- 11 Alternative B (2) – LUCs

Written comments included on the forms are summarized below.

**Comment No. 1:** Alternative “A” results in less expenditure at a time where funds are very limited. Since the investigation resulted in no serious hazards at this time the periodic surveys should suffice. Additionally, recent studies indicate lead projectiles develop a non-toxic crust after a period underground that prevents the leaching of hazardous particles into groundwater, etc.

**Response No. 1:** Although Alternative A (No Action) is the less costly alternative, the alternative selected for the WCIA must satisfy the threshold criterion, Overall Protectiveness of Human Health and the Environment, which is of primary importance. The preferred alternative (LUCs) for the WCIA is protective of human health through preventing future residential usages. Alternative A would not provide long-term protection of future residents from potential unacceptable exposure to site contaminants. APG appreciates your feedback and input on recent studies regarding the weathering or oxidation of lead projectiles. Please note, however, that the rate of oxidation depends upon several environmental factors including: oxidation/reduction potential, ionic strength, pH, oxygen content of the soil, and the presence of compounds (e.g., phosphate) that may inhibit oxidation.

**Comment No. 2:** Alternative B, LUCs appears to be the best alternative based upon the increased activities caused by BRAC at APG. More of APG’s acreage will be used/required for the research and development activities of the gaining commands.

**Response No. 2:** APG appreciates the feedback and agrees that the preferred alternative is protective of human health and the environment and is the best solution for this site.

**Comment No. 3:** Anything we can do to lower toxicity levels to near zero or zero is in our best interest. I understand that certain plants over time, especially our native Poplar tree, will absorb toxins from the soil and pass them from the soil.

**Response No. 3:** APG agrees that reducing toxicity levels in the environment is very important. However, the preferred alternative for the WCIA does not employ treatment to reduce toxicity, mobility or volume of hazardous substances, pollutants or contaminants. That said, the WCIA risk assessments did conclude that there were no concerns for potential human health (industrial/military) and ecological receptors exposure to surface soil, surface water, and sediment at the WCIA. Therefore, toxicity levels for these receptors exposed to WCIA surface media are already at low to non-existent levels.

**Comment No. 4:** Plan B sounds good to me. Why are there no information repositories in eastern Baltimore County, which is very close to the Edgewood Areas?

**Response No. 4:** APG appreciates the feedback and agrees that the preferred alternative is the best solution for this site. For several years, APG did maintain an information repository in eastern Baltimore County, first at the Essex Community College Library then at the Baltimore County Office Building in Towson. Your suggestion to maintain an information repository within Baltimore County will be re-evaluated.

**Comment No. 5:** While I strongly support the efforts and actions taken by APG in such matters, I also believe that if you are to proceed, you should do the full project. Taking No Action is simply to delay the inevitable. I commend APG for what you have already accomplished in "cleaning up" in Edgewood and APG.

**Response No. 5:** APG appreciates the feedback and agrees that the preferred alternative is protective of human health and the environment and is the best solution for this site.

**Comment No. 6:** Of the two options, this {Alternative B} is better provided it does not mean further damage will be done to the area.

**Response No. 6:** APG believes that the preferred alternative (LUCs) is protective of human health and the environment. Implementation of the LUC remedy will eliminate the principal human health risk at the WCIA through restriction of future residential land use that would result in unacceptable exposure. Currently, chemicals in surface media do not appear to pose unacceptable risk to ecological receptors. Additionally, every five years APG will perform a review of the remedy for the WCIA to ensure the long-term effectiveness of the remedial response.

**Comment No. 7:** This land should never be used in any residential way and should be posted as such. Has this remedy been used in other areas and has it been helpful?

**Response No. 7:** LUCs restricting residential land use within the WCIA will be implemented through the APG Master Planning system with GIS support. APG will be responsible for maintenance, periodic inspection, reporting on and enforcement of the

LUCs in accordance with this ROD. The U.S. Army will not modify or terminate LUCs or implementing actions without prior approval of USEPA, after conferring with MDE. The U.S. Army will seek prior concurrence before taking an action that would disrupt the effectiveness of the LUCs. If the U.S. Army transfers property in the areas addressed by this ROD, the U.S. Army will ensure that the restrictions on site activities are included in the deed to the property recorded in the local property records and that notification of the restrictions in the deed is filed with the appropriate agencies, so that current and future property owners will be aware of these restrictions.

APG has incorporated LUCs restricting future residential land usage as part of remedial response actions taken for numerous CERCLA sites within the Aberdeen and Edgewood Areas of APG (e.g., sites within the Other Aberdeen Areas, Lauderick Creek, Bush River, Canal Creek, Westwood, and J-Field Study Areas, etc.). APG believes that residential land use restrictions have been very helpful in the protection of human health at the installation.

**Comment No. 8:** The summary indicates that APG evaluated compliance with applicable or relevant and appropriate requirements (ARARs). This implies that the alternative meets all federal and state environmental laws. It also implies that the alternative provides adequate protection of human health and the environment. The section on comprehensive environmental studies states that APG sampling found only slightly elevated detections of metals, PAHs, and pesticides. It does not explain how these elevated levels compared to the ARARs, nor does it describe the presence of other constituents which might be expected at the site, such as perchlorate. The impression given is that contamination was minimized. The U.S. Environmental Protection Agency (EPA) has published ambient water quality criteria (AWQC) for many contaminants in surface water. Under Section 304(a) of the Clean Water Act (CWA), these criteria provide science-based recommendations for adequate levels of water quality. The WCIA Proposed Plan should address this issue.

**Response No. 8:** In accordance with the NCP, APG is required to evaluate the potential performance of each remedial alternative using nine criteria, one of which is Compliance with ARARs. However, no chemical-, location-, or action-specific ARARs are associated with the implementation of the Preferred Alternative (LUCs). The WCIA RI Report provides the comprehensive discussion on the evaluation of contaminant detections in WCIA media to RI comparison criteria and risk screening criteria in support of the remedial decision-making process. WCIA RI samples were analyzed for a full suite of parameters which included VOCs, SVOCs, pesticides and PCBs, metals, explosive-related compounds (to include perchlorate), chemical agent degradation products, general chemistry parameters, and radiological parameters. Although various contaminants were detected throughout the investigation area in surface media and groundwater, none exhibited a consistent and elevated pattern to distinguish any source(s) or pattern(s) of migration. During the WCIA RI, risk-based screening and identification of surface water COPCs was conducted by comparing the maximum detected chemical concentrations to USEPA Region III BTAG freshwater screening benchmarks and USEPA human health RSLs. Surface water analytes were compared to 10 times the RSL

for tap water to account for reduced surface water exposures. In accordance with USEPA risk assessment guidelines, the RSL values used were those at a cancer risk level of 1E-06 and a HQ of 0.1 for the purpose of screening.

COMMENTS FROM PUBLIC MEETING

No written comments were submitted at the public meeting and no oral comments were made.

#### PART 4: REFERENCES

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- General Physics Corporation (GP). 2010a. *Wright Creek Investigation Area Remedial Investigation Report, Other Edgewood Areas, APG*. APG: MD.
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