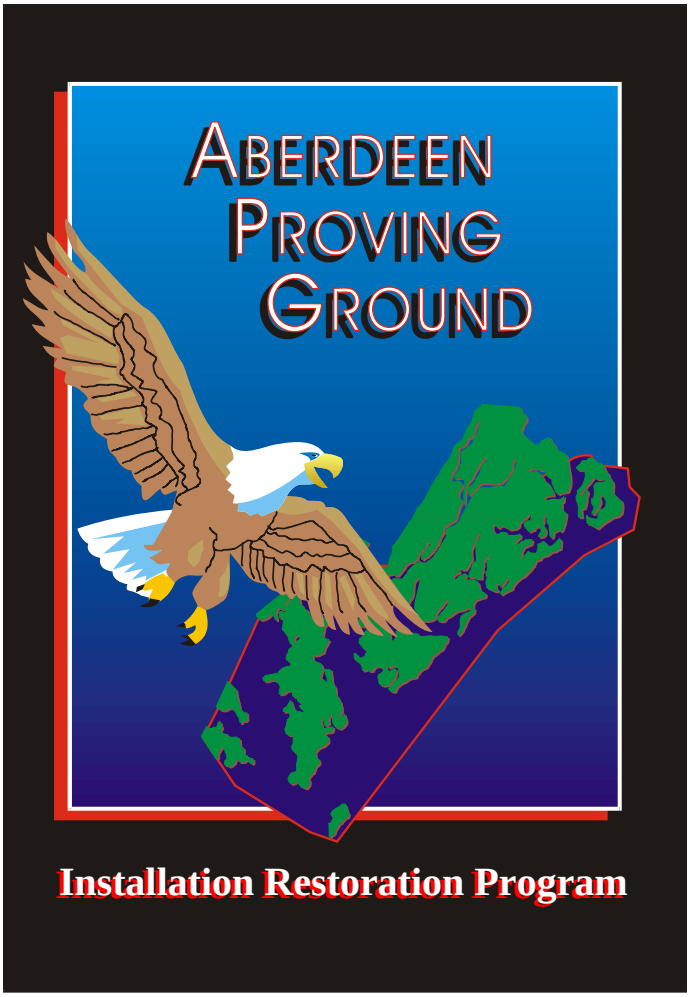
EPA/ROD/R2006030001336
2006

EPA Superfund
Record of Decision:

ABERDEEN PROVING GROUND
(MICHAELSVILLE LANDFILL)
EPA ID: MD3210021355
OU 07
ABERDEEN, MD
03/17/2006



OTHER ABERDEEN AREAS

Record of Decision: Five Sediment Sites

SITE 8: DISCARDED BATTERIES AT ABBEY POINT NAVIGATION LIGHT
SITE 9: DISCARDED BATTERIES AT SPESUTIE ISLAND NAVIGATION LIGHT
SITE12: OLD CHEMICAL DUMP ON SPESUTIE ISLAND
SITE 16: DRMO METAL SCRAP YARD
SITE 17: SILVER CONTAMINATED DITCH IN TRANSONIC RANGE AREA

Final

March 2006

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U.S. Army Garrison
Aberdeen Proving Ground, Maryland

Record of Decision
For Five Sediment Sites

Site 8: Discarded Batteries at Abbey Point Navigation Light
Site 9: Discarded Batteries at Spesutie Island Navigation Light
Site 12: Old Chemical Dump on Spesutie Island
Site 16: DRMO Metal Scrap Yard
Site 17: Silver Contaminated Ditch in Transonic Range Area

Other Aberdeen Areas, Aberdeen Area
Aberdeen Proving Ground, Maryland

FINAL

Directorate of Safety, Health, and Environment
Environmental Conservation and Restoration Division
Aberdeen Proving Ground, Maryland

March 2006

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

October 25, 2005

Mr. Naren Desai
Directorate of Safety, Health and Environment
Environmental Conservation and Restoration division
U.S. Army Aberdeen Proving Ground Support Activity
Aberdeen Proving Ground, MD 21005-5001

RE: Draft Other Aberdeen Areas Record of Decision: Five Sediment Sites Site 8: Discarded Batteries at Abbey Point Navigation Light Site 9: Discarded Batteries at Spesutie Island Navigation Light Site 12: Old Chemical Dump on Spesutie Island Site 16: DRMO Metal Scrap Yard Site 17: Silver Contaminated Ditch in Transonic Range Area U.S. Army Garrison Aberdeen Proving Ground, Maryland, EA Engineering and Technology, October 2005.

Dear Mr. Desai:

The Federal Facilities Division of the Maryland Department of the Environment's Hazardous Waste Program has reviewed the above referenced document and has no further comments at this time. This report address written comments made by this agency on previous drafts, as well as verbal comments that were discussed at previous agency meetings.

If you have any questions, please contact me at (410) 537-3419.

Sincerely,

Andy Zarins
Remedial Project Manager
Federal Facilities Division

AZ:mh

cc: Mr. Frank Vavra
Mr. Horacio Tablada
Mr. Harold L. Dye, Jr.

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LIST OF ACRONYMS

AA	Aberdeen Area
APG	Aberdeen Proving Ground
ARAR	Applicable or Relevant and Appropriate Requirement
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BRA	Baseline Risk Assessment
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
COPC	Contaminant of Potential Concern
DOD	Department of Defense
DRMO	Defense Reutilization Marketing Office
DU	Depleted Uranium
EA	EA Engineering, Science, and Technology
ECRD	Environmental Conservation and Restoration Division
EM	Electromagnetic
ERA	Ecological Risk Assessment
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft	feet
HAZWRAP	Hazardous Waste Remedial Actions Program
HHRA	Human Health Risk Assessment
HI	Hazard Index
IRP	Installation Restoration Program
LECR	Lifetime Excess Cancer Risk
MDE	Maryland Department of Environment
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NEPA	National Environmental Policy Act of 1969
OAA	Other Aberdeen Areas
O&M	Operation and Maintenance

LIST OF ACRONYMS (Continued)

OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
PW	Present Worth
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facilities Assessment
RG	Remediation Goal
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TBA	To Be Announced
TCE	Trichloroethene
TCL	Target Compound List
TSCA	Toxic Substances Control Act
µg/L	Microgram(s) per Liter
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1 DECLARATION

1.1 SITE NAME AND LOCATION

Five Sediment Sites: Site 8: Discarded Batteries at Abbey Point Navigation Light; Site 9: Discarded Batteries at Spesutie Island Navigation Light; Site 12: Old Chemical Dump on Spesutie Island; Site 16: DRMO Metal Scrap Yard; and Site 17: Silver Contaminated Ditch in Transonic Range Area, Other Aberdeen Areas (OAA), Aberdeen Proving Ground (APG), Maryland (areas associated with the Michaelsville Landfill NPL Site – Superfund Site ID Number MD3210021355).

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for the following Five Sediment Sites located in the OAA, Aberdeen Area at APG, Maryland:

- **Site 8: Discarded Batteries at Abbey Point Navigation Light**
- **Site 9: Discarded Batteries at Spesutie Island Navigation Light**
- **Site 12: Old Chemical Dump on Spesutie Island**
- **Site 16: DRMO Metal Scrap Yard**
- **Site 17: Silver Contaminated Ditch in Transonic Range Area**

The remedial action is chosen in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by Superfund Amendments Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This information supporting the decisions on the Selected Remedy is contained in the administrative record for APG.

The U.S. Department of the Army (site owner) is the lead agency for the five sediment sites; and together the Army and EPA have selected the remedial action for the sediment sites and issued this ROD. This action has been coordinated with the State of Maryland, represented by the Maryland Department of the Environment (MDE), who accepts the selected remedy. There is a low level of human health risk and although concentrations of site-related contaminants exceeded ecological benchmark values indicating a potential for ecological risk, there are uncertainties associated with the potential for ecological risk that would require extensive and expensive additional study to make a definitive determination of risk. To complete a streamlined response, EPA and MDE support the Selected Remedy as necessary to adequately and cost-effectively protect human health and the environment.

1.3 ASSESSMENT OF THE FIVE SEDIMENT SITES

The response action selected in this ROD is protective of the public health or welfare and the environment from actual or threatened releases of hazardous substances into the environment. Following verification sampling, Land Use Controls (LUCs) will be implemented to prohibit residential usage.

1.4 DESCRIPTION OF THE SELECTED REMEDIES

Sediment at the Five Sediment Sites has been impacted by site-specific contaminants, which resulted from prior activities that have occurred at each site. In conjunction with previous characterization efforts, the results of the Final Phase II Remedial Investigation (RI) (EA 2005 d), Human Health Risk Assessment (HHRA) (EA 2005a; EA 2005b) and the Baseline Ecological Risk Assessment (BERA) (EA 2004c) reports, were used to delineate areas impacted by the COCs. The COCs identified in sediment at each site are as follows:

- **Site 8 - Discarded Batteries at Abbey Point Navigation Light**: antimony, arsenic, cadmium, copper, lead, manganese, mercury, methylmercury, nickel, vanadium, and zinc.
- **Site 9 - Discarded Batteries at Spesutie Island Navigation Light:** mercury and zinc.
- **Site 12 - Old Chemical Dump on Spesutie Island:** cadmium, copper, lead, mercury and zinc.
- **Site 16 – DRMO Metal Scrap Yard:** PCBs (arochlor 1254 and arochlor 1260), arsenic, cadmium, copper, lead, nickel, vanadium, and zinc.
- **Site 17 – Silver Contaminated Ditch in Transonic Range Area:** chromium, mercury, silver, and zinc.

These COCs were considered to be a potential threat to human health and/or the environment. The Feasibility Study (FS) was prepared to evaluate the remedial alternatives as discussed in this document in order to address the impacted sediment at each of the five sites (EA 2005 e). The selected remedial action components (Alternative 3 – Excavation, Offsite Disposal and Land Use Controls) include sediment excavation and removal, off-Post disposal of contaminated sediments to an approved facility and LUCs to prevent military family housing, non-military residential housing, elementary and secondary schools, child-care facilities, and playground land use at the five sites. The selected remedial action is intended to prevent human or ecological exposure to COCs at levels of potential concern and to prevent future migration of COCs in sediment at the five sites. The major components of the selected remedial action are as follows:

- Excavating the COC-impacted sediment;
- Dewatering and physically separating sediment and water, sampling sediment and water for hazardous characteristics, treatment and/or disposal of water from the dewatering process, and disposing of sediment at an appropriate off-Post disposal facility; and

- Applying LUCs to prevent military family housing, non-military residential housing, elementary and secondary schools, child-care facilities, and playground land use.

1.5 STATUTORY DETERMINATIONS

This remedy 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, complies with federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent practicable.

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

Although this alternative will remove COC-impacted sediment, the sites will still have residential use restrictions based on potential unacceptable residual risk for such use. Therefore, a CERCLA 121(c) five-year review be conducted in accordance with CERCLA to ensure that the remedy remains protective of human health and the environment.

The cost to implement the selected remedy at the five sediment sites is $1,167,000.

1.6 DATA CERTIFICATION CHECKLIST

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

- COCs and their respective concentrations.
- Baseline risk represented by the COCs.
- Remedial goals established for COCs and the basis for these goals.
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment (BRA) and ROD.
- Potential land and groundwater use available at the site as a result of the selected remedy.

- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.

- Key factor(s) that led to selecting the remedy (i.e., a description of how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).

1.7 Authorizing Signatures and Support Agency Acceptance of Selected Remedy

John T. Wright
Colonel, OD
Deputy Installation Commander

2 March 2006
Date

Abraham Ferdas
Director
Hazardous Site Cleanup Division
U.S. Environmental Protection Agency, Region III

3/17/06
Date

2 THE DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

APG is located on the Chesapeake Bay, approximately 15 miles northeast of Baltimore, Maryland. APG covers approximately 72,000 acres (including water) of Harford and Baltimore counties (Figure 1). It is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder Falls State Park and residential areas; and to the north by the towns of Edgewood, Magnolia, Aberdeen, and Perryman. APG consists of two distinct and separate portions, the Aberdeen Area and the Edgewood Area. The Discarded Batteries at Abbey Point Navigation Light (Site 8), the Discarded Batteries at Spesutie Island Navigation Light (Site 9), the Old Chemical Dump on Spesutie Island (Site 12), the DRMO Metal Scrap Yard (Site 16) and the Silver Contaminated Ditch in Transonic Range Area (Site 17) are located within the Aberdeen Area (AA) of APG, known as the Other Aberdeen Areas (OAA) (Figure 2). The OAA are associated with the Michaelsville Landfill NPL Site – Superfund Site ID Number MD3210021355).

The land surrounding APG is used for farming and industry, but also includes residential areas. Industry is most concentrated along Route 40 through Baltimore and Harford counties. Residential areas are predominantly new town houses and developments located in Harford County.

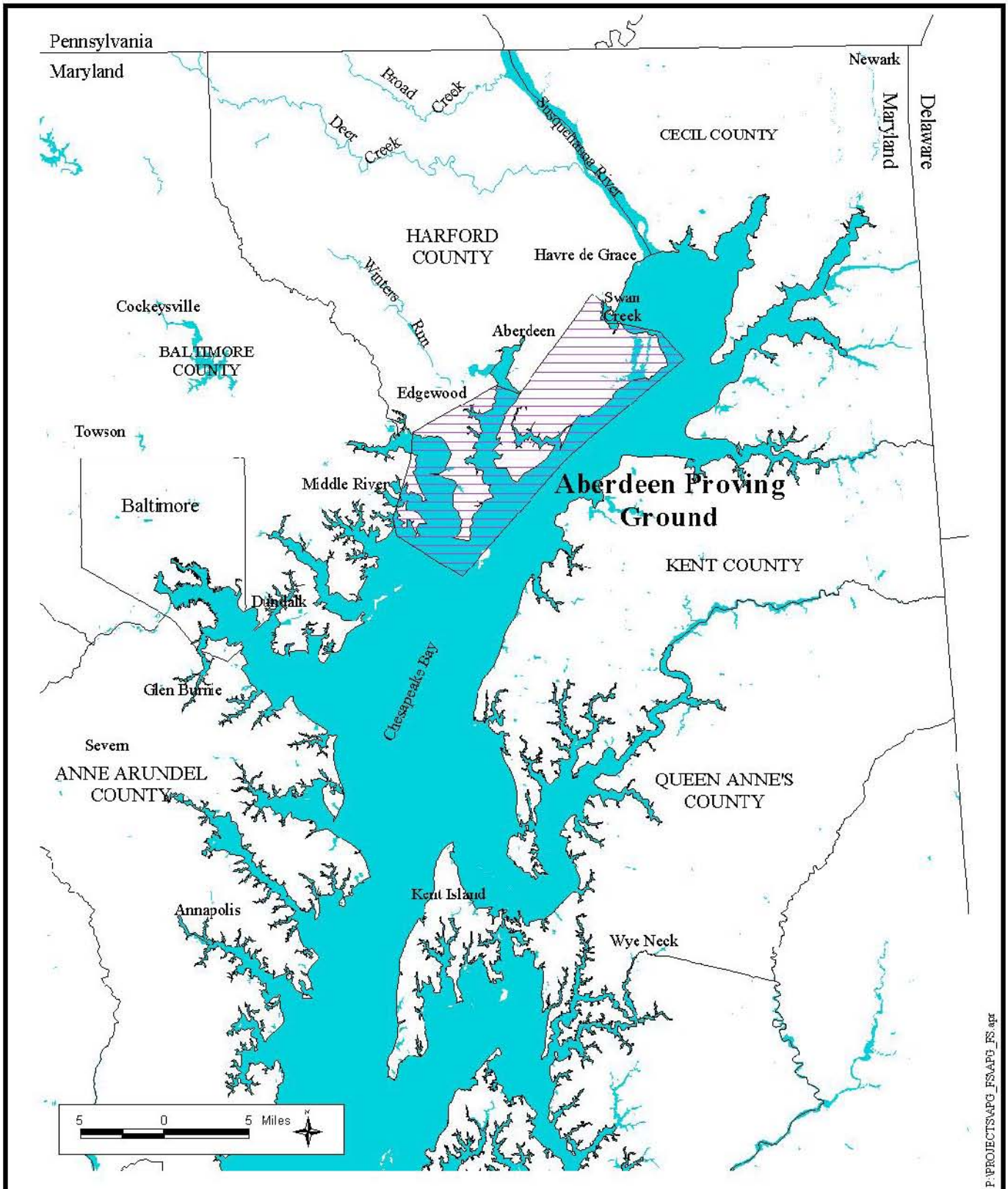
Sediment at the Five Sediment Sites has been impacted by site-specific contaminants resulting from activities that took place at each site. Based on previous investigations at the sites, COCs were reported at levels that may pose a risk to human or ecological receptors.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The AA of APG was established as an ordnance proving ground, and throughout its history has been the site of testing conventional weapons, ammunition, armored vehicles, and other equipment.

The OAA are expected to remain under military authority with testing and training activities currently being conducted. CERCLA activities at APG are being conducted under a Federal Facility Agreement (FFA) with EPA, signed in March 1990.

The following sections briefly describe historical operations and impacts to sediment as a result of these operations at each of the Five Sediment Sites. The information presented for the five sites represents a compilation of previous site investigations. Detailed descriptions of site history, characteristics and land use at the Five Sediment Sites are presented in the RI Report (EA 2005d).



Aberdeen Proving Ground

ABERDEEN, MARYLAND

Area Map

Figure 1

2.2.1 SITE 8: DISCARDED BATTERIES AT ABBEY POINT NAVIGATION LIGHT

This site is located in the southeast portion of the restricted area of APG along the shoreline of the Chesapeake Bay, northeast of Abbey Point Road and southwest of Romney Creek (Figure 2). Located in a remote area of an active range, the site is not presently accessible by roadway and can only be reached by boat when munition testing is not being performed in the area.

This site was initially inspected on 7 May 1995 as part of the Phase I scoping activities (URS 2002). The site is the location of a former lighted marine navigation tower where an unknown number of 6 volt and 12-volt lead-acid batteries were discarded on the ground when they could no longer be used to operate the lighted signal system. According to APG personnel, the navigation tower is no longer in operation since the structure was struck by a munitions round during testing performed in the area. The batteries in the housing were partially damaged by an electrical short circuit resulting from the disabling impact of the round. UXO and exploded ordnance debris are present in the wooded area and shoreline in the vicinity of the site.

Based on historical uses of the site and previous site investigations, the principal contaminants that have been detected at the site include antimony, arsenic, cadmium, copper, lead, manganese, mercury, methylmercury, nickel, vanadium, and zinc in sediment.

2.2.2 SITE 9: DISCARDED BATTERIES AT SPESUTIE ISLAND NAVIGATION LIGHT

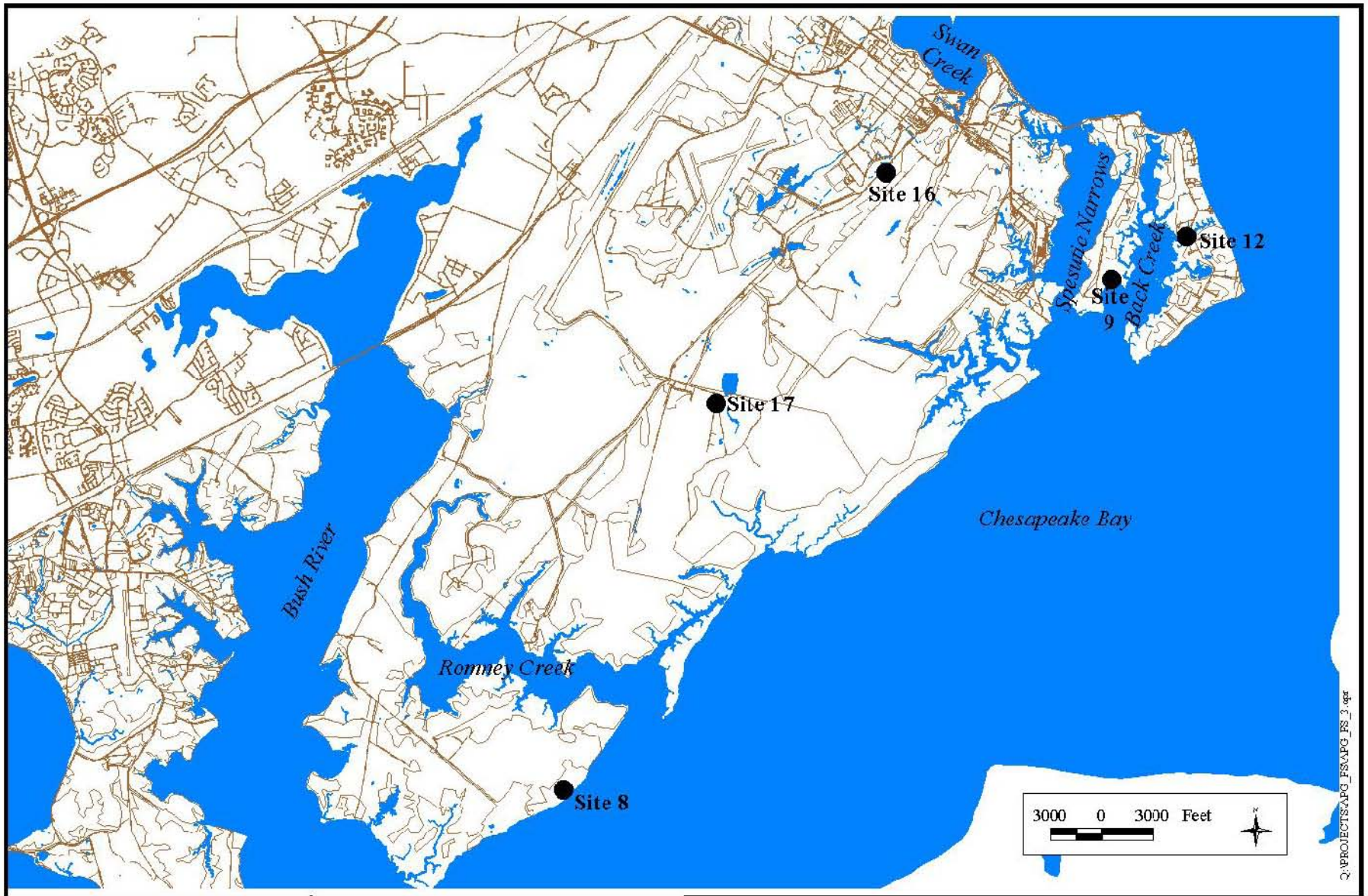
This site is located in the restricted area of APG along the shoreline of Back Creek in the southwest portion of Spesutie Island (Figure 2). This site was inspected on 7 May 1995 as part of the Phase I scoping activities. Located in a remote marsh on Spesutie Island, the site is accessible only by watercraft or foot. The site is the location of a former navigation tower previously used by APG security marine patrols. An unknown number of 6 and 12 volt lead-acid batteries were discarded into the shallow water of Back Creek and onto the shoreline below and around the tower when the units could no longer be used to operate the lighting system.

The tower consisted of a 15 ft by 15 ft square, wooden, open-frame structure approximately 30 ft high, which straddled the marsh shoreline and shallow tidal channel of Back Creek.

Based on historical uses of the site and previous site investigations, the principal contaminants that have been detected at the site include mercury and zinc in sediment.

2.2.3 Site 12: Old Chemical Dump on Spesutie Island

This site is located in the northeastern portion of Spesutie Island west of Spesutie Island Road (Figure 2). This site reportedly consists of old dump areas located off Duck Lane, on the north side of an overgrown road that travels through a marsh to an old bridge across a tributary to Back Creek. The dump area is located in a low-level marsh area,



IRP Sites 8, 9, 12, 16 and 17

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Location Map

Figure 2

which is partially submerged at high tide. The area inland along the road is covered with briars and grass, with a few sparse trees. The Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) estimates that the dump area is adjacent to the road and 300 ft in length with a maximum width of 20 ft. Boxes with bottles of chemicals were reportedly thrown from the road into the marsh.

Based on historical uses of the site and previous site investigations, the principal contaminants that have been detected at the site include cadmium, copper, lead, mercury and zinc in sediment.

2.2.4 SITE 16: DRMO METAL SCRAP YARD

The DRMO Metal Scrap Yard is located in the north-central portion of the restricted area of APG along the east side of Michaelsville Road and a railroad track (Figure 2). The DRMO Metal Scrap Yard covers an area of approximately 12.7 acres. The yard is clear of vegetation and is accessible through a gate on the north end of the yard.

The DRMO Metal Scrap Yard is an active facility and has been used to store various types of large rolling stock (trucks, jeeps, and trailers), automated data processing equipment, used ammunition canisters, cable, wiring, stoves, refrigerators, air conditioners, and various compressors and motors.

Based on historical uses of the site and previous site investigations, the principal contaminants that have been detected at the site include PCBs (arochlor 1254, arochlor 1260), arsenic, cadmium, copper, lead, nickel, vanadium, and zinc in sediment.

2.2.5 SITE 17: SILVER CONTAMINATED DITCH IN TRANSONIC RANGE AREA

This site is located in the central portion of the restricted area of APG, in the area known as the Transonic Range (Figure 2). The Transonic Range is one of the Research, Development, Test, and Evaluation Facilities located in the Downrange Area of the Aberdeen Area of APG. The range is used to test-fire depleted uranium (DU) projectiles at hard targets (APG 1981). This activity had occurred outdoors in the past, but is now conducted indoors to eliminate atmospheric releases of DU vapor resulting from impact of the projectiles (APG 1981). Photographs have historically been processed in Building 740B within the Transonic Range Area. Based upon available historical and analytical data, it is assumed that in the past, wastewater from the developing process was drained from Building 740B to a septic tank, located in proximity to a series of seasonal drainage ditches/culverts that lead to Delph Creek (approximately 1,300 ft downstream). Based upon available information, it is believed that this procedure was stopped in the mid-1970s (APG 1994). A sewer line at the Transonic Range that was thought to be directed to a wastewater treatment plant was found to be discharging to these series of seasonal drainage ditches that lead to Delph Creek. Samples of sediment collected in the upper 300-ft section of the drainage ditch (i.e., closest to Building 740) contained silver believed to be attributed to the photo processing.

Based on historical uses of the site and previous site investigations, the principal contaminants that have been detected at the site include chromium, mercury, silver and zinc in sediment.

2.3 COMMUNITY PARTICIPATION

Community relations activities that have taken place at APG to date include monthly Restoration Advisory Board (RAB) meetings, APG Superfund Citizens Coalition (APGSCC) meetings, public meetings and site tours, as well as press releases, and public access to the APG website.

Administrative Record – Consistent with requirements of CERCLA section 113(k), an Administrative Record containing information associated with CERCLA cleanup activities at APG is available to the public. The locations, contact information and hours of operation for the Administrative Record file are as follows:

Harford County Library - Aberdeen Branch
21 Franklin Street
Aberdeen, MD 21001
(410) 273-5608
Hours: Monday, Tuesday, and Thursday 10 am to 8 pm
Wednesday 1 pm to 8 pm
Friday and Saturday 10 am to 5 pm
Sunday 1 pm to 5 pm (October-May only)

Harford County Library - Edgewood Branch
2205 Hanson Road
Edgewood, MD 21040
(410) 612-1600
Hours: Monday, Tuesday, and Thursday 10 am to 8 pm
Wednesday 1 pm to 8 pm
Friday and Saturday 10 am to 5 pm
Sunday Closed

Washington College
Clifton M. Miller Library
Kent County
Chestertown, MD 21620
(410) 778-7280
Hours: Monday through Thursday 815 am to 12 am
Friday 815 am to 10 pm
Saturday 10 am to 10 pm
Sunday 12 pm to 12 am

Mailing List – A mailing list of all interested parties in the community is maintained by APG and updated regularly.

Fact Sheet – A fact sheet describing the status of the Installation Restoration Program was last distributed to the mailing list addressees on 10 August 2005.

Proposed Plan – The Proposed Plan regarding this remedial action was made available to the public for their comments.

The Feasibility Study (FS) and Proposed Plan for the OAA Five Sediment Sites were made available to the public in May 2005 and July 2005, respectively. They can be found in the Administrative Record file and the information repository maintained at the EPA Docket Room Region III and the public libraries of Harford County. The notice of availability of the Proposed Plan was published in newspapers, including The Avenue on Wednesday, 3 August 2005; The East County Times and Kent County News on Thursday, 4 August 2005; and The Aegis and The Cecil County Whig on Friday, 5 August 2005.

A public meeting was held on 18 August 2005 at Aberdeen Senior Center, located at 7 Franklin Street, in Aberdeen, Maryland, to present the Proposed Plan. At this meeting, representatives from the Army, EPA and MDE answered questions about problems at the site and the remedial alternatives. The Army and EPA also used this meeting to solicit a wider cross-section of community input on the reasonably anticipated future land use and potential water resources at the site. Response to comments received during this period is included in the Responsiveness Summary, which is a part of this ROD.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

The Other Aberdeen Areas are associated geographically with the Michaelsville Landfill. The Michaelsville Landfill is the only site actually included in the NPL listing, but the entire surrounding northern area of the installation is being addressed under the FFA. The northern area of the installation is separated from the Edgewood Area by the Bush River. The entire southern area (Edgewood Area) is a separate NPL Site. The Solid Waste Management Units identified in the northern area of the installation were identified by a RCRA Facility Assessment (RFA) and were given Defense Site Environmental Restoration Tracking System (DSERTS) identification numbers by the Army. Originally, these units would have been addressed by MDE under the RCRA program. The Army later agreed to address these RCRA SWMUs under the RCRA/CERCLA integration policy and the Army's responsibilities for addressing these SWMUs under Superfund are detailed in the FFA. For administrative convenience, the northern area was broken down into the Michaelsville Landfill area, the Western Boundary Area and the Other Aberdeen Areas study groups.

The Michaelsville Landfill has two RODs, OU1 (the landfill) in June 1992 and OU2 (all media at the site) in September 1997. Construction was completed in 1994 and long-term monitoring is currently being performed

The Western Boundary Study Area (WBSA) consists of two Operable Units and is also included in the Michaelsville NPL listing. OU1 has a ROD dated July 2000 and provides

the installation of a carbon adsorption system on the Harford County production wells and long-term monitoring. A ROD for WBSA-OU2 has not yet been prepared. Future RODS to be prepared for Other Aberdeen Areas include one ROD for two Landfills (Old Dump on Swan Creek and Old Dump on Woodrest Creek), a ROD for six groundwater sites (DRMO Metal Scrap Yard, Building 525 Site, Building 3327 UST Site, Tower Road Site, Building 507 Site, and Building M600 Site), a ROD for two former shooting ranges (Pistol Range and Known Distance Range), and a ROD for the Shell Washout Wastewater Facility at Building 700B.

This ROD addresses only the Five Sediment Sites related to elevated concentrations of site-specific COCs in sediment. The activities selected in this ROD will address COC-impacted sediment directly associated with past activities at the sites. A FS was prepared to evaluate remedial alternatives to address the contaminated sediments (EA 2005e).

The Selected Remedy for the Five Sediment Sites is intended to prevent human exposures to COCs at levels of unacceptable risk and prevent migration of COCs from the Five Sediment Sites. The Selected Remedy is designed to reduce or eliminate the potential risks to human or ecological receptors via excavation and off-Post disposal of contaminated sediments with LUCs to restrict future residential use.

2.5 SITE CHARACTERISTICS

The region surrounding APG extends across two physiographic provinces, the Piedmont Plateau and the Coastal Plain. The Piedmont is characterized by rolling to hilly terrain, and the Coastal Plain is generally characterized by a low-lying, gently rolling terrain. The AA, where the Five Sediment Sites are located, is situated in the Coastal Plain Physiographic Province and occupies a large peninsula that extends into the Chesapeake Bay just south of the mouth of the Susquehanna River. The Coastal Plain Physiographic Province is characterized by marine and non-marine sediments consisting of clay, silt, sand and gravel, coarsening with depth.

The regional geology is very complex, heterogeneous, and spatially variable, making it difficult to correlate the aquifers and confining units. Regional groundwater flow is generally southeast towards the Chesapeake Bay.

Each of the five sites is generally located in flat areas. Site 8 - Discarded Batteries at Abbey Point Navigation Light is a flat shoreline area located around a former navigation light. Site 9 - Discarded Batteries at Spesutie Island Navigation Light is located at a navigation light positioned in a tidal marsh area that is intermittently submerged to a depth of 4 feet (ft). Site 12 - Old Chemical Dump on Spesutie Island is a flat marsh area along both sides of a raised dirt road known as Duck Lane. The area at the topographic low of Site 16-DRMO Metal Scrap Yard, creates an intermittent drainage area with impacted sediment. The Site 17 - Silver Contaminated Ditch in Transonic Range Area is also located in a generally flat area that contains intermittent drainage that flow towards Delph Creek.

Regional surface waters in Baltimore County, Harford County, and Cecil County include both freshwater and estuarine (mixture of fresh and salt water) systems and consist of rivers, estuarine creeks, freshwater creeks, estuarine marshes, freshwater marshes, freshwater ponds, and ephemeral ponds. Regional surface water flows toward the Chesapeake Bay, following the topography. Flow and volume in major rivers of the region range widely. All five sites are considered sediment or hydric (infrequently flooded terrestrial) surface soil sites given continuing or intermittent surface water exposure. Abbey Point and Spesutie Island (Sites 8, 9, and 12) are located in remote shoreline or wetland areas immediately adjacent to the Chesapeake Bay or its tributaries. The area of concern at Site 16-DRMO Metal Scrap Yard is a topographically depressed ditch where draining storm water slowly infiltrates into the soil. Site 17 is an intermittent/seasonal drainage ditch 1,300 ft upstream of Delph Creek.

Based on previous site investigations that have been performed at each of the Five Sediment Sites, it has been determined that sediments at each of the sites are impacted with site-specific COCs. The following discussion includes characteristics specific to each site. Table 1 presents a conceptual site model illustrating contaminant sources, release mechanisms, exposure pathways, migration routes and potential human and ecological receptors at each site.

Site 8: Discarded Batteries at Abbey Point Navigation Light

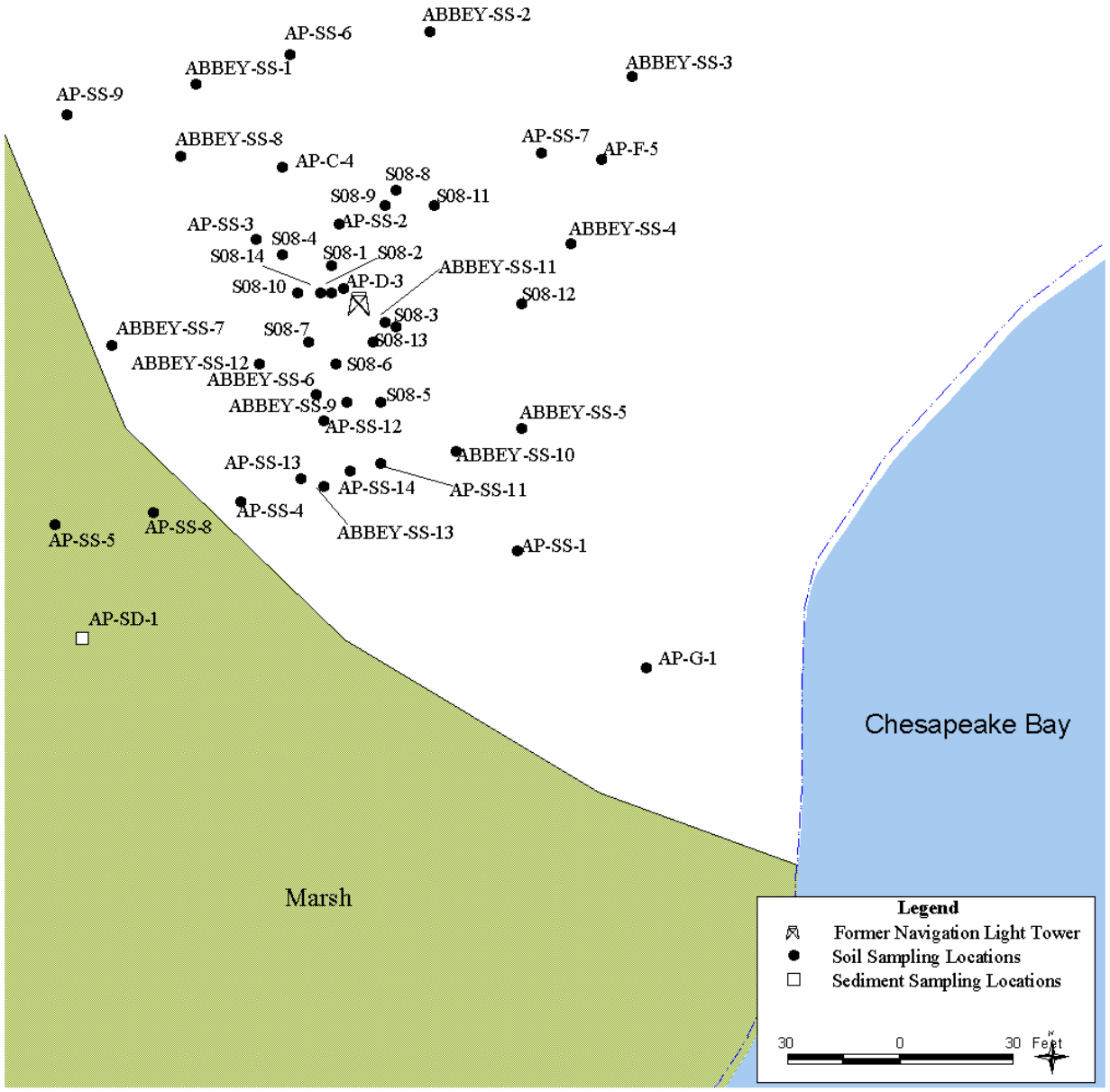
During the 1995 Phase I scoping visit, a minimum of 50 discarded batteries were observed in a low-profile pile located approximately 15 to 20 ft southwest of the tower. Several of the batteries were exposed at the surface, whereas others were partially buried by soil. The lateral extent of the battery pile was estimated to be approximately 15 ft by 20 ft at the time of the visit. Single batteries were observed in other areas of the site. The vertical extent of the battery pile could not be determined during the Phase I visit. However, it appeared that the pile of batteries extended below the surface of the soft soil present at the site. No evidence of stressed vegetation or stressed wildlife was observed at the site. In 1996, APG removed the exposed batteries from the site for off-post disposal.

Historical site investigations have included a geophysical survey throughout the area of the former light tower and the collection of surface soil and sediment samples. Sample locations are presented on Figure 3. The area of investigation included soil and sediment within an approximate one-acre area. Several electromagnetic (EM) anomalies were found during the geophysical survey that could represent buried batteries (URS 2002). The surface soils immediately surrounding the former light tower are contaminated with metals associated with the batteries and primarily consist of (highest detected concentration in parentheses) antimony (14,700 mg/kg), arsenic (7.3 mg/kg), cadmium (6.65 mg/kg), copper (878.5 mg/kg), lead (1,600 mg/kg), manganese (14,700 mg/kg), mercury (104 mg/kg), nickel (271 mg/kg), vanadium (42.35 mg/kg), and zinc (162,000 mg/kg). Assessment of contaminant data indicate that there is approximately 186 cubic yards of COC-impacted surface media at the site.

Table 1: Conceptual Site Model – Five Sediment Sites

Site	Primary Source	Primary Release Mechanism	Secondary Source	Secondary Release Mechanism	Pathway	Exposure Route	Receptor				
							Human			Ecological	
							Construction Worker	Commercial Worker	Tresspasser	Terrestrial	Aquatic
Site 8	Discarded Batteries	Leaching/ Decomposition	Soil or Sediment	Erosion or Dust Entrainment	Soil	Ingestion	●	●	●	●	
						Dermal	●	●	●		
						Inahalation (air)	●	●	●		
					Sediment	Ingestion		●	●		●
						Dermal		●	●		
Site 9	Discarded Batteries	Leaching/ Decomposition	Sediment	Erosion	Sediment	Ingestion		●	●		●
						Dermal		●	●		
					Surface Water	Ingestion		●	●		●
						Dermal		●	●		
Site 12	Solid Waste	Leaching/ Decomposition	Sediment	Erosion	Soil	Ingestion	●	●	●	●	
						Dermal	●	●	●		
						Inhalation (air)	●	●	●		
					Sediment	Ingestion		●	●		●
						Dermal		●	●		
					Surface Water	Ingestion		●	●		●
						Dermal		●	●		
Site 16	Scrap Materials	Leaching/ Decomposition	Soil or Sediment	Erosion or Dust Entrainment	Soil	Ingestion	●	●	●	●	
						Dermal	●	●	●		
						Inhalation (air)	●	●	●		
					Sediment	Ingestion		●	●		●
						Dermal		●	●		
					Surface Water	Ingestion		●	●		●
						Dermal		●	●		
Site 17	Process Waste Water	Leaching	Sediment	Erosion	Sediment	Ingestion		●	●		●
						Dermal		●	●		
					Surface Water	Ingestion		●	●		●
						Dermal		●	●		

Note: Groundwater pathway was assessed where applicable and addressed under a separate ROD.



IRP Site 8: Discarded Batteries at Abbey Point Navigation Light

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Sampling Locations

Figure 3

Site 9: Discarded Batteries at Spesutie Island Navigation Light

During the Phase I Remedial Investigation (RI) scoping visit in 1995, a minimum of 50 to 60 discarded batteries were observed in shallow water beneath the tower. Numerous batteries were also observed submerged in approximately 3 to 4 ft of water immediately around the tower. In 1996, APG removed the batteries from the site for off-post disposal.

Historical site investigations have included a geophysical survey throughout the area of the former light tower and the collection of sediment and surface water samples. Sample locations are presented on Figure 4. The area of investigation included soil and sediment within an approximate ¾ of an acre area. Five electromagnetic (EM) anomalies were found during the geophysical survey that could represent buried batteries in the sediment of Back Creek (URS 2002). The sediments immediately surrounding the former light tower are contaminated with metals associated with the batteries and primarily consist of (highest detected concentration in parentheses) mercury (17.4 mg/kg) and zinc (4,140 mg/kg). Assessment of contaminant data indicate that there is approximately 185 cubic yards of COC-impacted surface media at the site.

Site 12: Old Chemical Dump on Spesutie Island

During the planning of the Phase I RI, aerial photographs from 1952, 1957, and 1981 were reviewed, and no evidence of dumping at the reported location was observed in any of the photos. In addition, no evidence of site impairment (such as vegetation stress) was noted on 1981 color-infrared photographs. The site was visually inspected during a reconnaissance visit and no debris believed to be associated with an old dump was observed (URS 2002).

The Phase I RI consisted of performing a geophysical survey and the collection of sediment and groundwater samples (URS 2002). Results of the geophysical survey revealed an area with elevated electromagnetic response approximately 25 ft in length, adjacent to the roadbed in both the north and south direction. In addition, several pieces of metallic debris (metal reel and cable, small arms shell casings, field radio, and several cylindrical metal covers) were found within this area. No bottles, boxes of chemicals, canisters, or other surface expressions of chemical dumping were observed during the geophysical investigation.

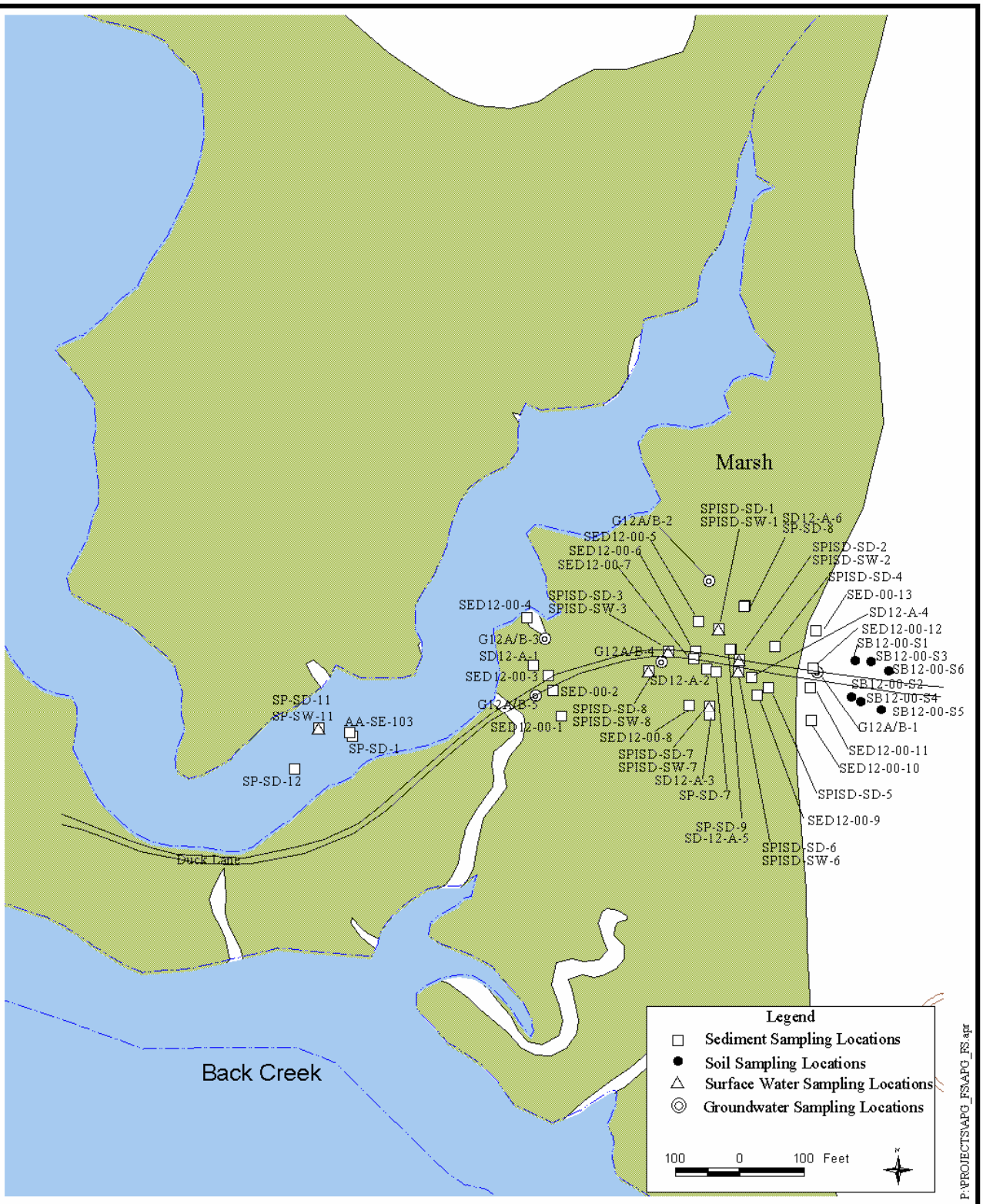
Historical site investigations, in addition to the geophysical investigation, have included the collection of soil, sediment, surface water and groundwater samples. Sample locations are presented on Figure 5. The area of investigation included soil and sediment within an approximate 8-acre area. The sediments in a localized area immediately adjacent to the road are contaminated with metals associated with the refuse and primarily consist of (highest detected concentration in parentheses) copper (16,200 mg/kg), cadmium (20 mg/kg), lead (153 mg/kg) , mercury (225 mg/kg), and zinc (25,100 mg/kg). Assessment of contaminant data indicate that there is approximately 93 cubic yards of COC-impacted surface media at the site.

IRP Site 9: Discarded Batteries
at Spesutie Island Navigation Light

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Sampling Locations

Figure 4



IRP Site 12: Old Chemical Dump
on Spesutie Island

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Sampling Locations

Figure 5

Site 16: DRMO Metal Scrap Yard

Preliminary soil sampling was performed at Site 16 during the 1990 Remedial Facility Evaluation to evaluate whether contaminant releases had occurred at the facility. Elevated levels of lead and PCBs were detected in samples collected from three areas within and immediately adjacent to the yard area of the site where transformers were previously stored (WES 1990).

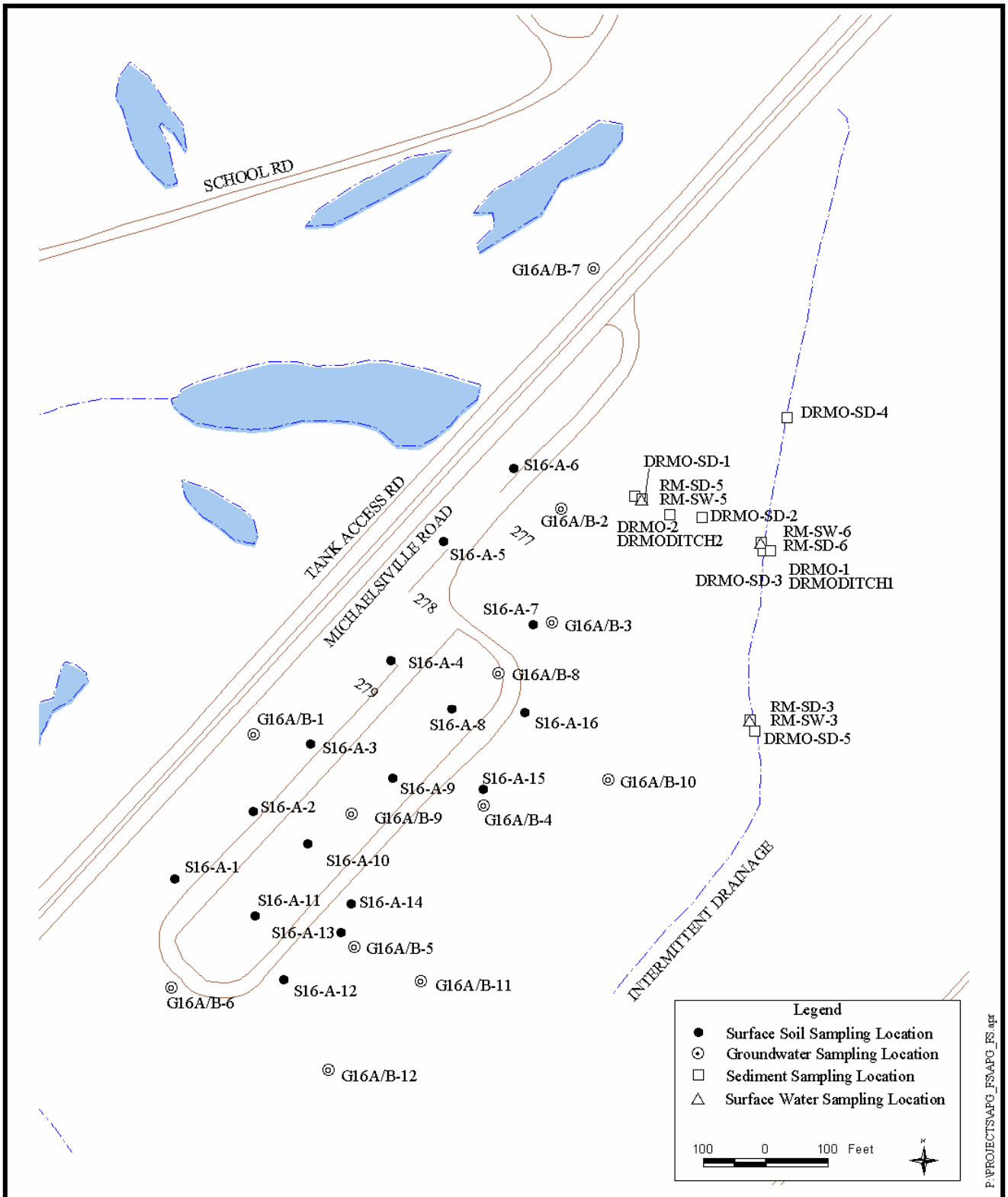
A removal action was completed in the former transformer storage area in January and August 1994. This action consisted of the excavation and disposal of contaminated soil from three areas. Two of the areas were approximately 25 ft by 25 ft in an area within the DRMO Metal Scrap Yard, and the third area, adjacent to the first two areas separated by a chain-link fence, was approximately 15 ft by 30 ft. Each area was excavated to a depth of 1 ft, and a total of 106 tons of soil with a maximum contamination of 83 mg/kg of PCBs was removed (URS 2002).

Historical site investigations have included the collection of soil, sediment, surface water and groundwater samples. Sample locations are presented on Figure 6. The area of investigation included soil and sediment within an approximate 12.7-acre area. The sediments located within an intermittent drainage to the north end of the site are contaminated with (highest detected concentration in parentheses) PCBs (arochlor 1254) (17 mg/kg), arsenic (18.4 mg/kg), cadmium (59.1 mg/kg), copper (2,980 mg/kg), lead (2,560 mg/kg), nickel (331 mg/kg), vanadium (81.1 mg/kg), and zinc (30,900 mg/kg), that are believed to be associated with historical storage of transformers. Assessment of contaminant data indicate that there is approximately 111 cubic yards of COC-impacted surface media at the site.

Additionally, groundwater in the southern portion of the site is impacted with chlorinated solvents but is not associated with the area of sediment impacts as they are separate areas of the site and are impacted with different types of contaminants. The impacted groundwater portion of the site is addressed in a separate FS (EA 2005f) and ROD.

Site 17: Silver Contaminated Ditch in Transonic Range Area

Historical site investigations have included the collection of sediment, surface water and groundwater samples. Sample locations are presented on Figure 7. The area of investigation included soil and sediment within an approximate 9-acre area The sediments located within an intermittent drainage from Building 740B are contaminated with metals associated with the former film processing activities including (highest detected concentration in parentheses) silver (804 mg/kg) and chromium (417.2 mg/kg). Assessment of contaminant data indicate that there is approximately 111 cubic yards of COC-impacted surface media at the site.

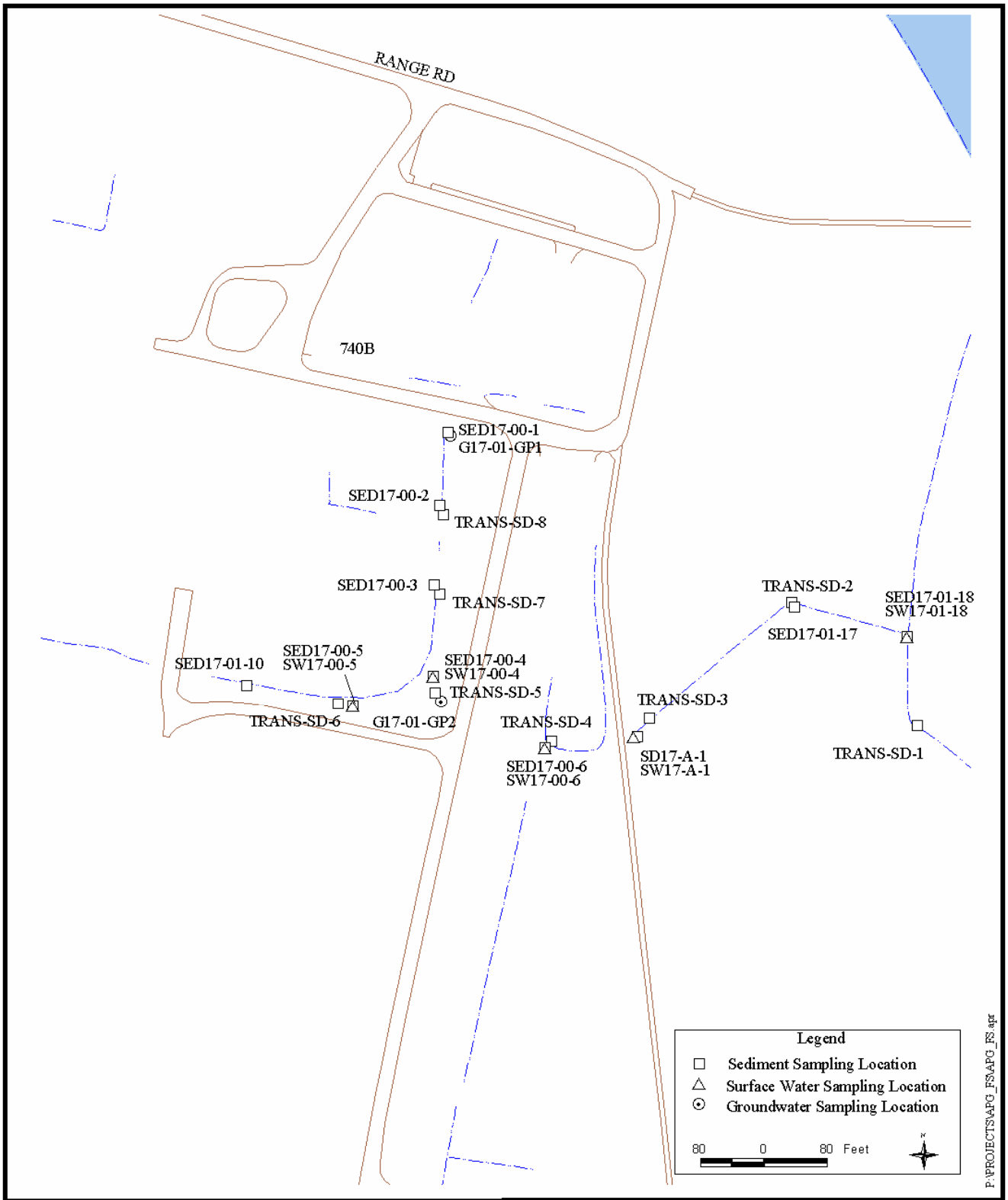


IRP Site 16: DRMO Metal Scrap Yard

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Sampling Locations

Figure 6



IRP Site 17: Silver Contaminated Ditch in Transonic Range Area

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Sampling Locations

Figure 7

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

All Five Sediment Sites are located within the restricted access area of the Aberdeen Area. Abbey Point and Spesutie Island (Sites 8, 9, and 12) are undeveloped and unused sites located in remote, outlying range areas. Site 16 is the DRMO Metal Scrap Yard, a remote fenced lot located alongside Michaelsville Road in the restricted area and adjacent to an active range. Site 17 is a drainage ditch located in the Transonic Range, part of the Research, Development, Test, and Evaluation Facilities at APG. A number of facilities, including an indoor testing range, laboratories, and administrative facilities, are located around the Site 17 ditch. Control of all five sites is expected to remain under military authority with continued land use for military training, operational range, and industrial activities for the foreseeable future; therefore, future residential development is highly unlikely for these five sites.

There are currently no drinking water wells at any of the five sites and the groundwater is not in use. The installation of such wells is highly unlikely in the future.

The current land use surrounding the AA generally consists of residential communities, light industrial areas and agricultural areas; these land uses are anticipated to remain the same in the future. The estuaries and creeks around the Five Sediment Sites are an important natural resource and are used for public recreation including boating, fishing and swimming; however, a restriction on these activities is imposed directly around military property, which extends offshore approximately one mile into the Chesapeake Bay. The water bodies, marshes, and upland areas (particularly areas of the AA where development has not occurred) are also an important habitat for waterfowl, fish, and other wildlife species.

2.7 SUMMARY OF SITE RISKS

The Baseline Risk Assessment (BRA) estimates what risk the site poses if no action is taken. It provides the basis for taking action, if necessary, and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for the Five Sediment Sites.

2.7.1 Human Health Risk Assessment

The purpose of a human health risk assessment is to determine whether exposure to site-related contaminants would likely adversely affect human health. The focus of the human health risk assessment is on the potential human health effects that could occur under current or potential future use scenarios in the event that contamination is not remediated. The risk is expressed as lifetime excess cancer risk (LECR) for carcinogens, and hazard index (HI) for non-carcinogens. For example, an LECR of $1x10^{-6}$ represents the probability of one additional cancer in a population of one million exposed. The cancer risk of $1x10^{-4}$ to $1x10^{-6}$ is the acceptable risk range within which risk may be managed. A hazard index is the ratio of anticipated exposure of an individual to the

reference dose, the dose at which no adverse effects are expected to occur. If this ratio is less than or equal to one, then no adverse non-cancer effects are expected to occur. A hazard quotient (HQ) is the sum of the hazard indices for all site contaminants and/or routes of exposure. An HQ above one presents a likelihood of non-carcinogenic health effects in exposed populations.

2.7.1.1 Identification of Contaminants of Concern

The identification of contaminants of concern for each site was conducted in several steps. First, maximum concentrations of contaminants found were compared to USEPA Region III Risk-Based Criteria or other approved screening levels. Chemicals exceeding or lacking these criteria were identified as contaminants of potential concern (COPCs). These contaminants were then evaluated using exposure models and dose-based criteria to identify chemicals that may pose risks to receptors. Maximum or 95% Upper Confidence Limit on the Mean (UCLM) values were used as the exposure point concentrations in these models based on the statistical distribution of contaminant concentrations. This process resulted in identification of contaminants of concern (COCs) for further evaluation in the feasibility study. No human health-based COCs were identified for surface media at Sites 8, 9, 12 and 17. COCs for Site 16 surface media, their mean, maximum, and exposure point concentrations, and their frequency of detection are presented in Table 2.

2.7.1.2 Exposure Assessment

The five sediment sites are located in the downrange area where current installation restrictions prevent residential land use. In addition, there are no drinking water wells (i.e., public water is provided) at the sites downrange and installation of such wells at these sites is highly unlikely.

Therefore, the assessments for these sites examined construction worker, adolescent trespasser, and industrial/ military/ commercial worker exposure scenarios since these sites demonstrate current and reasonably anticipated future industrial/military land use. Due to the restricted range location of these sites, residential scenarios were not considered in the assessment of these sites, but a residential evaluation was performed and results provided for informational purposes only in Appendix H of the HHRA (EA, 2005a; 2005b). (Potential unacceptable residential risks were determined for each site in the residential scenario.) For downrange sites, industrial/military commercial scenarios were considered the reasonable worst-case scenarios and used as the basis for remedial decisions.

The risk assessment considered specific exposure pathways for each receptor. For trespassers and commercial workers, exposures to contaminants in soil, sediment and surface water were considered complete via dermal contact, incidental ingestion, and inhalation. For construction workers, exposures to contaminants in soil were considered complete via dermal contact, incidental ingestion, and inhalation. Exposures to shallow groundwater were also considered complete when groundwater was within 10 feet of the

ground surface or as a conservative measure. Groundwater exposure risks and response actions were addressed separately under a separate ROD (EA 2005g). It is important to note that not every site included all the media of concern listed above; scenarios were applied to each site where the targeted media of concern were sampled and a route of exposure was considered complete.

Exposure estimates were derived using exposure assumptions for USEPA guidance, or from other sources with USEPA approval. Risks from lead were evaluated using modeled blood lead levels; these were also developed using EPA models (USEPA 1994, 1996). Exposure parameters and models are presented in detail in the approach document for these sites (EA 2004).

2.7.1.3 Toxicity Assessment

A human toxicity assessment was performed to evaluate whether exposure to specific contaminants may cause adverse effects, and to identify specific numeric criteria that could be used to assess the impacts of such exposures.

For non-cancer endpoints, contaminant-specific reference doses (RfD) were compiled from the Integrated Risk Information System (IRIS) (USEPA, 2004), which provides toxicity potency concentrations. Where these were unavailable, toxicity values from the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997) were used as a second source. If a value was not available for one route of exposure, values for alternate routes were evaluated for technical applicability and used where appropriate; for example, some oral RfDs were modified for use as dermal RfDs using adjustment factors. Chronic RfDs were used to assess long-term exposures of seven years to a lifetime; subchronic RfDs were used to assess exposures of less than seven years. For lead, the toxicity assessment identified the established blood-lead threshold value of 10ug/lead/dL for comparison to model results.

For carcinogenic endpoints, cancer slope factors were derived from IRIS, HEAST, or other sources as approved. These slope factors relate cumulative exposures to the probability of developing cancer. In some cases, oral RfDs were modified for use as dermal RfDs using adjustment factors.

2.7.1.4 Risk Characterization

The following sections discuss the risk characterization results for each site. It is important to note that this record of decision applies only to surface media; groundwater is addressed in a separate Record of Decision for Six Groundwater Sites (EA, 2005h).

Site 8: Discarded Batteries at Abbey Point Navigation Light

For Site 8, total carcinogenic risks from contaminants of potential concern in surface media were below 10^{-6}, and HQs for contaminants of potential concern presenting non-carcinogenic risks were below 1. Based on this information, contaminants in surface

media at Site 8 do not pose unacceptable risks to humans for the anticipated future use of the site.

Site 9: Discarded Batteries at Spesutie Island Navigation Light

For Site 9, total carcinogenic risks from contaminants of potential concern in surface media were below 10^{-6}, and HQs for contaminants of potential concern presenting non-carcinogenic risks were below 1. Based on this information, contaminants in surface media at Site 9 do not pose unacceptable risks to humans for the anticipated future use of the site.

Site 12: Old Chemical Dump on Spesutie Island

For Site 12, total carcinogenic risks from contaminants of potential concern in surface media were below 10^{-6}, and HQs for contaminants of potential concern presenting non-carcinogenic risks were below 1. Based on this information, contaminants in surface media at Site 12 do not pose unacceptable risks to humans.

Site 16: DRMO Metal Scrap Yard

At Site 16, surface soil was identified as the only media of concern. PCBs in soil (Aroclor 1254) present an unacceptable non-cancer risk with an HQ greater than 1 for construction workers; cancer risks were within the acceptable risk range. Table 2 provides a summary of risk assessment results for construction workers from PCBs.

Table 2: Risk Summary for Primary COCs Contributing to Construction Worker Scenario Non-Cancer Hazard for Site 16

Contaminants of Concern	Frequency of Detection	Contaminant Concentrations (mg/kg)			Total Non-Carcinogenic Risk		
		Mean	Maximum	EPC	Reference Dose (mg/kd-bw/day)	Source (Target Organ)	Total Risk Across Exposure Routes[1]
PCB (Aroclor 1254)[1]	16/16	2.53	17.0	6.86 (95UCLM)	2.0×10^{-5}	IRIS, 2004 (Liver, skin)	1.61

[1] – Includes exposure via soil through ingestion and dermal absorption and exposure via air through inhalation of dust

Site 17: Silver Contaminated Ditch in Transonic Area

For Site 17, total carcinogenic risks from contaminants of potential concern in surface media were below 10^{-6}, and HQs for contaminants of potential concern presenting non-carcinogenic risks were below 1. Based on this information, contaminants in surface media at Site 17 do not pose unacceptable risks to humans.

Uncertainties

There are a number of uncertainties inherent to human health risk assessment methodology. In many cases, the risk assessment uses assumptions that are conservatively protective; such as ingestion rates exposure durations. These assumptions

are likely to overestimate risks, and may result in risk estimates finding a greater likelihood of effects than actually present.

2.7.2 Ecological Risk Assessment

An ecological risk assessment was conducted for each site according to USEPA guidance. A conceptual model was developed identifying exposure pathways by which receptors might be exposed to contaminants. Based on this model, concentrations of source-related contaminants in environmental media were screened against conservative screening values provided by USEPA BTAG Region III (USEPA, 1995). Screening results were used with information concerning exposure, toxicity, fate, and transport to conduct a baseline problem formulation and create a BERA site model. Based on this model, additional sampling was conducted and site-specific analyses and bioassays were performed to further investigate site-specific bioavailability, toxicity, and bioaccumulation. This information was used in food web models to derive estimates of wildlife exposures, which were then compared to no adverse effects and low adverse effects benchmarks. Toxicity test data was used to directly evaluate risks to lower trophic level receptors.

These results were used as part of a weight of evidence to prepare a risk characterization identifying specific COCs for each receptor. The full weight of evidence is presented in the final ecological risk assessments (EA 2005c, 2005d).

2.7.2.1 Identification of Contaminants of Concern

Contaminants of concern (COCs) were identified based on the results of the weight of evidence presented in the risk characterization. A variety of exposure point concentrations and scenarios were evaluated as part of this approach, including site maxima and site mean. Models and comparisons included evaluation of whole media concentrations, estimated bioavailable concentrations of metals, and concentrations in plant, worm, and/or fish tissue from bioassays or field collected specimens. Table 3 presents the final list of COCs as developed in the ecological risk assessments (EA 2005c, 2005d).

2.7.2.2 Exposure Assessment

The BERA conceptual model for Sites 8, 9, 12, 16, and 17 identified receptors and assessment endpoints specific to each site. Sites 9 and 12 are located in marshes and provide solely aquatic habitat; assessment endpoints for these sites included protection of the survival, growth, and reproduction of aquatic and benthic organisms and of aquatic organism-consuming birds and mammals.

Site 8 is characterized as solely terrestrial habitat; assessment endpoints for this site included protection of survival, growth, and reproduction of terrestrial plants, soil invertebrates, herbivorous mammals, vermivorous mammals and birds, predatory mammals and birds.

Sites 16 and 17 consist of drainage ditches; these areas provide ephemeral wetland habitat that may support terrestrial receptors and few aquatic organisms. Assessment endpoints for these sites included protection of survival, growth, and reproduction of terrestrial plants, soil invertebrates, herbivorous mammals, vermivorous mammals and birds, predatory mammals and birds, and aquatic and benthic organisms.

Ingestion/root uptake and direct contact were considered complete exposure pathways for lower trophic level organisms. Ingestion of prey and environmental media was considered the most significant complete exposure pathway for wildlife; there is inadequate data to estimate inhalation and dermal exposures for wildlife, which are expected to result in less significant exposures than ingestion.

Protection of amphibians and reptiles was also included as an assessment endpoint at all sites, although the lack of data for these receptors prohibited quantitative evaluation.

2.7.2.3 Toxicity Assessment

A toxicity assessment was performed to identify whether contaminants detected at the site may cause effects on receptors and to determine benchmarks for comparison to exposure point concentrations and modeled doses. Benchmarks were derived from no adverse effects concentrations (NOAECs), dose-based no adverse effects levels (NOAELs), low adverse effects concentrations (LOAECs), and dose-based low adverse effects levels (LOAELs) from a large number of literature-based sources. To identify the potential for effects, concentrations and modeled doses were compared to benchmarks to develop a hazard quotient (HQ). Site-specific bioavailability and bioaccumulation data were used to modify exposure point concentrations and modeled doses to provide more site-specific conclusions regarding risks. A hazard quotient greater than 1 indicates that there is a potential for adverse effects to occur.

In addition to benchmarks, toxicity tests were performed using soil, sediment, and surface water from the sites to directly assess the toxicity of contaminants in environmental media; test results were compared to test results from unimpacted reference areas.

2.7.2.4 Risk Characterization

The risk characterization for each site considered many factors as part of a weight of evidence approach. These included comparisons of exposure point concentrations to environmental media-based benchmarks; comparisons of doses modeled using total and bioavailable concentrations to benchmarks; toxicity test results; evidence of bioavailability, uptake, and bioaccumulation; spatial distribution of contaminants in relation to habitat; and comparisons between exposures and effects at the site and exposures and conditions at unimpacted reference areas. The following sections summarize the findings of the risk characterization for each site. Because data was not available to quantitatively assess reptiles and amphibians, these receptors were qualitatively assessed by examining whether or not other receptors were at risk.

Site 8: Discarded Batteries at Abbey Point Navigation Light

The BERA assessed the potential for adverse effects on the survival, growth, and reproduction of a selected group of ecological receptors based on food web modeling and toxicological studies. Similar to the HHRA, ecological-based numeric criteria are used to identify the ecological contaminants of concern (COC). Based on the results of the risk characterization, adverse effects to ecological receptors may result from concentrations of specific COCs presented below and included on Table 3 (EA 2005c):

- Vermivorous mammals (antimony, arsenic, methylmercury, mercury, and zinc)- based on food web modeling;
- Vermivorous birds (methylmercury, mercury, and zinc)- based on food web modeling.

Site 9: Discarded Batteries at Spesutie Island Navigation Light

The BERA assessed the potential for adverse effects on the survival, growth, and reproduction of a selected group of ecological receptors based on food web modeling and toxicological studies (EA 2005c). Based on the results of the toxicological studies adverse effects to aquatic and benthic organisms were noted and may be related to mercury and zinc at Site 9 as presented on Table 3.

Site 12: Old Chemical Dump on Spesutie Island

The BERA assessed the potential for adverse effects on the survival, growth, and reproduction of a selected group of ecological receptors based on food web modeling and toxicological studies. Based on the results of the toxicological studies, adverse effects to aquatic and benthic organisms were noted and may be related to elevated levels of copper and zinc at Site 12 as presented on Table 3.

Site 16: DRMO Metal Scrap Yard

The BERA assessed the potential for adverse effects on the survival, growth, and reproduction of a selected group of ecological receptors based on food web modeling and toxicological studies (EA 2005c). Based on the results of the risk characterization, adverse effects to ecological receptors may result from concentrations of specific COCs presented below and included on Table 3.

- Vermivorous birds - arsenic, vanadium, and PCBs.

Site 17: Silver Contaminated Ditch in Transonic Range Area

The BERA assessed the potential for adverse effects on the survival, growth, and reproduction of a selected group of ecological receptors based on food web modeling and toxicological studies (EA 2005c). Based on the results of the risk characterization,

Table 3: Chemicals of Concern

Chemical of Concern	Media of Concern	Minimum (mg/kg)	Maximum (mg/kg)	Mean (mg/kg)	Frequency of Detection	Receptors
SITE 8 –ABBEY POINT NAVIGATION LIGHT						
Antimony	Soil	1.8	3.3	0.76	21/21	• Vermivorous mammals
Arsenic	Soil	3	6	4.01	6/6	• Vermivorous mammals
Cadmium	Soil	0.07	6.9	1.88	4/5	• Soil invertebrates
Copper	Soil	3.2	1650	94.5	21/21	• Terrestrial plants
Lead	Soil	9.9	747	95.5	20/20	• Soil invertebrates
Mercury/Methylmercury	Soil	0.09	104	17.7	16/18	• Terrestrial plants • Soil Invertebrates • Vermivorous mammals • Vermivorous birds
Nickel	Soil	0.87	112	15.4	21/21	• Terrestrial plants
Zinc	Soil	4	206,000	14,100	21/21	• Terrestrial plants • Soil Invertebrates • Vermivorous mammals • Vermivorous birds
SITE 9 – SPESUTIE ISLAND NAVIGATION LIGHT						
Mercury	Sediment	0.11	17.4	4.13	15/15	• Aquatic and benthic organisms
Zinc	Sediment	115	4140	859	21/21	• Aquatic and benthic organisms
SITE 12 – OLD CHEMICAL DUMP ON SPESUTIE						
Copper	Sediment	27.1	16,200	1960	9/9	• Aquatic and benthic organisms
Zinc	Sediment	35.2	25,100	2350	12/12	• Aquatic and benthic organisms
SITE 16 – DRMO METAL SCRAP YARD						
Arsenic	Hydric soil	4.8	52.2	14.4	7/7	• Vermivorous mammals
Cadmium	Hydric soil	0.94	11.2	5.02	6/6	• Terrestrial plants
Copper	Hydric soil	29.3	576	204	8/8	• Terrestrial plants
Lead	Hydric soil	69.7	788	289	8/8	• Terrestrial plants
Nickel	Hydric soil	14.7	107	51.8	8/8	• Terrestrial plants
PCBs (Aroclor 1254/1260)	Hydric soil	.288	13.2	3.79	8/8	• Vermivorous mammals
Vanadium	Hydric soil	31	68	45.7	8/8	• Vermivorous mammals
Zinc	Hydric soil	113	1340	528	8/8	• Terrestrial plants

Table 3 (Continued): Chemicals of Concern

Chemical of Concern	Media of Concern	Minimum (mg/kg)	Maximum (mg/kg)	Mean (mg/kg)	Frequency of Detection	Receptors
SITE 17 – TRANSONIC RANGE SILVER CONTAMINATED DITCH						
Chromium	Hydric soil	5.8	275	70.3	8/8	• Terrestrial plants • Soil Invertebrates
Mercury	Hydric soil	0.17	0.48	0.159	4/8	• Soil Invertebrates
Silver	Hydric soil	1.6	580	471	6/7	• Terrestrial plants • Soil Invertebrates • Vermivorous birds
Zinc	Hydric soil	24.5	251	72.2	8/8	• Soil Invertebrates

The range of concentrations presented in this table represent data from the 2002-2004 BERA sampling events that included toxicity and sequential extraction procedure (SEP) analysis. The values in this table use a subset (the risk assessment investigations) of the site data to determine the RGs. RI data was used to determine the hotspots and the risk data further evaluated the hotspots and have the SEP data.

adverse effects to ecological receptors may result from concentrations of specific COCs presented below and included on Table 3:

- Vermivorous birds – silver.

Uncertainties

There are a number of uncertainties associated with the ecological risk assessment. In many cases, model assumptions are chosen conservatively and may overestimate risk; site-specific data used in the risk assessment helps to decrease this likelihood. There is also uncertainty associated with reptiles and amphibians since data was unavailable to quantitatively assess these receptors and to develop remedial goals. In addition, data and benchmarks are unavailable for some contaminants, and thus there is related uncertainty.

2.7.3 Basis for Action

Concentrations of site-related COCs in soil or sediment present either a low level of unacceptable human health risk (Site 16) or may have adverse affects on ecological receptors (All Sites). The response action selected in this ROD is protective of public health and welfare and the environment.

2.8 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are goals developed for the protection of human health and the environment. The following RAOs were developed to prevent or eliminate complete exposure pathways where concentrations would likely result in unacceptable risks. The RAOs developed for sediment at each site are as follows:

- Prevent human/ecological exposure to COCs in excess of site-specific risk-based Remediation Goals (RG) in sediment and hydric soil (Table 4) within the confines of each site; and
- Prevent migration of COCs in sediment to adjacent media or to offsite areas.

The remedial alternatives discussed below focus on the COC-impacted sediment/hydric surface soil at the five sites. The COCs and site-specific RGs established for all five sites are presented in Table 4. As previously mentioned, human health risks are associated with only one of the five sites, Site 16: DRMO Metal Scrap Yard. RGs were presented in the FS (EA 2005e) at Site 16 for the PCB Aroclor 1254 based on protectiveness of human health (3.56 mg/kg) and ecological receptors (2.02 mg/kg). The lower of the two goals (2.02 mg/kg) is chosen as the site-specific RG. This is presented in Table 3. For the remaining four sites, the site-specific RGs were established based on ecological receptors. In some cases, the ecological RGs were based on the results of exposure modeling for wildlife; these exposure models estimate the amount of each COC consumed by wildlife and the levels likely to result in adverse effects. In other cases, the RG was established to define a specific region of COC-impacted sediment where adverse effects were noted during toxicological studies.

TABLE 4: FINAL RISK-BASED REMEDIAL GOALS

COC	RG (mg/kg)	RG Source	Soil invertebrate or plant bioassay-based benchmark* (mg/kg)
SITE 8 –ABBEY POINT NAVIGATION LIGHT			
Antimony	5	BACKGROUND	NA
Arsenic	13.1	BERA WILDLIFE GOAL	3.5
Cadmium	NA	NA	0.19
Copper	NA	NA	15.6
Lead	NA	NA	47.5
Mercury/Methylmercury	**1.2**	BACKGROUND	78.8
Nickel	NA	NA	14.4
Zinc	1,610**	SOIL INVERTEBRATE	1,610
SITE 9 – SPESUTIE ISLAND NAVIGATION LIGHT			
Mercury	**5.5**	AQUATIC/BENTHIC GOAL	NA
Zinc	**2110**	AQUATIC/BENTHIC GOAL	NA
SITE 12 – OLD CHEMICAL DUMP ON SPESUTIE ISLAND			
Copper	**851**	AQUATIC/BENTHIC GOAL	NA
Zinc	**693**	AQUATIC/BENTHIC GOAL	NA
SITE 16 – DRMO METAL SCRAP YARD			
Arsenic	13.09	BERA WILDLIFE GOAL	NA
Cadmium	NA	NA	5.06
Copper	NA	NA	69.1
Lead	NA	NA	159
Nickel	NA	NA	34.8
Aroclor 1254	**2.02**	BERA WILDLIFE GOAL	NA
Vanadium	45.7	BACKGROUND	NA
Zinc	NA	NA	281
SITE 17 – TRANSONIC RANGE SILVER CONTAMINATED DITCH			
Chromium	NA	NA	275
Mercury	NA	NA	0.48
Silver	**31.7**	BERA WILDLIFE GOAL	580
Zinc	NA	NA	133

BACKGROUND – Listed value is the 95% Upper Prediction Limit of the reference data set.
BERA WILDLIFE GOAL – Listed value is the site-specific clean-up goal developed in the BERA for mammalian and/or avian receptors. Goals represent mean exposure point concentrations.
NA – Receptor not identified as requiring development of a clean-up goal by the BERA.
* - Benchmarks developed for soil invertebrates and terrestrial plants are based on bioassay results; these values are listed separately from model-based goals since they are site-specific and involve uncertainties associated with limitations of bioassay data.
** - RG for zinc at Site 8 is based on soil invertebrate and terrestrial plant bioassay results. An RG based on the BERA Wildlife Goal (14,000 mg/kg) was deemed too high a value by EPA.
Bolded Values – Represent compounds that are anticipated to be the primary contaminant(s) that will determine the spatial extent of remediation.

The estimated volume of COC-impacted sediment above RGs that will be remediated at each site is presented in Table 5. Estimated soil volumes within the area of attainment were calculated based on the analytical results of the 2003 Phase II RI and the risk assessments. Surface square footage was calculated using a plan view of analytical data points and estimating that COC-impacted soil was present to mid-way between sampling points. An average depth of one-foot below ground surface (bgs) was used at each site, except Site 9, to calculate the volumes of impacted sediment. A depth of two feet was used at Site 9 based on potential for deeper impacts related to the heavy batteries sinking into the sediment. Figures 8 through 12 present estimated areas of each site that are expected to exceed site specific RGs. Sampling and analysis will be performed during remediation to verify compliance with RGs and the precise dimensions of the areas of attainment, with an assessment of residential use compatibility.

2.9 DESCRIPTION OF ALTERNATIVES

This section presents a description of the five remedial alternatives that were developed in the FS for each of the five sites:

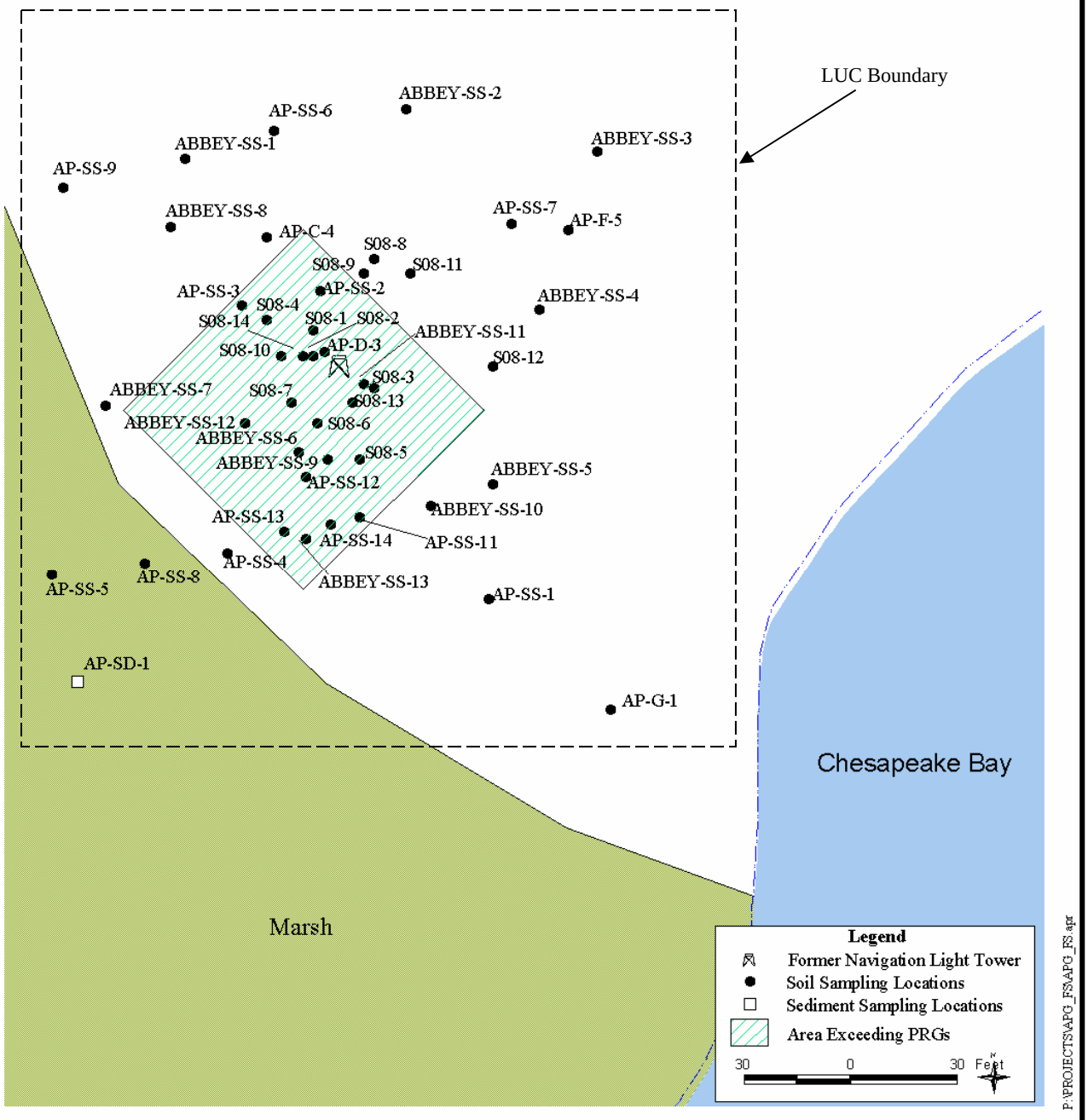
- **Alternative 1 – No Action**;
- **Alternative 2 – Land Use Controls** – To restrict future residential use;
- **Alternative 3 – Excavation, Offsite Disposal and Land Use Controls -** Excavate COC-impacted soil. Dewater and physically separate sediment and water. Sample sediment and water for hazardous characteristics and dispose of at appropriate off-Post landfill. Institute LUCs to restrict future residential land use;
- **Alternative 4 – Sediment Washing and Land Use Controls**- Excavate COC-impacted soil. Transport sediment to staging area. Dewater and physically separate sediment and water by soil washing and screening. Sample water and sediment for hazardous characteristics. Dispose of washed sediment on site and hazardous waste at an appropriate off-Post landfill (COC concentrations in soil are required not to exceed RGs prior to disposal as clean fill onsite). Institute LUCs to restrict future residential land use; and
- **Alternative 5 – In-Situ Cap and Land Use Controls**- Install low permeability cap over impacted areas. Monitor surface water for COC migration. Monitor and maintain cap integrity. Institute LUCs to restrict future residential land use.

Except for Alternative 1, the no-action alternative, all alternatives share the following common LUCs:

1. Master Plan use restriction on military family housing, non-military residential housing, elementary and secondary schools, child care facilities and playgrounds;
2. Access restrictions; and,
3. Periodic inspections and reports.

TABLE 5: ESTIMATED SEDIMENT VOLUMES EXCEEDING RGs

Attainment Area	Length (feet)	Width (feet)	Depth (feet)	Cubic Feet	Cubic Yards	Tons
Site 8: Discarded Batteries at Abbey Point Navigation Light	71	71	1	5,041	186	278
Site 9: Discarded Batteries at Spesutie Island Navigation Light	50	50	2	5,000	185	278
Site 12: Old Chemical Dump on Spesutie Island	50	50	1	2,500	93	140
Site 16: DRMO Metal Scrap Yard	300	10	1	3,000	111	167
Site 17: Silver Contaminated Ditch in Transonic Range Area	600	5	1	3,000	111	167
				Totals	**686**	**1,030**

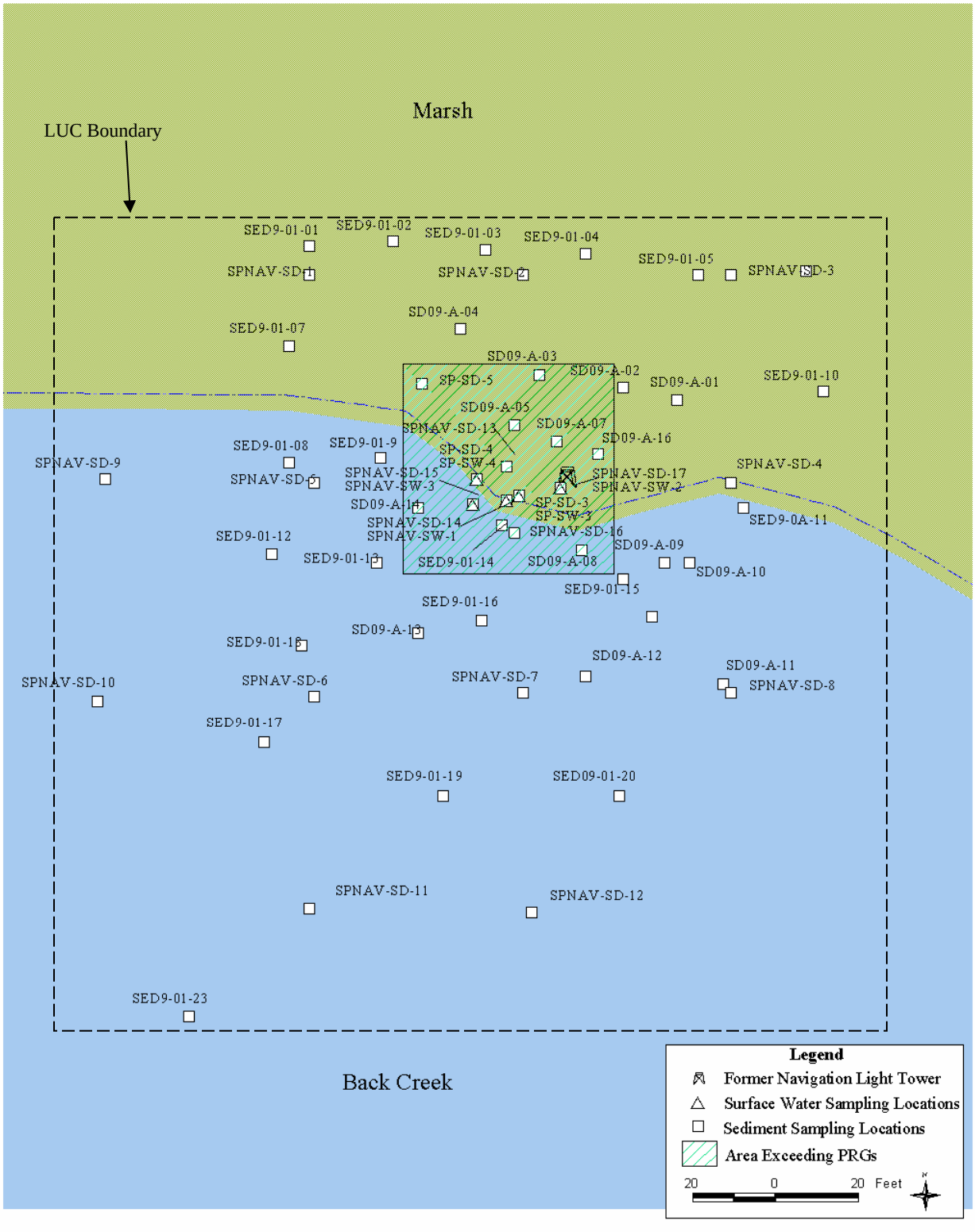


IRP Site 8: Discarded Batteries at Abbey Point Navigation Light

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Estimated Area Exceeding PRGs

Figure 8

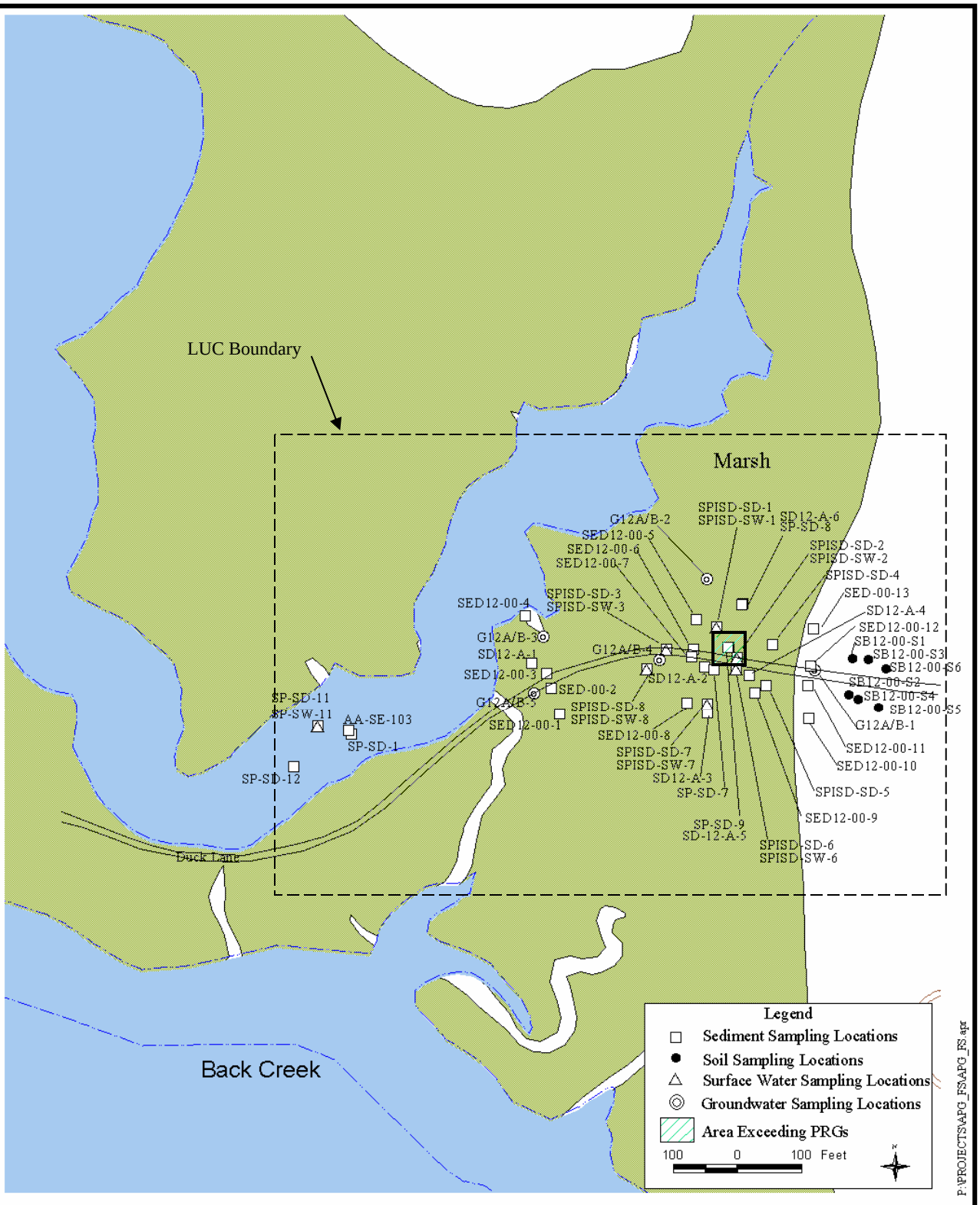


IRP Site 9: Discarded Batteries at Spesutie Island Navigation Light

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Estimated Area Exceeding PRGs

Figure 9

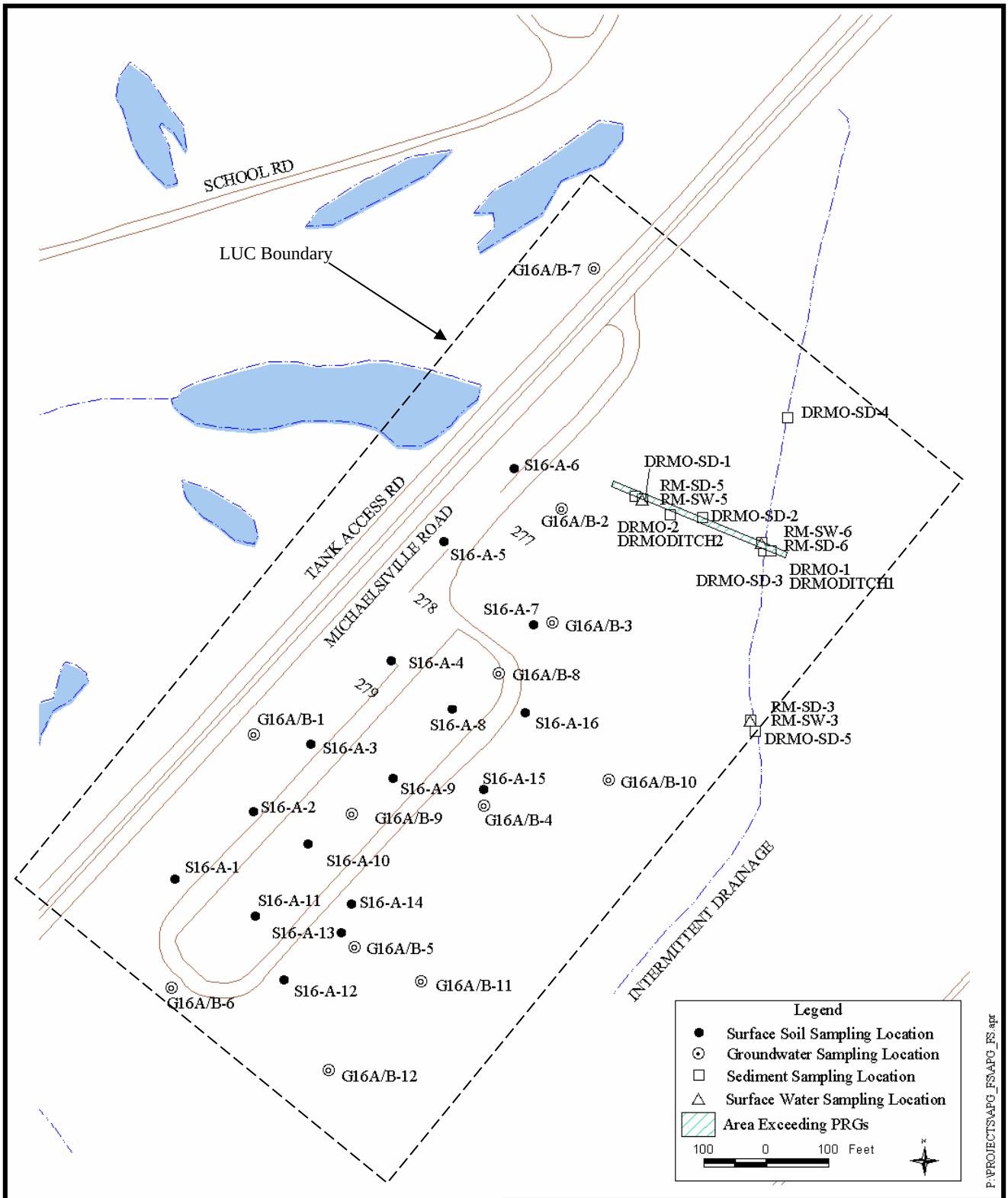


IRP Site 12: Old Chemical Dump
on Spesutie Island

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Estimated Area
Exceeding PRGs

Figure 10

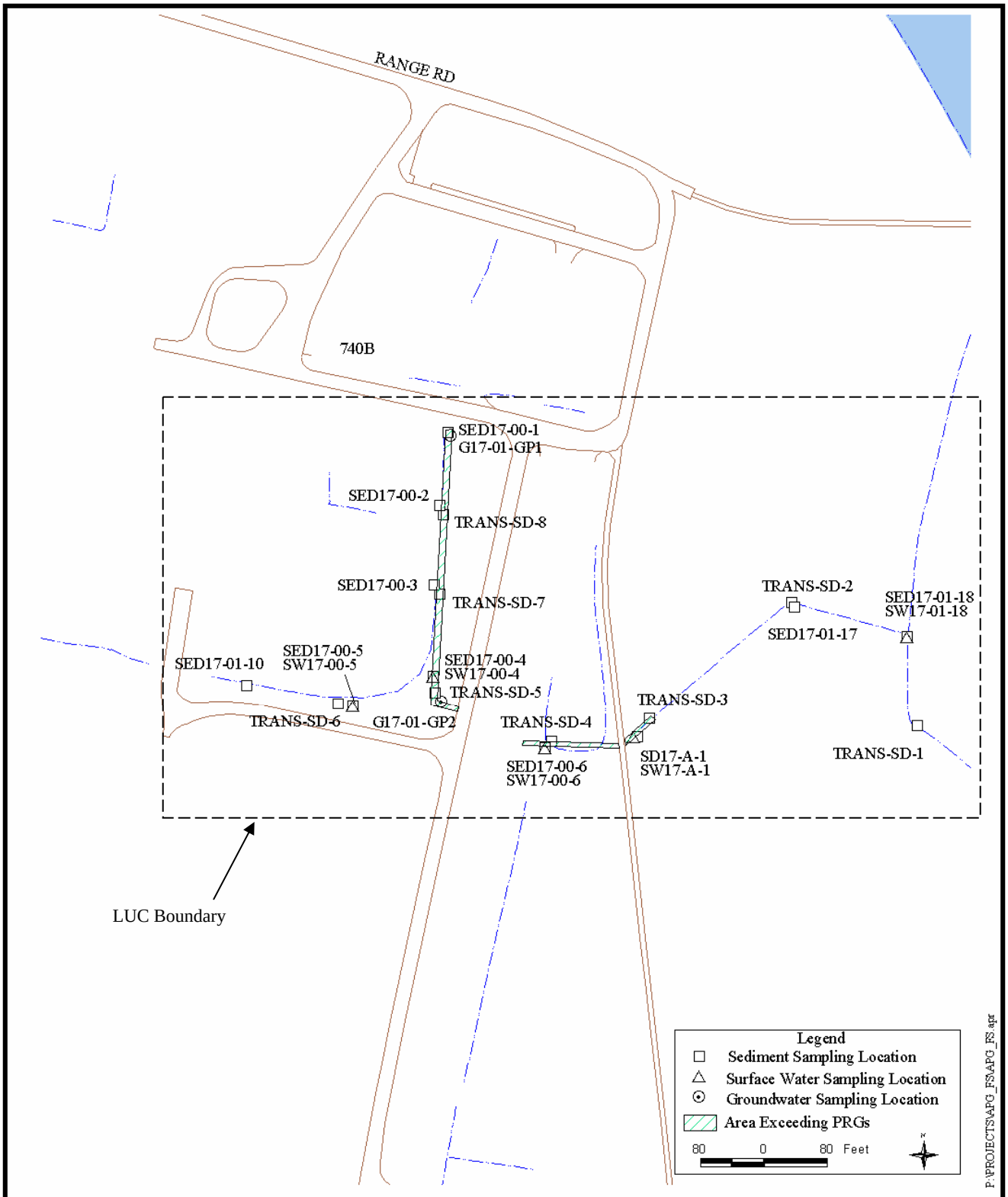


IRP Site 16: DRMO Metal Scrap Yard

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Estimated Area Exceeding PRGs

Figure 11



IRP Site 17: Silver Contaminated Ditch in Transonic Range Area

ABERDEEN AREA,
ABERDEEN PROVING GROUND, MARYLAND

Estimated Area Exceeding PRGs

Figure 12

2.9.1 Alternative 1: No Action

For each site:

Estimated Capital Cost:	$0
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$51,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	0

Pursuant to Section 300.430(e)(3)(ii)(6) of the revised NCP, the "No Action" alternative is developed to provide a baseline against which the other remedial alternatives are to be compared.

Evaluation of this alternative in the FS assumed that LUCs would not be implemented and actions, such as LUCs, would not continue. The FS also indicated that Remedy reviews every five years would be required because the contamination remaining onsite would not allow for unlimited use and unrestricted exposure. The cost estimate is based on performing the remedy reviews six times during a 30-year period.

2.9.2 Alternative 2: Land Use Controls

Site 8 – Discarded Batteries at Abbey Point Navigation Light:

Estimated Capital Cost:	$46,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$97,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	4 months

Site 9 – Discarded Batteries at Spesutie Island Navigation Light:

Estimated Capital Cost:	$50,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$101,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	4 months

Site 12 – Old Chemical Dump on Spesutie Island:

Estimated Capital Cost:	$46,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$97,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	4 months

Site 16 – DRMO Metal Scrap Yard:

Estimated Capital Cost:	$63,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$114,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	4 months

Site 17 – Silver Contaminated Ditch in Transonic Range Area:

Estimated Capital Cost:	$87,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$138,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	4 months

Alternative 2 involves LUCs which would restrict or prevent use, development, and exposure at the sites. These controls are in addition to the current use controls in place as each of the sites are currently within an active range area.

LUCs for this alternative would prevent human receptors from contacting site sediment by creating planning and physical barriers to restrict future residential use and non-residential use at Site 16. Restrictions would include amending the Installation master plan to note limitations on residential use and development, and non-residential use at Site 16. In addition, administrative security measures including limiting personnel authorized to access the site, creating notification procedures for site access, and limiting/tracking authorized activities would be implemented. As a physical barrier, a permanent fence with a secured gateway and appropriate signage would be erected around the site boundaries to prevent unauthorized access. Pursuant to CERCLA Section 121(c), 5-year reviews would be conducted to protect human health and the environment as long as deemed necessary based on the presence of residual COCs that would prevent unrestricted use of the sites. LUCs would not address COCs for ecological receptors.

2.9.3 Alternative 3: Excavation, Offsite Disposal and Land Use Controls

Site 8 - Discarded Batteries at Abbey Point Navigation Light:

Estimated Capital Cost:	$180,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$231,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 9 - Discarded Batteries at Spesutie Island Navigation Light:

Estimated Capital Cost:	$202,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$253,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 12 - Old Chemical Dump on Spesutie Island:

Estimated Capital Cost:	$200,00
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$251,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 16 - DRMO Metal Scrap Yard:

Estimated Capital Cost:	$167,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$218,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 17 - Silver Contaminated Ditch in Transonic Range Area:

Estimated Capital Cost:	$163,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$214,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

This remedial alternative involves excavating COC-impacted sediment for off-Post disposal.

Alternative 3 includes the following remedial components:

- Excavation of sediment/hydric soil impacted above RGs via mechanical or hydraulic dredging/excavation utilizing turbidity control to prevent resuspension as necessary. Dewatering of sediment to improve material handling characteristics. Removal of oversize fraction from sediment by dewatering and separation techniques;
- Characterization of dewatered sediment stockpiles for transport and disposal to an appropriate off-Post landfill;
- Characterization and proper disposal of water from the dewatering process;
- Post-removal confirmation sampling of excavated areas;

- Revegetation and reconstruction of removal areas;
- LUCs, as amended in the Master Plan, to prevent military family housing, non-military residential housing, elementary and secondary schools, child care facilities and playgrounds in this area; and
- CERCLA 121(c) 5-Year Reviews by the Army and USEPA.

2.9.4 Alternative 4: Sediment Washing and Land Use Controls

Site 8 - Discarded Batteries at Abbey Point Navigation Light:

Estimated Capital Cost:	$221,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$272,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 9 - Discarded Batteries at Spesutie Island Navigation Light:

Estimated Capital Cost:	$239,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$290,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 12 - Old Chemical Dump on Spesutie Island:

Estimated Capital Cost:	$286,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$337,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 16 - DRMO Metal Scrap Yard:

Estimated Capital Cost:	$193,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$244,000
Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

Site 17 - Silver Contaminated Ditch in Transonic Range Area:

Estimated Capital Cost:	$199,000
Estimated Present Worth O&M Cost:	$51,000
Estimated Total Present Worth Cost:	$250,000

Estimated Construction Timeframe:	0
Estimated Time to Achieve RAOs:	12 months

This remedial alternative involves excavating COC-impacted soil and separating the soil onsite using the soil washing process prior to off-Post disposal. Alternative 4 includes the following remedial components:

- Excavation of sediment/hydric soil impacted above RGs via mechanical or hydraulic dredging/excavation utilizing turbidity control to prevent resuspension as necessary. Dewatering of sediment by soil washing to improve material handling characteristics. Removal of oversize fraction from sediment /hydric soil by dewatering and soil washing techniques;
- Removal and concentration of COCs from sediment/hydric soil into a smaller volume by sediment washing techniques;
- Characterization and proper disposal of water from the dewatering process;
- Characterization of sediment stockpiles for transport and disposal to an appropriate off-Post landfill;
- Post-removal confirmation sampling of excavated areas;
- Revegetation and reconstruction of removal areas;
- LUCs, as amended in the Master Plan, to prevent military family housing, non-military residential housing, elementary and secondary schools, child care facilities and playgrounds in this area; and
- CERCLA 121(c) 5-Year Reviews by the Army and USEPA.

2.9.5 Alternative 5: In-Situ Cap and Land Use Controls

Site 8 - Discarded Batteries at Abbey Point Navigation Light:

Estimated Capital Cost:	$223,000
Estimated Present Worth O&M Cost:	$203,000
Estimated Total Present Worth Cost:	$426,000
Estimated Construction Timeframe:	12 months
Estimated Time to Achieve RAOs:	12 months

Site 9 - Discarded Batteries at Spesutie Island Navigation Light:

Estimated Capital Cost:	$206,000
Estimated Present Worth O&M Cost:	$205,000
Estimated Total Present Worth Cost:	$411,000
Estimated Construction Timeframe:	12 months
Estimated Time to Achieve RAOs:	12 months

Site 12 - Old Chemical Dump on Spesutie Island:

Estimated Capital Cost:	$286,000
Estimated Present Worth O&M Cost:	$251,000

Estimated Total Present Worth Cost:	$537,000
Estimated Construction Timeframe:	12 months
Estimated Time to Achieve RAOs:	12 months

Site 16 – DRMO Metal Scrap Yard:

Estimated Capital Cost:	$184,000
Estimated Present Worth O&M Cost:	$214,000
Estimated Total Present Worth Cost:	$398,000
Estimated Construction Timeframe:	12 months
Estimated Time to Achieve RAOs:	12 months

Site 17 - Silver Contaminated Ditch in Transonic Range Area:

Estimated Capital Cost:	$183,000
Estimated Present Worth O&M Cost:	$192,000
Estimated Total Present Worth Cost:	$375,000
Estimated Construction Timeframe:	12 months
Estimated Time to Achieve RAOs:	12 months

This remedial alternative involves installing a low permeability in-situ cap over impacted areas, followed by annual monitoring and maintenance.

Alternative 5 includes the following remedial components:

- Install a 6-inch low permeability cap consisting of a bentonite/gravel substrate mat overlain by 6-inch of a backfill/benthic substrate;
- Conduct annual COC monitoring of adjacent surface water and sediment;
- Conduct annual cap integrity monitoring by visual inspection and measurement;
- Conduct cap maintenance activities to restore cap integrity and address deficiencies identified during annual monitoring and inspection events;
- LUCs, as amended in the Master Plan, to prevent military family housing, non-military residential housing, elementary and secondary schools, child care facilities and playgrounds in this area; and
- CERCLA 121(c) 5-Year Reviews by the Army and USEPA.

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

To evaluate the remedial alternatives for the five sediment sites, the potential performance of each alternative is considered in terms of the nine evaluation criteria required by the NCP:

- protection of human health and the environment;
- compliance with ARARs;
- long-term effectiveness;
- reduction of toxicity, mobility, or volume;

- short-term effectiveness;
- implementability;
- cost;
- state acceptance; and
- community acceptance.

A summary of the comparative analysis of each remedial alternative is presented in Table 6. The nine criteria are then categorized into one of the three following groups:

- *Threshold criteria*, which are requirements that each alternative must meet in order to be eligible for selection;
- *Primary balancing criteria*, which are used to weigh major trade-offs among alternatives; and
- *Modifying criteria*, which are considered after receipt of comments on the preferred alternative and other alternatives presented in the proposed plan, and which indicate whether the State and the community support the selected alternative. In the final balancing of trade-offs between alternatives upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria.

2.10.1 Threshold Criteria

Overall Protection of Human Health and the Environment

Alternative 1 is eliminated from further consideration under the remaining eight criteria since this alternative is not protective of human health and/or the environment. Alternative 1 would not achieve RGs.

Alternative 2 would be protective of human health at these sites; however, this alternative does not meet the RGs for ecological receptors at all of the sites. Therefore, Alternative 2 is eliminated from further discussion since this alternative is not fully protective of the environment.

Alternative 3 would be protective of human health and the environment through excavation and processing of sediment exceeding RGs, off-Post disposal of impacted sediment, confirmation monitoring of excavated areas, and LUCs. LUCs would insure that the sites are not used for residential purposes. This alternative would meet the RAOs.

Alternative 4 would be protective of human health and the environment through excavation of sediment exceeding RGs, dewatering/sediment washing, off-Post disposal of impacted sediment, confirmation monitoring of excavated areas and LUCs. LUCs would insure that the sites are not used for residential purposes. This alternative would meet the RAOs.

TABLE 6: COMPARATIVE ALNALYSIS SUMMARY OF REMEDIAL ALTERNATIVES FOR EACH OF THE FIVE SITES

Criteria	Alternative 1- No Action	Alternative 2- Land Use Controls	Alternative 3 - Excavation, Offsite Disposal and Land Use Controls	Alternative 4— Sediment Washing	Alternative 5— In-Situ Cap
Overall Protection of Human Health and the Environment	∇	♦	Δ	Δ	Δ
Compliance with ARARs	∇	∇	Δ	Δ	Δ
Long-Term Effectiveness	∇	♦	Δ	Δ	♦
Reduction of Toxicity, Mobility and Volume Through Treatment	∇	∇	∇	∇	∇
Short-Term Effectiveness	∇	∇	♦	♦	♦
Implementability	∇	Δ	Δ	Δ	Δ
Total Cost (estimated 30-Year Present Worth)	Site 8: $51,000 Site 9: $51,000 Site 12: $51,000 Site 16: $51,000 Site 17: $51,000 **Total: $255,000**	Site 8: $97,000 Site 9: $101,000 Site 12: $97,000 Site 16: $114,000 Site 17: $138,000 **Total: $547,000**	Site 8: $231,000 Site 9: $253,000 Site 12: $251,000 Site 16: $218,000 Site 17: $214,000 **Total: $1,167,000**	Site 8: $272,000 Site 9: $290,000 Site 12: $337,000 Site 16: $244,000 Site 17: $250,000 **Total: $1,393,000**	Site 8: $426,000 Site 9: $411,000 Site 12: $537,000 Site 16: $398,000 Site 17: $375,000 **Total: $2,147,000**

Notes:

Δ- Complies well with criteria.

♦- Partially complies with criteria.

∇- Does not comply as well with criteria.

Alternative 5 would be protective of human health and the environment by containing impacted sediment, through cap installation and annual monitoring of the capped areas, and through LUCs. This alternative would meet the RAOs. The cap has the potential to destroy established habitats. Therefore, revegetation of the area would be required to restore the habitat.

Compliance with Applicable or Relevant and Appropriate Requirements

With respect to the remedial alternatives, there are no chemical-specific ARARs for soil or sediment. Alternatives 3, 4, and 5 would comply with location-specific ARARs regulating wetlands, flood plains and proximity to surface water. Alternatives 3 and 4 would be conducted in compliance with action-specific ARARs related to sediment removal, erosion and sediment control, dust emissions, transportation, hazardous, and non-hazardous waste disposal, and monitoring. Alternative 5 would be conducted in compliance with action-specific ARARs related to cap construction and monitoring.

2.10.2 Primary Balancing Criteria

Long-Term Effectiveness

Alternative 3 significantly reduces residual risk through the removal of COC-impacted sediment at each of the five sites. The removal of sediment within the area of attainment from the site effectively removes potential long-term exposure pathways for human (at least at Site 16) and ecological receptors. The removal of sediment within the area of attainment reduces the potential of further migration of COCs offsite.

Alternative 4 reduces residual risk through the removal and washing of COC-impacted sediment at each site. The removal of contaminated sediment within the area of attainment from each site effectively removes the long-term exposure pathways for human and ecological receptors. Sediment removal, sediment washing, revegetation/habitat replacement, and off-Post sediment disposal are reliable and proven technologies with minor long-term maintenance or residual risk.

Alternative 5 reduces residual risk through the containment of COC-impacted sediment within the area of attainment at each site, which effectively blocks the long-term exposure pathways for human and ecological receptors. The installation of a cap requires extensive and continuing monitoring and maintenance to ensure the cap's structural integrity and the absence of completed risk pathways.

Use of LUCs in Alternatives 3, 4, and 5 would insure that the sites are not used for residential purposes.

Reduction of Toxicity, Mobility, and Volume Through Treatment

No treatment is proposed to be used in Alternatives 3, 4 and 5; therefore, there will be no reduction of toxicity, mobility or volume through treatment.

Short-Term Effectiveness

Alternative 3, Alternative 4, and Alternative 5 have the potential for harm to human and ecological receptors in the short-term due to potential contact with disturbed sediment and munitions during remedial activities. Potential occupational risks to site workers from munitions or direct contact with sediment will require adherence to a site safety and health plan, Occupational Safety and Health Administration (OSHA) health and safety procedures, and proper use of personal protective equipment. Revegetation and site reconstruction following remedial activities will re-establish these ecological habitats, mitigating the short-term impacts. Remedial activities are expected to be completed and meet the RAO performance standards within a 1-year time frame at each site. However, Alternative 5 would require ongoing maintenance and inspection, which would be conducted on an annual basis.

Implementability

Alternative 3, Alternative 4, and Alternative 5 are implementable based on numerous case studies on each of these three alternatives. Additional remedial actions related to residual risk or sources would not be prevented by the implementation of either of the three alternatives. However, under Alternative 5 the cap may need to be excavated in the future to access impacted sediment.

Cost

Alternative 3 capital costs include excavation, separation, transport, disposal costs, and site reconstruction costs. Ongoing costs include the 5-year reviews. The 30-year present worth cost for each site is as follows:

- Site 8 – Discarded Batteries at Abbey Point Navigation Light: $231,000
- Site 9 – Discarded Batteries at Spesutie Island Navigation Light: $253,000
- Site 12 – Old Chemical Dump on Spesutie Island: $251,000
- Site 16 – DRMO Metal Scrap Yard: $218,000
- Site 17 – Silver Contaminated Ditch in Transonic Range Area: $214,000
- **Total for all five sediment sites: $1,167,000**

Alternative 4 capital costs include excavation, washing, transport, disposal costs, and site reconstruction costs. Ongoing costs include the 5-year reviews. The 30-year present worth cost for each site is as follows:

- Site 8 – Discarded batteries at Abbey Point Navigation Light: $272,000
- Site 9 – Discarded Batteries at Spesutie Island Navigation Light: $290,000
- Site 12 – Old Chemical Dump on Spesutie Island: $337,000
- Site 16 – DRMO Metal Scrap Yard: $244,000
- Site 17 – Silver Contaminated Ditch in Transonic Range Area: $250,000
- **Total for all five sediment sites: $1,393,000**

Alternative 5 capital costs include cap materials, cap installation, and site reconstruction costs. Ongoing costs include annual monitoring, inspection, maintenance and the 5-year reviews. The 30-year present worth cost for each site is as follows:

- Site 8 – Discarded Batteries at Abbey Point Navigation Light: $426,000
- Site 9 – Discarded Batteries at Spesutie Island Navigation Light: $411,000
- Site 12 – Old Chemical Dump on Spesutie Island: $537,000
- Site 16 – DRMO Metal Scrap Yard: $398,000
- Site 17 – Silver Contaminated Ditch in Transonic Range Area: $375,000
- **Total for all five sediment sites: $2,147,000**

2.10.3 Modifying Criteria

State Acceptance

The MDE, Waste Management Administration, accepts the selection of Alternative 3 for each of the Five Sediment Sites.

Community Acceptance

A full transcript of the Public Meeting held on 18 August 2005 is available in the Administrative Record. In general, the community is supportive of the Selected Remedies for the five sediment sites. Responses to written comments received from the community are presented in Section 3 of this document.

2.11 SELECTED REMEDY

The preferred alternative for the five sediment sites is Alternative 3, Excavation, Offsite Disposal and Land Use Controls. Alternative 3 is expected to meet all the specific RAOs determined based on review of available data and all ARARs. The remediation costs for Alternative 3, as estimated in the FS (EA 2005e), are presented for each of the five sites on Tables 7 through 11. The estimated total cost for each of the five sites is as follows:

- Site 8 – Discarded Batteries at Abbey Point Navigation Light: $231,000
- Site 9 – Discarded Batteries at Spesutie Island Navigation Light: $253,000
- Site 12 – Old Chemical Dump on Spesutie Island: $251,000
- Site 16 – DRMO Metal Scrap Yard: $218,000
- Site 17 – Silver Contaminated Ditch in Transonic Range Area: $214,000
- **Total for all five sediment sites: $1,167,000**

Under this alternative, contaminated sediment above the surface soil RGs (Table 4) for Sites 8, 9, 12, 16, and 17 will be removed, as presented on Figures 8 through 12. The impacted sediment will be dewatered to physically separate sediment and water. Sediment and water will be sampled for hazardous characteristics and disposed of at the appropriate off-Post landfill.

TABLE 7

Alternative 3 -Estimated Remediation Costs - Discarded Batteries at Abbey Point Navigation Light (Site 8)

Item	Description	Quantity		Unit Cost ($)	Total Cost ($)
1	**Mobilization**				
1.1	Equipment Mobilization-Site 8	2	wks	2,500	5,000
2	**Staging Area**				
2.1	Geotextile Cover	5,000	yds	3	15,000
3	**Site Prep**				
3.1	Clear/Grub Vegetation-Wet	0.12	acres	3,000	360
3.2	Vegetative Waste-Staging/Transport	2.4	tons	10	20
3.3	Dust Control	186	yds^2	0.5	0
3.4	Equipment Decontamination	1	LS	5000	5,000
4	**Excavation**				
4.1	Mechanical Excavation	278	tons	20	6,000
4.2	Barge Transport/Staging	278	tons	25	7,000
4.3	UXO Oversight	12	days	1,500	18,000
4.4	Turbidity Control Measures	1	LS	5000	5,000
5	**Dewatering/Stockpile**				
5.1	Size separation/Dewatering	186	cy	10	2,000
5.2	Water Treatment/ Disposal	186	cy	15	3,000
5.3	Stockpile Composite Sample Analysis-one sample per 100 cy and duplicate; TAL Metals and TCLP Analysis	3	samples	140	420
5.4	Oversight; Stockpile Sampling and Reporting	22	days	650	14,000
6	**Transport and Disposal**				
6.1	Non-Hazardous Waste Transport/Disposal	278	tons	75	21,000
7	**Confirmation Sampling**				
7.1	Confirmation Sample Analysis-TAL Metals	11	samples	95	1,000
7.2	Confirmation Sampling and Reporting	1	LS	5000	5,000
8	**Site Reconstruction**				
8.1	Revegetate/Stabilize Excavation Areas	1	LS	5000	5,000
9	**Site Closure**				
9.1	Remedial Action Closure Report	1	LS	25,000	25,000
				SUBTOTAL	138,000
10	**Adjustments**				
10.1	Management, Permitting, and Site Services			10%	14,000
10.2	Contingency			20%	28,000
				TOTAL CAPITAL COSTS	**180,000**
Operations and Maintenance					
11	**Review Costs**				
11.1	Five Year Reviews (30 Years)	6		15,000	90,000
				SUBTOTAL	90,000
				TOTAL REVIEW COSTS	90,000
Total 30-Year Present Worth					**51,000**
	30-Year Present Worth = (O&M)*(P/A, 3.5%, 30 years)				
	Annual Review Cost (Every 5 Years) = $ 15,000				
				TOTAL PRESENT WORTH COST	**231,000**

TABLE 8

Alternative 3 - Estimated Remediation Cost - Discarded Batteries at Spesutie Island Navigation Light (Site 9)

Item	Description	Quantity		Unit Cost ($)	Total Cost ($)
1	**Mobilization**				
1.1	Equipment Mobilization-Site 9	2	wks	2,500	5,000
2	**Staging Area**				
2.1	Geotextile Cover	5,000	yds	3	15,000
3	**Site Prep**				
3.1	Clear/Grub Vegetation-Wet	0.25	acres	3,000	750
3.2	Vegetative Waste-Staging/Transport	5	tons	10	50
3.4	Equipment Decontamination	1	LS	10,000	10,000
4	**Excavation**				
4.1	Mechanical Excavation	278	tons	20	6,000
4.2	Barge Transport/Staging	278	tons	25	7,000
4.3	UXO Oversight	10	days	1,500	15,000
4.4	Turbidity Control Measures	1	LS	5,000	5,000
5	**Dewatering/Stockpile**				
5.1	Size separation/Dewatering	184	cy	10	2,000
5.2	Water Treatment/ Disposal	184	cy	15	3,000
5.3	Stockpile Composite Sample Analysis-one sample per 250 cy and duplicate; TAL Metals and TCLP Analysis	2	samples	140	280
5.4	Oversight; Stockpile Sampling and Reporting	20	days	650	13,000
6	**Transport and Disposal**				
6.1	Non-Hazardous Waste Transport/Disposal	278	tons	75	21,000
7	**Confirmation Sampling**				
7.1	Confirmation Sample Analysis-TAL Metals	16	samples	95	2,000
7.2	Confirmation Sampling and Reporting	1	LS	15,000	15,000
8	**Site Reconstruction**				
8.1	Revegetate/Stabilize Excavation Areas	1	LS	10,000	10,000
9	**Site Closure**				
9.1	Remedial Action Closure Report	1	LS	25,000	25,000
				SUBTOTAL	155,000
10	**Adjustments**				
10.1	Management, Permitting, and Site Services			10%	16,000
10.2	Contingency			20%	31,000
				TOTAL CAPITAL COSTS	**202,000**
Operations and Maintenance					
11	**Review Costs**				
11.1	Five Year Reviews (30 Years)	6		15,000	90,000
				SUBTOTAL	90,000
				TOTAL REVIEW COSTS	90,000
Total 30-Year Present Worth					**51,000**
	30-Year Present Worth = (O&M)*(P/A, 3.5%, 30 years)				
	Annual Review Cost (Every 5 Years) = $ 15,000				
				TOTAL PRESENT WORTH COST	**253,000**

TABLE 9

Alternative 3 - Estimated Remediation Cost - Old Chemical Dump on Spesutie Island (Site 12)

Item	Description	Quantity		Unit Cost ($)	Total Cost ($)
1	**Mobilization**				
1.1	Equipment Mobilization-Site 12	4	wks	2,500	10,000
2	**Staging Area**				
2.1	Geotextile Cover	5,000	yds	3	15,000
2.2	Fencing	500	lf	12	6,000
3	**Site Prep**				
3.1	Clear/Grub Vegetation-Wet	1.5	acres	3,000	4,500
3.2	Vegetative Waste-Staging/Transport	30	tons	10	300
3.4	Equipment Decontamination	1	LS	10,000	10,000
4	**Excavation**				
4.1	Mechanical Excavation	140	tons	20	3,000
4.2	Transport/Staging	140	tons	25	4,000
4.3	UXO Oversight	10	days	1,500	15,000
4.4	Turbidity Control Measures	1	LS	5,000	5,000
5	**Dewatering/Stockpile**				
5.1	Size separation/Dewatering	93	cy	10	1,000
5.2	Water Treatment/ Disposal	93	cy	15	1,000
5.3	Stockpile Composite Sample Analysis-one sample per 250 cy and duplicate; TAL Metals and TCLP Analysis	1	samples	140	140
5.4	Oversight; Stockpile Sampling and Reporting	15	days	650	10,000
6	**Transport and Disposal**				
6.1	Non-Hazardous Waste Transport/Disposal	140	tons	75	11,000
7	**Confirmation Sampling**				
7.1	Confirmation Sample Analysis-TAL Metals	33	samples	95	3,000
7.2	Confirmation Sampling and Reporting	1	LS	15,000	15,000
8	**Site Reconstruction**				
8.1	Revegetate/Stabilize Excavation Areas	1	LS	15,000	15,000
9	**Site Closure**				
9.1	Remedial Action Closure Report	1	LS	25,000	25,000
				SUBTOTAL	154,000
10	**Adjustments**				
10.1	Management, Permitting, and Site Services			10%	15,000
10.2	Contingency			20%	31,000
				TOTAL CAPITAL COSTS	**200,000**
Operations and Maintenance					
11	**Review Costs**				
11.1	Five Year Reviews (30 Years)	6		15,000	90,000
				SUBTOTAL	90,000
				TOTAL REVIEW COSTS	90,000
Total 30-Year Present Worth					**51,000**
	30-Year Present Worth = (O&M)*(P/A, 3.5%, 30 years)				
	Annual Review Cost (Every 5 Years) = $ 15,000				
				TOTAL PRESENT WORTH COST	**251,000**

TABLE 10
Alternative 3 - Estimated Remediation Cost - DRMO Metal Scrap Yard (Site 16)

Item	Description	Quantity		Unit Cost ($)	Total Cost ($)
1	**Mobilization**				
1.1	Equipment Mobilization-Site 16	2	wks	2,500	5,000
2	**Staging Area**				
2.1	Geotextile Cover	5,000	yds	3	15,000
2.2	Fencing	500	lf	12	6,000
3	**Site Prep**				
3.1	Clear/Grub Vegetation-Wet	0.05	acres	3,000	150
3.4	Equipment Decontamination	1	LS	5,000	5,000
4	**Excavation**				
4.1	Mechanical Excavation	167	tons	20	3,000
4.2	Transport/Staging	167	tons	25	4,000
4.3	UXO Oversight	12	days	1,500	18,000
4.4	Turbidity Control Measures	1	LS	5,000	5,000
5	**Dewatering/Stockpile**				
5.1	Size separation/Dewatering	111	cy	10	1,000
5.2	Water Treatment/ Disposal	111	cy	15	2,000
5.3	Stockpile Composite Sample Analysis-one sample per 100 cy and duplicate; TAL Metals and TCLP Analysis	2	samples	140	280
5.4	Oversight; Stockpile Sampling and Reporting	22	days	650	14,000
6	**Transport and Disposal**				
6.1	Non-Hazardous Waste Transport/Disposal	167	tons	75	13,000
7	**Confirmation Sampling**				
7.1	Confirmation Sample Analysis-TAL Metals/PCB	11	samples	200	2,000
7.2	Confirmation Sampling and Reporting	1	LS	5,000	5,000
8	**Site Reconstruction**				
8.1	Revegetate/Stabilize Excavation Areas	1	LS	5,000	5,000
9	**Site Closure**				
9.1	Remedial Action Closure Report	1	LS	25,000	25,000
				SUBTOTAL	128,000
10	**Adjustments**				
10.1	Management, Permitting, and Site Services			10%	13,000
10.2	Contingency			20%	26,000
				TOTAL CAPITAL COSTS	**167,000**
Operations and Maintenance					
11	**Review Costs**				
11.1	Five Year Reviews (30 Years)	6		15,000	90,000
				SUBTOTAL	90,000
				TOTAL REVIEW COSTS	90,000
Total 30-Year Present Worth					**51,000**
	30-Year Present Worth = (O&M)*(P/A, 3.5%, 30 years)				
	Annual Review Cost (Every 5 Years) = $ 15,000				
				TOTAL PRESENT WORTH COST	**218,000**

TABLE 11
Alternative 3 - Estimated Remediation Cost - Silver Contaminated Ditch in Transonic Range Area (Site 17)

Item	Description	Quantity		Unit Cost ($)	Total Cost ($)
1	**Mobilization**				
1.1	Equipment Mobilization-Site 17	2	wks	2,500	5,000
2	**Staging Area**				
2.1	Geotextile Cover	5,000	yds	3	15,000
2.2	Fencing	500	lf	12	6,000
3	**Site Prep**				
3.1	Clear/Grub Vegetation-Wet	0.14	acres	3,000	420
3.4	Equipment Decontamination	1	LS	5,000	5,000
4	**Excavation**				
4.1	Mechanical Excavation	167	tons	20	3,000
4.2	Transport/Staging	167	tons	25	4,000
4.3	UXO Oversight	8	days	1,500	12,000
4.4	Turbidity Control Measures	1	LS	5,000	5,000
5	**Dewatering/Stockpile**				
5.1	Size separation/Dewatering	111	cy	10	1,000
5.2	Water Treatment/ Disposal	111	cy	15	2,000
5.3	Stockpile Composite Sample Analysis-one sample per 100 cy and duplicate; TAL Metals and TCLP Analysis	2	samples	140	280
5.4	Oversight; Stockpile Sampling and Reporting	18	days	650	12,000
6	**Transport and Disposal**				
6.1	Non-Hazardous Waste Transport/Disposal	167	tons	75	13,000
7	**Confirmation Sampling**				
7.1	Confirmation Sample Analysis-TAL Metals	11	samples	95	1,000
7.2	Confirmation Sampling and Reporting	1	LS	5,000	5,000
8	**Site Reconstruction**				
8.1	Revegetate/Stabilize Excavation Areas	1	LS	10,000	10,000
9	**Site Closure**				
9.1	Remedial Action Closure Report	1	LS	25,000	25,000
				SUBTOTAL	125,000
10	**Adjustments**				
10.1	Management, Permitting, and Site Services			10%	13,000
10.2	Contingency			20%	25,000
				TOTAL CAPITAL COSTS	**163,000**
Operations and Maintenance					
11	**Review Costs**				
11.1	Five Year Reviews (30 Years)	6		15,000	90,000
				SUBTOTAL	90,000
				TOTAL REVIEW COSTS	90,000
Total 30-Year Present Worth					**51,000**
	30-Year Present Worth = (O&M)*(P/A, 3.5%, 30 years)				
	Annual Review Cost (Every 5 Years) = $ 15,000				
				TOTAL PRESENT WORTH COST	**214,000**

Alternatives 4 and 5 were rejected primarily due to the relatively small size and remote locations of the sites. Alternative 4 would be complicated process for the small sites and would most likely require the excavation and staging of soil/sediment at a common location prior to treatment. The contaminated sludge (containing concentrated levels of COCs) and water would then require disposal following treatment. Alternative 5 would be impractical in the small wetland, marsh, and drainage ditch areas. Each of the sites are located in flood plain areas where the cap may be subject to flooding during storm events, which may subsequently affect the integrity of the cap.

The estimated volume of sediment to be removed for each of the five sites is presented in Table 5. COC soil volumes were calculated based on the analytical results of the 2003 Phase II RI and the risk assessments. Surface square footage was calculated using a plan view of analytical data points and estimating that COC-impacted soil was present to mid-way between sampling points. An average depth of one ft bgs was used at each site, except Site 9, to calculate cubic yards of COC-impacted sediment. A depth of two feet was used at Site 9 based on potential for deeper impacts related to the heavy batteries sinking into the sediment. Figures 8 through 12 present the approximate attainment areas but the actual extent and depth of the excavation will depend on the extent of contamination above RGs. Sampling and analysis will be performed during remediation to determine compliance with RGs.

Alternative 3 will include the following actions for each of the five sites:

- Conduct site clearance activities to identify and remove munitions materials from excavation areas;
- Excavate sediment/hydric soil impacted above RGs via mechanical or hydraulic dredging/excavation utilizing turbidity control to prevent resuspension as necessary;
- Dewater sediment to improve material handling characteristics. Removal of oversize fraction from sediment by dewatering and separation technologies;
- Characterize and properly dispose of water from the dewatering process;
- Characterize dewatered sediment stockpiles for transport and disposal to an appropriate off-Post landfill;
- Conduct post-removal confirmation sampling of excavated areas;
- Revegetate and reconstruct removal areas;
- Implement LUCs to prevent military family housing, non-military residential housing, elementary and secondary schools, child care facilities and playgrounds in this area; and
- Conduct CERCLA 121(c) 5-Year Reviews by the Army and USEPA.

Stockpiles will be sampled for RCRA hazardous waste characterization based on the daily throughput of the sediment processing operation with a minimum of one composite sample per 100 yd^3. It has been assumed for purposes of providing a common foundation for evaluating the proposed alternatives that the excavated sediment will be characterized as non-hazardous waste, based on historical data. Sediment characterized as hazardous waste will be transported and disposed of in accordance with applicable United States

Department of Transportation (USDOT) and RCRA regulations at an off-Post RCRA Subtitle C Landfill. Non-hazardous sediments will be transported and disposed of at an off-Post municipal landfill.

Options for off-Post disposal of sediment removed from Site 16–DRMO Metal Scrap Yard will depend on the stockpile PCB concentrations. Sediment with PCB concentrations greater than 50 mg/kg is subject to Toxic Substance Control Act (TSCA) (40 CFR 761.61) regulation. However, commercial solid waste management facilities such as RCRA Subtitle D landfills may impose a more stringent limit of 35 mg/kg as an acceptance criteria. This provides facilities a safety margin for accepting bulk wastes classified via composite sampling. Excavated sediment from Site 16 will be composited to determine appropriate disposal methods. Stockpiles with a composite PCB concentration greater than 35 mg/kg will be disposed of in TSCA-permitted landfills. Stockpiles with composite PCB concentrations less than 35 mg/kg will be disposed of at an appropriate landfill based on RCRA hazardous waste characterization.

Sediment samples will be collected from sediment in the excavated areas and analyzed for metals to confirm complete excavation of sediment impacted above RGs. At Site 16-DRMO Metal Scrap Yard, confirmation sampling will also include PCB analysis. Confirmation data will be tabulated and presented to the APG Installation Restoration Project Team for discussion as to the need for additional sampling and analysis and/or remedial action.

Water accumulated from the dewatering process will be collected and analyzed for RCRA waste characterization. The water will then be properly disposed using the most appropriate method including onsite filtration, disposal to the POTW, and/or offsite disposal, depending on analytical results.

Upon completion of confirmation sampling and analysis, site reconstruction activities will be conducted to mitigate the impacts of excavation. Reconstruction activities will include placement of clean fill such as sand and gravel to stabilize excavation areas, re-establish bottom topography, and habitat replacement. In addition to excavation areas, banks and shoreline areas immediately adjacent to sediment removal areas may require stabilization to control bank erosion, slumping, and sloughing. Revegetation efforts will consist of site appropriate vegetation including aquatic and wetland species.
Following the remedial actions at the sites, contamination may remain that may exceed residential criteria. LUCs will then be implemented to restrict future residential or child-occupied use of the site.

LUCs will be maintained until the concentration of hazardous substances in the soil are reduced to levels that allow for unlimited use and unrestricted exposure. The anticipated LUC area encompasses the area of each site outlined in Figures 8 through 12. Figures 8 through 12 present the LUC boundary for each site where future residential or child-occupied use of the site will be restricted. The Remedial Design will include a more detailed map or a descriptive survey plan with specific locations and design details for each LUC. If these sites are subsequently remediated to unrestricted use, the ROD will

be changed to remove the LUCs as part of the remedy. CERCLA 121(c) five-year reviews will be conducted to assess the long-term effectiveness of the remedy, including LUCs.

The Remedial Design will be submitted in accordance with the remedial design schedule provisions of the FFA and will include a LUC component describing the details of LUC implementation and maintenance, including periodic inspections. The Army shall be responsible for implementation, maintenance, periodic reporting, and enforcement of LUCs in accordance with the RD. Although the Army may transfer these responsibilities to another party by contract, property transfer agreement, or through other means, the Army shall remain ultimately responsible for remedy integrity and shall; (1) perform CERCLA 121(c) perform five year reviews; (2) notify the appropriate regulators and/or local government representatives of any known LUC deficiencies or violations; (3) provide access to the property to conduct any necessary response; (4) retain the ability to change, modify or terminate LUCs and any related deed or lease provisions; and (5) ensure that the LUC objective is met to maintain remedy protectiveness.

As a condition of property transfer or lease, the Army may require the transferee or lessee in cooperation with other stakeholders to assume responsibility for various implementation actions. Third party LUC responsibility will be incorporated into pertinent contractual, property and remedial documentation, such as a purchase agreement, deed, lease, and RD addendum. To the extent permitted by law, a transfer deed shall require the LUCs imposed as part of a CERCLA remedy to run with the land and bind all property owners and users.

If the Army intends to transfer ownership of any site, the Army may, if Federal and/or State law allows, upon transfer of fee title grant the State an environmental covenant or easement that would allow the State to enforce LUC terms and conditions against the transferee(s), as well as subsequent property owner(s) or user(s) or their contractors, tenants, lessees or other parties. This covenant will be incorporated by reference in the transfer deed and will run with the land in accordance with State realty law. This state enforcement right would supplement, not replace, the Army's right and responsibility to enforce the LUCs.

Pursuant to CERCLA Section 121(c), 5-year reviews shall be conducted to protect human health and the environment as long as deemed necessary based on the presence of COCs above residential risk based levels. The NCP further provides that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be reviewed every 5 years to ensure protection of human health and the environment. Although this alternative will remove sediment impacted above RGs, the site will still have future residential restrictions.

2.12 STATUTORY DETERMINATIONS

The remedial alternatives were developed to achieve a completed response action for these sites in a streamlined fashion. There is a low level of human health risk and

although concentrations of site-related contaminants exceeded ecological benchmark values indicating a potential for ecological risk, there are uncertainties associated with the potential for ecological risk, and extensive and expensive additional study would be required to make a definitive determination of risk. To complete a streamlined response, EPA and MDE support the Selected Remedy as necessary to adequately and cost-effectively protect human health and the environment. The selected remedy will meet the following statutory requirements of CERCLA 121 (b): to be protective of human health and the environment; to comply with ARARs; and to be cost-effective. The Selected Remedy does not employ treatment technologies to reduce toxicity, mobility and volume of source material because of high costs and lack of performance advantage. The Selected Remedy utilizes a permanent solution to the maximum extent practicable.

The following sections discuss how the selected remedy meets these statutory requirements.

2.12.1 Protection of Human Health and the Environment

The Selected Remedy (Alternative 3) will be protective of human health and the environment through excavation and processing of impacted sediment, off-Post disposal of impacted sediment, confirmation monitoring of excavated areas and implementation of LUCs. The Selected Remedy will meet the RGs.

The remedy permanently addresses all COC impacted sediment. The complete removal of impacted sediment removes potential unacceptable risks to non-residential human health, and eliminates the ecological receptor exposure to concentrations of COCs in soil and sediment above RGs. It also removes the potential for further COC migration via surface water. However, during implementation, clearing and grubbing of vegetation and the removal of sediment are likely also to destroy established habitats. Revegetation will eventually address the replacement of habitat. To protect workers, onsite activities will be conducted in accordance with Occupational, Safety and Health Administration (OSHA) requirements for workers at remedial sites (29 CFR Part 1910).

Data from confirmation monitoring will verify whether the Selected Remedy was effective in attaining the RGs. LUCs will be implemented to insure that the sites are not used for residential purposes.

2.12.2 Compliance with Applicable or Relevant and Appropriate Requirements

There are no chemical-specific ARARs that govern the response action at the Five Sediment Sites. The Selected Remedy will comply with location-specific ARARs regulating wetlands, flood plains, proximity to surface water, and ecological receptors. The Selected Remedy will also be conducted in compliance with action-specific ARARs related to sediment removal, erosion and sediment control, dust emissions, hazardous and non-hazardous waste disposal, and monitoring. Table 12 presents ARARs for the Selected Remedy. Federal and State regulations governing transportation of RCRA

Table 12 - ARARs: Action/Location-Specific Applicable or Relevant and Appropriate Requirements are the Substantive Requirements found in the Following Regulations

Environmental Laws and Regulations	Action	Status	Consideration as an ARAR
Federal Action Specific ARARs			
RCRA Land Disposal Restrictions (LDRs) (40 CFR 268)	Disposal of hazardous waste.	Applicable	Toxicity Characteristic Leaching Procedure (TCLP) test results of excavated soils for the RCRA metals and PCBs in Table 3 may trigger the RCRA LDRs.
The state RCRA program is the authorized Federal program; The following regulation is a Federal ARAR (RCRA Identification and Listing Hazardous Waste (COMAR 26.13.02)) except any of those subsections which are broader in scope than the corresponding federal regulation.	Waste generation from remediation of waste and contaminated media.	Applicable	Any waste media that are actively managed or shipped offsite must be tested to determine if they are RCRA characteristic wastes.
Toxic Substance Control Act (TSCA) (40 CFR 761.61)	Disposal of PCB remediation waste.	Applicable	Sediment with PCB concentrations >50 mg/kg is subject to TSCA regulation.
Control of Fugitive Particulate Matter (40 CFR 50.6 & 50.7)	Remedial excavation/construction.	Applicable	Applies to emission of particulates (dust) generated during excavation or other remedial construction activities.
Federal Location Specific ARARs:			
Protection of Floodplains (40CFR 6, Appendix A)	Actions conducted in Floodplains.	To Be Considered	Actions to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.
Floodplains Executive Order (EO 11988 40 CFR 6.302 (b)			
Fish and Wildlife Coordination Act (16 USC 661 et seq.) 40 CFR 6.302 (g)	Actions producing a structural change to a stream or water body.		
Wetlands Executive Order (EO 11990) 40 CFR 6.302 (a)	Remedial excavation/construction.		Applies to construction or management of property in wetlands.

Table 12 – Continued

Maryland Action Specific ARARs - The following Maryland regulations which are more stringent than the corresponding federal regulations are ARARs			
Environmental Laws and Regulations	**Action**	**Status**	**Consideration as an ARAR**
RCRA Identification and Listing Hazardous Waste (COMAR 26.13.02)	Waste generation from remediation of waste and contaminated media.	Applicable	Any waste media that are actively managed or shipped offsite must be tested to determine if they are RCRA characteristic wastes.
Erosion and Sediment Controls (COMAR 26.17.01)	Remedial excavation/construction.	Applicable	Applicable to any soil cover or waste removal actions.
Control of Fugitive Particulate Matter (COMAR 26.11.06.03) (COMAR 26.11.06.08)	Remedial excavation/construction.	Applicable	Applies to emission of particulates (dust) generated during excavation or other remedial construction activities.
Maryland – Location Specific ARARs			
Non-Tidal Wetlands COMAR 26.23.01-05	Remedial excavation/construction.	Applicable	Applies to construction or management of property in wetlands.
Tidal Wetlands COMAR 26.24.01-05	Remedial excavation/construction.	Applicable	Applies to construction or management of property in wetlands.
Maryland Natural Resources Article, Title 8, Subtitle 18	Remedial excavation/construction.	To Be Considered	Applies to land use policies within the Critical Areas of the Chesapeake Bay.

wastes off-site which are applicable at the time that the transportation takes place must be complied with fully.

2.12.3 Cost Effectiveness

In the lead agency's judgment, the Selected Remedy represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." [NCP Section 300.430(f)(l)(ii)(D)]. This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness of each Alternative 3, 4, and 5 was compared to the other alternatives and evaluated to determine cost-effectiveness.

The estimated present worth cost of the Selected Remedy for the Five Sediment Sites is $1,167,000. The Selected Remedy is less expensive than Alternative 5 and although Alternatives 4 is less expensive then the Selected Remedy, it is less effective at achieving RGs; therefore, the Selected Remedy (Alternative 3) is the most cost-effective.

2.12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

The Army and EPA, in coordination with the MDE, has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Five Sediment Sites. The Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria and considering State and community acceptance.

The Selected Remedy addresses the materials constituting a risk to human health and the environment at the five sites, through excavation and removal via off-Post disposal, achieving significant reduction in COCs in sediment which satisfies the criteria for long-term effectiveness. The Selected Remedy does not present short-term risks different from the other treatment alternatives. There are no special implementability issues that set the Selected Remedy apart form any of the other alternatives evaluated. The time required for mobilization and construction of the Selected Remedy is estimated to be approximately 12 months.

2.12.5 Preference for Treatment as a Principal Element

The Selected Remedy does not utilize treatment as a principal element.

2.12.6 Five Year Review Requirements

Although the Selected Remedy will remove most COC-impacted sediment, the sites will still have future residential use restrictions. Therefore, five-year reviews will be conducted in accordance with CERCLA to ensure that the Selected Remedy remains protective of human health and the environment.

2.13 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE ON PROPOSED PLAN

There are no significant changes to the Preferred Alternative of the Five Sediment Sites Proposed Plan for Remedial Action (EA 2005g).

3 RESPONSIVENESS SUMMARY

The final component of the Record of Decision is the Responsiveness Summary. The purpose of the Responsiveness Summary is to provide a summary of the public's comments, concerns, and questions about the Five Sediment Sites, sediment remediation and the Army's responses to these concerns.

APG held a public meeting on 18 August 2005 to formally present the proposed plan and clean up actions and to answer questions and receive comments. The transcript of this meeting is part of the administrative record for this site. During the public comment period, APG also received written comments. The Army and EPA have considered all comments and concerns, summarized below, in selecting the cleanup method for the Five Sediment Sites.

The Responsiveness Summary is divided into the following sections:

3.1 Overview.
3.2 Background on community involvement.
3.3 Summary of comments received during the public comment period and APG's responses.

A sample newspaper notice announcing the public comment period and the public meeting is presented in Appendix A.

3.1 OVERVIEW

At the time of the public comment period, the Army and EPA presented the preferred alternative (Alternative 3), with which MDE also concurred, for the sediment at the Five Sediment Sites. This alternative proposed excavating areas of COC-impacted sediment that exceed RGs and removing it off-Post, transporting it in accordance with applicable USDOT and RCRA regulations, to a regulated landfill. In view of the comments received, the Community generally accepts the selected alternative.

3.2 BACKGROUND ON COMMUNITY INVOLVEMENT

APG has maintained an active public involvement and information program for the Installation Restoration Program since the early 1990's. Community members in Harford and Baltimore Counties have actively participated in information sessions, tours, and public meetings, and APG staff has given briefings at community association meetings. APG's community relations activities specifically related to the Other Aberdeen Areas Five Sediment Sites Proposed Plan included the following:

- APG began discussing the Other Aberdeen Areas sediment Phase II RI with the Restoration Advisory Board (RAB) in August 2002. Other Board meetings where APG presented information on these sites included September 2003 and September 2004.

- APG released the OAA Five Sediment Sites Proposed Plan for public comment on 4 August 2005. 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 copy of the Proposed Plan also was posted on the Installation Restoration Program's Web Site, and the public was invited to comment through the Web Site.

- A 45-day comment period on the Five Sediment Sites ran from 4 August to 19 September 2005.

- APG prepared a news 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 Avenue on Wednesday, 3 August 2005; The East County Times and The Kent County News on Thursday, 4 August 2005; and The Aegis and The Cecil Whig on Friday, 5 August 2005.

- APG prepared and published a fact sheet on the Five Sediment Sites. On 10 August 2005, APG mailed copies of this fact sheet to approximately 2,300 citizens and elected officials on its Installation Restoration Program mailing list. The fact sheet included a form, which citizens could use to send APG their comments.

- On 18 August 2005, APG held a public meeting at the Aberdeen Senior Center in Aberdeen, Maryland. Representatives of the Army, EPA and MDE were present. APG representatives presented information on the Five Sediment Sites and on the proposed cleanup actions.

3.3 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND ARMY RESPONSES

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

COMMENTS FROM PUBLIC MEETING

As part of its fact sheets on the Proposed Plans, APG included a questionnaire that residents could return with their comments. APG received 18 forms on the sediment sites. The alternatives preferred by individuals returning comment forms on the sediment sites were:

0	Alternative No. 1 - Take No Action.
0	Alternative No. 2 - Land Use Controls
15	Alternative No. 3 – Excavation, Offsite Disposal and Land Use Controls
1	Alternative No. 4 – Sediment Washing and Land Use Controls

1 Alternative No. 5 – In-Situ Cap and Land Use Controls
1 Have no preference

Written comments included on the sediment sites forms are summarized below.

Comment No. 1: [Commenter selected alternative 3] "I feel the APG investigating staff are far better qualified in making their alternative selection than any concerned person like myself."

Response No. 1: APG appreciates the confidence expressed regarding its staff. We will continue to provide the community with opportunities to participate and provide input into our decisions.

Comment No. 2: [Commenter selected alternative 3] "Thanks for keeping us informed."

Response No. 2: APG appreciates the feedback and will continue to keep the community informed and involved in its environmental cleanup program.

Comment No. 3: [Commenter selected alternative 3] "These fact sheets were harder to understand than ones received in past. Too much like a technical document. Believe you are experts but need better communication to involve the public."

Response No. 3: APG appreciates the feedback. The purpose of the fact sheets is to communicate technical information in a manner that citizens can easily understand and to enable citizens to participate in environmental decisions. We will look closely at future fact sheets to ensure they are achieving this objective. We also encourage any community members with questions to contact us through the environmental program's Information Line at 800-APG-9998.

Comment No. 4: [Commenter selected alternative 3] "Prefer #3, unless #4 will have a greater safety margin for human health and the environment; whichever alternative is the best for both of those goals in the long run."

Response No. 4: APG and EPA selected alternative #3 and believe it is protective of human health and the environment. Alternative #4 is less effective than Alternative #3 at achieving RGs.

Comment No. 5: [Commenter selected alternative 3] "This proposed action should not create any additional environmental problems and help clean-up the mess created in previous years."

Response No. 5: APG and EPA believe alternative 3 is the best solution for addressing the contamination at the sites.

Comment No. 6: [Commenter selected alternative 3] "Thanks for the information."

Response No. 6: APG appreciates the feedback and the participation.

Comment No. 7: [Commenter selected alternative 3] "Need more notice of meetings—did not receive fact sheets until 2 days before meetings. These fact sheets seemed to be more difficult to understand than other ones—too many acronyms and technical terms."

Response No. 7: APG agrees the community needs more than 2 days notice of meetings. APG provides initial notice of the meetings through newspaper advertisements which ran in the papers several weeks before the meetings. We follow-up with the fact sheets to those on our mailing list who may have missed the newspaper advertisements and as a reminder. Where possible, we try to distribute the fact sheets at least a week prior to the public meetings. We also post the full Proposed Plans on our Web Site which contain information about the public meeting. As stated in the response to Comment 3, we will look more closely at future fact sheets.

Comment No. 8: [Commenter stated he has no preference on the alternative] "I have no comments. Do the best you can to right any wrong that has been done."

Response No. 8: APG appreciates your taking the time to review the information. We believe alternative 3 is the best alternative for these sites and is protective of human health and the environment.

Comment No. 9: [Commenter selected alternative 4] "Land should be made safe and useable. It is wrong to clean one area with harmful materials and substances and contaminate another. Thanks for working to make and keep our environment clean and safe."

Response No. 9: APG and EPA selected alternative #3 and believe it is protective of human health and the environment. The off-site disposal of the impacted sediment will occur at a facility that is equipped to handle this type of waste and has controls in place to prevent damage to the environment or impacts to human health.

Comment No. 10: [Commenter selected alternative 3] "Makes permanent changes that complies with regulations and provides improved safety."

Response No 10: APG acknowledges and agrees with the comment.

COMMENTS FROM PUBLIC MEETING

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

4.0 REFERENCES

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APPENDIX A

SAMPLE NEWSPAPER NOTICE

U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR FIVE CONTAMINATED SEDIMENT SITES LOCATED IN ABERDEEN AREA OF APG

The U. S. Army at Aberdeen Proving Ground (APG) invites the public to comment on its Proposed Plan for five sediment sites in the Other Aberdeen Areas Study Area, located in the Aberdeen Area of APG. All five sites are located in range and testing areas of APG.

FACT SHEET

APG has prepared a fact sheet on the Proposed Plan that includes a comment form that can be returned to APG. If you are not on APG's mailing list, you can request a copy of the fact sheet by calling APG's 24-hour Environmental Information Line at (410) 272-8842 or (800) APG-9998.

PUBLIC MEETING

APG invites the public to attend a meeting on:

Date: Thursday, August 18, 2005
Time: 6:30 p.m. informal poster/ information session
7:15 p.m. presentation
Place: Aberdeen Senior Center
7 Franklin Street
Aberdeen, MD 21001

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

WEB SITE

You can review the Proposed Plan and provide comments through the APG Web Site at www.apg.army.mil. Click on Directorates; Safety, Health and Environment; Environmental Conservation and Restoration Division.

WRITTEN COMMENTS

The 45-day public comment period on the proposed action extends from 4 August through 19 September 2005. Written comments, postmarked by September 19, should be sent to:

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

Mr. Frank Vavra
U.S. Environmental Protection Agency
1650 Arch Street (3HS11)
Philadelphia, PA 19103

Mr. Andy Zarins
Maryland Department of the Environment
Federal Facilities Division
1800 Washington Boulevard, Suite 645
Baltimore, MD 21230

PROPOSED ACTION

APG is proposing to take action at the five contaminated sediment sites listed below:

1. The Discarded Batteries at Abbey Point Navigation Light is a navigation light that is no longer operational. Metal contamination is localized in soil and sediment; primary contaminants of concern are antimony, arsenic, mercury, methylmercury, and zinc.

2. The Discarded Batteries at Spesutie Island Navigation Light Site is a former navigation light location. Metal contamination is localized in sediments; primary contaminants of concern are mercury and zinc.

3. Old Chemical Dump on Spesutie Island is a former dump site. Sediment contamination is limited to a small dump area; primary contaminants of concern are copper and zinc.

4. The DRMO Metal Scrap Yard is an active scrap yard facility. Sediment contamination is present in a drainage ditch; primary contaminants of concern are arsenic, PCBs and vanadium.

5. Silver Contaminated Ditch in Transonic Range Area is a test facility that had a photo-processing facility that discharged wastes to a drainage ditch; the primary contaminant of concern is silver.

ALTERNATIVES EVALUATED FOR SIX GROUNDWATER SITES

Five alternatives were evaluated for each site. These include:

Alternative 1: No Action.
Alternative 2: Land Use Controls.
Alternative 3: Excavation, Offsite Disposal, and Land Use Controls.
Alternative 4: Sediment Washing and Land Use Controls.
Alternative 5: In-Situ Cap and Land Use Controls.

Based on an analysis of the alternatives, APG prefers Alternative 3 for all of the sites.

The preferred alternatives 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 Feasibility Study and the Proposed Plan are available for review at the APG information repositories. The repositories are located at the Edgewood and Aberdeen branches of Harford County Library and Miller Library at Washington College in Kent County.