**EPA/ROD/R03-05/061**
**2005**

# EPA Superfund
# Record of Decision:

**FORT PICKETT**
**EPA ID: VA2210020705**
**OU 06**
**BLACKSTONE, VA**
**05/18/2005**

*FINAL*

# Decision Document
# EBS-13 Parcel
# Operable Unit 6

## Fort Pickett Army Garrison
## Blackstone, Virginia

Prepared for

## THE FORT PICKETT BASE REALIGNMENT AND CLOSURE OFFICE

2193 Military Road
Blackstone, Virginia

**Prepared by:**

**TETRA TECH, INC.**
800 Oak Ridge Turnpike
Suite A-600
Oak Ridge, Tennessee 37830

**May 18, 2005**

W.O. No. 03886.182.005

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# LIST OF ACRONYMS

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## LIST OF ACRONYMS

| | |
|---|---|
| AOC | Area of Concern |
| ARAR | applicable or relevant and appropriate requirement |
| BCT | BRAC Cleanup Team |
| Bgs | below ground surface |
| BHHRA | Baseline Human Health Risk Assessment |
| BRAC | Base Realignment and Closure |
| BRACA | Defense Base Realignment and Closure Act of 1990 as amended |
| BTEX | Benzene, Toluene, Ethylbenzene, and Xylenes |
| CENAO | U.S. Army Corps of Engineers, Norfolk District |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| CERFA | Community Environmental Response Facilitation Act |
| COC | constituent of concern |
| COPC | constituent of potential concern |
| CPT | cone-electrometer test |
| DOA | U.S. Department of the Army |
| DoD | U.S. Department of Defense |
| EA | EA Engineering, Science, and Technology |
| EBS | environmental baseline survey |
| ERA | Ecological Risk Assessment |
| EPTC | s-ethyl dipropylthiolcarbamate |
| FRC | Former Recycling Compound |
| FS | Feasibility Study |
| ft | feet/foot |
| GC | gas chromotograph |
| GTI | Groundwater Technology, Inc. |
| HI | hazard index |
| HQ | hazard quotient |
| ILCR | increased lifetime cancer risk |
| IRA | interim removal action |
| LRA | Local Redevelopment Authority |
| LUC | land use controls |
| MCL | maximum concentration limit |
| MD | munitions debris |
| MNA | monitored natural attenuation |
| MPPEH | material potentially presenting an explosive hazard |
| MSL | mean sea level |
| NCP | National Oil and Hazardous Substance Pollution Contingency Plan |
| O&M | operation and maintenance |
| ORC | oxygen-release compound |
| PAH | polycyclic aromatic hydrocarbon |
| PA/SI | preliminary assessment/site inspection |

| | |
|---|---|
| PCB | polychlorinated biphenyl |
| PID | photoionization detector |
| PP | Proposed Plan |
| Ppm | parts per million |
| PRG | preliminary remediation goal |
| RAB | Restoration Advisory Board |
| RBC | risk-based criteria |
| RCRA | Resource Conservation & Recovery Act |
| RCZ | Runway Clear Zone |
| RfD | reference dose |
| RI | Remedial Investigation |
| SARA | Superfund Amendments and Reauthorization Act of 1986 |
| SSL | soil screening level |
| SVOC | semi-volatile organic compound |
| Site | Fort Pickett, Blackstone, Virginia |
| TAL | target analyte list |
| TBC | to be considered |
| TCL | target compound list |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TCRA | time-critical removal action |
| TEQ | toxicity equivalent |
| TOC | total organic carbon |
| USACE | U.S. Army Corps of Engineers |
| USEPA | U.S. Environmental Protection Agency |
| UXO | unexploded ordnance |
| VDEQ | Virginia Department of Environmental Quality |
| VOC | volatile organic compound |

# FORT PICKETT ARMY GARRISON
# EBS-13 PARCEL
# FORMER RECYCLING COMPOUND
# Operable Unit 6

# DECLARATION FOR THE DECISION DOCUMENT

BLACKSTONE, NOTTOWAY COUNTY, VIRGINIA

MAY 2005

## SITE NAME AND LOCATION

The Environmental Baseline Survey, Parcel 13 (EBS-13), located within Operable Unit 6 at Fort Pickett Army Garrison, Blackstone, Nottoway County, Virginia, is a Former Recycling Compound (FRC). The site in not listed in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) nor does it have a National Superfund Database identification number.

## STATEMENT OF BASIS AND PURPOSE

Fort Pickett is undergoing a base closure process under the Defense Base Realignment and Closure Act (BRACA) of 1990 (as amended) due to its selection by the Base Realignment and Closure (BRAC) 95 Commission. The strategy for investigation, remediation, and closure is being overseen by the BRAC Cleanup Team (BCT), which includes the U. S. Department of the Army (DOA) BRAC Atlanta Field Office, U. S. Environmental Protection Agency (USEPA) Region 3, the Virginia Department of Environmental Quality (VDEQ), and the Fort Pickett Environmental Office. EBS-13 was identified as a BRAC parcel for transfer or lease.

This Decision Document presents the selected remedial action for the EBS-13. This finding was determined following the Community Environmental Response Facilitation Act (CERFA) and U.S. Department of Defense (DoD) BRAC Cleanup Plan Guidebook (DoD 1993) guidelines and in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This Decision Document is based on information contained in the Administrative Record for this site located at the Fort Pickett BRAC Environmental Office, 2193 Military Road, Pickett Park, Blackstone, Virginia 23824.

The USEPA Region 3, VDEQ, and the Commonwealth of Virginia concur with the selected remedy.

The basis for this action is removal of the source of groundwater contamination to address human health risk (i.e., the risk driver) above the VDEQ target risk goal, associated with exposure to contaminants present in groundwater. Land use controls (LUCs) will also be implemented as part of this action to address human health concerns associated with contaminated groundwater, until such time as it is restored to unrestricted use, and safety concerns associated with potential future contact with material potentially presenting an explosive hazard (MPPEH).

## ASSESSMENT OF THE SITE

Results of the Remedial Investigation/Feasibility Study (RI/FS) indicate that, based on available information, the concentration of specific constituents of concern (COCs) in groundwater associated with the EBS-13 site present an unacceptable risk to human health. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the remedial action selected, may present endangerment to public health, welfare, or the environment. The primary area of concern (AOC) is the source of groundwater contamination (i.e., contaminated soils in the area of a former

paint disposal pit). The response action selected and documented in this Decision Document is necessary to protect the public health, welfare, and the environment from releases of hazardous substances into the environment.

## DESCRIPTION OF THE SELECTED REMEDY

This Decision Document was developed in accordance with guidance provided in USEPA's "Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Document" (EPA 540-R-98-031), as well as the "Navy Principles" Policy on Land Use Controls Associated with Environmental Restoration Activities (DoD, 2003).

The principle factors that lead to the remedy selection decision were: 1) the remedy would be protective of human health and the environment; 2) it would comply with applicable or relevant and appropriate requirements (ARARs) developed during the RI (and refined during the FS) conducted for the site; 3) it utilizes permanent solutions; 4) it is cost effective; and 5) it utilizes alternative treatment technologies to the extent practical.

The selected remedy includes removal of the source of groundwater contamination and enhanced bioremediation of the groundwater in the paint disposal pit area. LUCs are also included in the remedy to restrict the use of, or limit access to, real property in order to prevent or reduce risks to human health.

There are no wastes at the site that would be characterized as principle wastes (i.e., highly toxic or highly mobile contaminants).

## STATUTORY DETERMINATIONS

The remedy selected satisfies the requirements of CERCLA §121, and to the extent practical the NCP, and is based upon the RI/FS conducted for the EBS-13 site. The selected remedy is protective of human health and the environment, complies with federal and state requirements that have been identified as chemical-specific, location-specific, and action-specific to the remedial action ARARs (i.e., compliance with the USEPA National Primary Drinking Water Standards for benzene, ethylbenzene, toluene, and xylenes), is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Since this preferred alternative will result in contaminants remaining at the site above levels that would allow for unlimited use and unrestricted exposure to groundwater, the remedy also includes long-term monitoring of the groundwater, and implementing LUCs.

A statutory review of this remedial action will be conducted within five years after initiation of the remedial action in accordance with the CERCLA five-year review guidance and the NCP [NCP §300.430(f)(4)(ii)].

## DATA CERTIFICATION

The following information is included in the Decision Summary section of this Decision Document:

- A complete listing of COCs and their respective concentrations;
- Baseline risks represented by the COCs;
- Cleanup levels established for the COCs and the basis for these levels;
- How source materials constituting principal threats will be addressed (as applicable);
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment;
- Potential land and groundwater use that will be available at the site as a result of the selected remedy;
- Estimated capital, annual operation and maintenance (O&M), and direct and indirect costs; and
- Key factors that led to the selection of the remedy and a description of how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria.

Additional information can be found in the Administrative Record file for the site.

## DECISION DOCUMENT AUTHORIZING SIGNATURE

Glynn D Ryan 18MAY05

Glynn D. Ryan Date

Chief, Atlanta Field Office
Department of the Army
Base Realignment and Closure
Fort McPherson, Georgia

# FORT PICKETT ARMY GARRISON
# EBS-13 PARCEL
# FORMER RECYCLING COMPOUND
# Operable Unit 6

## DECLARATION FOR THE DECISION DOCUMENT

BLACKSTONE, NOTTOWAY COUNTY, VIRGINIA

MAY 2005

# DECISION SUMMARY

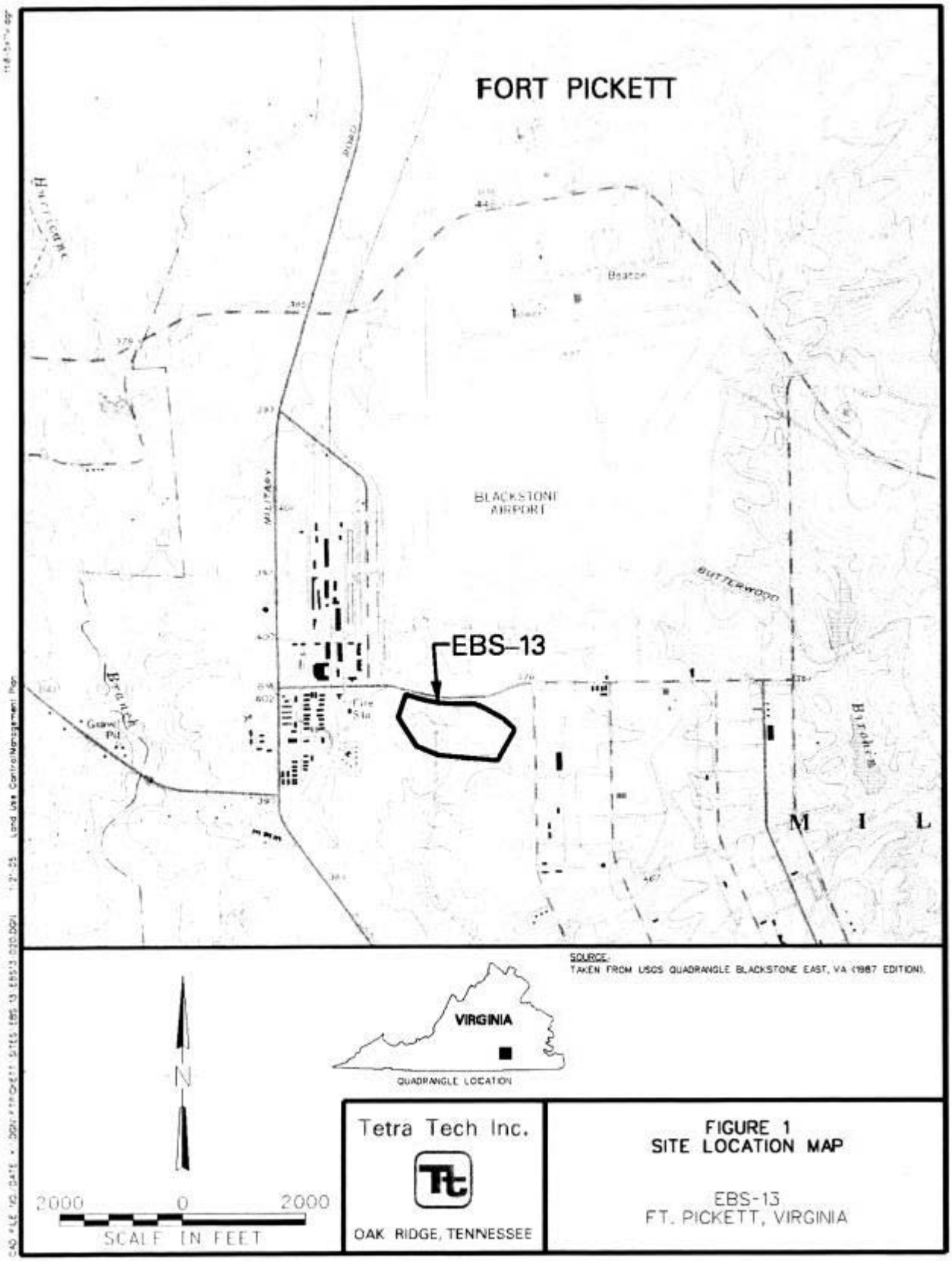
# SECTION 1
## SITE NAME, LOCATION, AND DESCRIPTION

The U.S. Army Garrison at Fort Pickett encompasses approximately 45,145 acres and is located 60 miles southwest of Richmond, Virginia, approximately two miles east of Blackstone, Virginia within Brunswick, Dinwiddie, Lunenburg, and Nottoway Counties. The site in not listed in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) nor does it have a National Superfund Database identification number. The U.S. Department of the Army (DOA) is the lead agency for the remediation activities at Fort Pickett. The source of funding for implementation of the selected remedy is the U.S. Department of Defense (DoD) as authorized and appropriated by the Defense Base Closure and Realignment Act of 1990 (BRACA), Section 2905 (a)(A).

Fort Pickett was established in 1941 as a combat training facility, with a peak number of 85,000 troops stationed at the installation during 1943. During operation of the installation, the Environmental Baseline Survey, Parcel 13 (EBS-13) site was used for the storage of used vehicles, metal containers, crates and debris and the burial of metal scrap, demolition debris and possibly paints, solvents, and petroleum products.

Fort Pickett is in the final stages of a base closure process under the BRACA, [Public Law 101-510 (P.L.)] as amended (commonly known as BRAC). This process was conducted following the Community Environmental Response Facilitation Act (CERFA) and the DoD BRAC *Cleanup Plan Guidebook* (DoD 1993) guidelines. Approximately 2,864 acres have been identified as BRAC property, subject to transfer or lease of which 2,804 have been transferred for private use through the Fort Pickett Local Redevelopment Authority (LRA) and other public entities. The remaining 33.05 acres are being retained by the Army pending environmental investigations and possible cleanup, including 31.47 acres designated as the EBS-13, that contains a Former Recycling Compound (FRC) (Figure 1). As part of the evaluation process, a Remedial Investigation/Feasibility Study (RI/FS) was prepared in accordance with the Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (USEPA October 1988).

This Decision Document, issued by the DOA, provides a brief summary of the investigations, evaluations, and remedial alternatives considered during the RI/FS for EBS-13, and discusses the remedial action selected (Tetra Tech 2004b). The strategy for remediation, closure, and reuse of the property is being overseen by the BRAC Cleanup Team (BCT), comprised of members from the U.S. Environmental Protection Agency (USEPA) Region 3 and Virginia Department of Environmental Quality (VDEQ) as support agencies, and the Fort Pickett Army Garrison BRAC Environmental Coordinator. The BCT has been involved throughout the RI/FS process at the EBS-13 site by providing review, comment, and concurrence with Work Plans, Sampling Plans, and the RI/FS report. The United States Army Corps of Engineers (USACE) Norfolk District (CENAO) was also involved in the oversight process. The Fort Pickett Restoration Advisory Board (RAB) was regularly briefed on progress.


FORT PICKETT
BLACKSTONE AIRPORT
EBS–13
M I L
SOURCE:
TAKEN FROM USGS QUADRANGLE BLACKSTONE EAST, VA (1987 EDITION).
VIRGINIA
QUADRANGLE LOCATION
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SCALE IN FEET
Tetra Tech Inc.
OAK RIDGE, TENNESSEE
FIGURE 1
SITE LOCATION MAP
EBS-13
FT. PICKETT, VIRGINIA

# SECTION 2
## SITE HISTORY AND ENFORCEMENT ACTIVITIES

### 2.1 PROPERTY HISTORY

Fort Pickett was established in 1941 as a combat training facility, with a peak number of 85,000 troops stationed at the installation during 1943. The installation was briefly closed in 1944, fully re-activated in 1950, selected for closure in 1995 by the BRAC 95 Commission, and then closed in 1997. In the late 1940s, the subject FRC was established on the EBS-13 site and operated at various times until the early 1970s. Activities which led to the current environmental problems that have necessitated this action included the storage of used vehicles, metal containers, crates and debris and the burial of metal scrap, demolition debris and possibly paints, solvents, and petroleum products. Pesticides were applied to areas of Fort Pickett, including the EBS-13 site, for pest control from the early 1940s through 1997. The site was in operation well before the effective date of key environmental regulations [i.e., before the November 1980 initiation of the Resource Conservation & Recovery (RCRA) Act of 1976].

In 1997, as part of the BRAC process, an EBS of the installation was performed following CERFA and DoD BRAC Cleanup Plan Guidebook guidelines. The survey was conducted by Woodward-Clyde, Inc. The EBS Report describes the environmental condition of the property, including reviews of existing installation environmental documents; federal, state, and local government records; and aerial photographs, as well as the results of site visits.

The EBS revealed that some sites had little or no historical documentation and would need further investigation. EBS-13 was one of these sites and designated for a Preliminary Assessment/Site Inspection (PA/SI).

In 1999, Weston performed a PA/SI that revealed the presence of drums, and metallic debris and ordnance related scrap. As a result of this inspection, in 1999, Groundwater Technology, Inc. (GTI) (GTI 2000) conducted a time-critical removal action (TCRA) of scrap, debris, and soil in a three-acre area located on the northwest side of the FRC. Included in the TCRA was exploratory trenching to determine the extent of debris and ordnance related scrap. As a result of the findings of the PA/SI, the BCT decided that the site should be moved to the RI phase.

The RI was performed between 1999 and 2003 in three phases: Phase I; Phase II; and a Supplemental RI. The Phase I RI was conducted by EA Engineering Science and Technology, Inc. (EA) (EA 2000). During the Phase I RI, a paint disposal pit was identified and an interim removal action (IRA) was conducted to remove approximately 100 cubic yards of the primary source material, consisting of discarded paints, and secondarily contaminated soils. Although the primary source (i.e., the obvious mass of contamination) was removed, confirmatory samples indicate that residual soil contamination (i.e., the source of groundwater contamination) remained. The Phase II and Supplemental Ms were conducted by Tetra Tech, Inc. (Tetra Tech 2004).

The results of the RI were used to prepare an FS to develop, screen, and evaluate potential remedial alternatives for soil and groundwater at EBS-13. The FS was completed in February 2004.

The VDEQ database listing of RCRA Corrective Action Baseline Facilities indicates that the EBS-13 site is not currently subject to any pending RCRA corrective action. There are no ongoing CERCLA enforcement activities or Potentially Responsible Party investigations ongoing at the site.

# SECTION 3
## COMMUNITY PARTICIPATION

The Proposed Plan (PP) was released to the public for a 30-day comment period, beginning August 16, 2004. The notice and availability of the PP and notification of the PP public meeting was published in the *Blackstone Courier Record* on August 11, 2004. The public meeting was held on August 31, 2004. Although the meeting was conducted to solicit views on the assumptions about reasonably anticipated future land use and potential beneficial uses of groundwater, there were no

public attendees at this meeting. No comments were submitted by the community; therefore, no detailed responses to comments were required or included in this Decision Document.

Detailed information describing the selected alternative was also presented to the Fort Pickett RAB on June 29, 2004. The RAB has concurred with the remedy outlined in the PP and included in this Decision Document. The final PP also remains available to the public in the Information Repository, located at the Fort Pickett BRAC Environmental Office.

This Final Decision Document becomes part of the Fort Pickett Administrative Record and is available to the public in the Information Repository, located at the Fort Pickett BRAC Environmental Office. Public Participation requirements under CERCLA and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) Section 300.430(0(3), which establish the required number of public participation activities, have been met.

# SECTION 4
## SCOPE AND ROLE OF OPERABLE UNIT

As part of the BRAC process at Fort Pickett, Woodward-Clyde conducted an EBS of the entire base (Woodward-Clyde 1997). The EBS identified 311 BRAC parcels, which were defined as areas that can be segregated from surrounding areas based on environmental conditions or concerns. The EBS recommended that the base be divided into three geographic zones, each comprised of a number of BRAC parcels (sites) with specific environmental classifications. ERI conducted an Aerial Photographic Analysis of the base to identify BRAC parcels (ERI 1997). The photographic investigation identified 13 additional BRAC parcels, with assigned numbers in the format PI-##. The BCT conducted field surveys to identify areas of potential environmental concern based on visual information and known historic land uses. The BCT identified another 15 BRAC parcels, with assigned numbers in the format BCT-##. The balance of the BRAC portion of the property (i.e., not part of EBS-13), referred to as Excess Property, has either been transferred, or remains the focus of continued environmental activities.

This Decision Document is limited to the EBS-13 site within Operable Unit 6. Final measures for the other sites at Fort Pickett will be documented in separate Decision Documents for other BRAC property transfers, in accordance with the Fort Pickett Site Management Plan.

This remedial action will address the removal of the source of groundwater contamination to address human health risk (i.e., the risk driver) above the VDEQ target risk goal, associated with exposure to contaminants present in groundwater. Land use controls (LUCs) will be implemented to address human health concerns associated with contaminated groundwater until such time as it is restored for unrestricted use, i.e., until the USEPA National Primary Drinking Water Standards for benzene, ethylbenzene, toluene, and xylenes [with maximum concentration limits (MCLs) of 0.005, 0.7, 1, and 10 parts per million (ppm), respectively] are met. In addition, LUCs will also be implemented to address safety concerns associated with potential future contact with material potentially presenting an explosive hazard (MPPEH). All actions will be performed as part of this remedy are based upon the RI/FS conducted for the EBS-13 site, and under the authority and to satisfy the requirements of CERCLA §121, and to the extent practical the NCP.

# SECTION 5
## SITE CHARACTERISTICS

### 5.1 CONCEPTUAL SITE MODEL

Contaminant fate and transport modeling was performed based on the conceptual site model that included the potential constituent of potential concern (COPC) transport pathways. These pathways included air transport, surface runoff, sediment transport, and advective groundwater flow (see section 7.2 for more detailed discussion of contaminant fate and transport).

In addition, based on site topography and the COPCs in soil, there is the potential for offsite transport by erosion of surface soil and sediment. volatile organic compounds (VOCs) and methylphenols easily dissolve into surface water, though heavier organic compounds, such as pesticides, semi-volatile organic compound (SVOCs), polychlorinated

biphenyl (PCBs), polycyclic aromatic hydrocarbon (PAHs), and dioxin/furans, tend to sorb to soil, degrade slowly, and tend not to dissolve into surface water. Metals typically sorb to soil, oxidize to hydrous oxide compounds, or form insoluble organic complexes. The transport of metals and heavier organic COPCs sorbed to surface soil and sediment may occur during surface runoff events. Metals and dioxin/furan COPCs appear to be restricted to low-lying areas immediately downslope of the site. No COPCs were identified in the water and sediment in the stream located east and south of the site when excluding upstream sample results.

The groundwater migration route was conceptually identified as an exposure route where off-site exposure to groundwater could be possible, although based on the surrounding land use and absence of nearby water-supply wells, this is highly unlikely. The paint disposal pit was identified as a possible source of contaminants in groundwater.

The primary receptors for onsite soil and groundwater are current and future resident adults and children, construction workers, commercial workers, adult trespassers, and adolescent trespassers.

## 5.2 SITE OVERVIEW

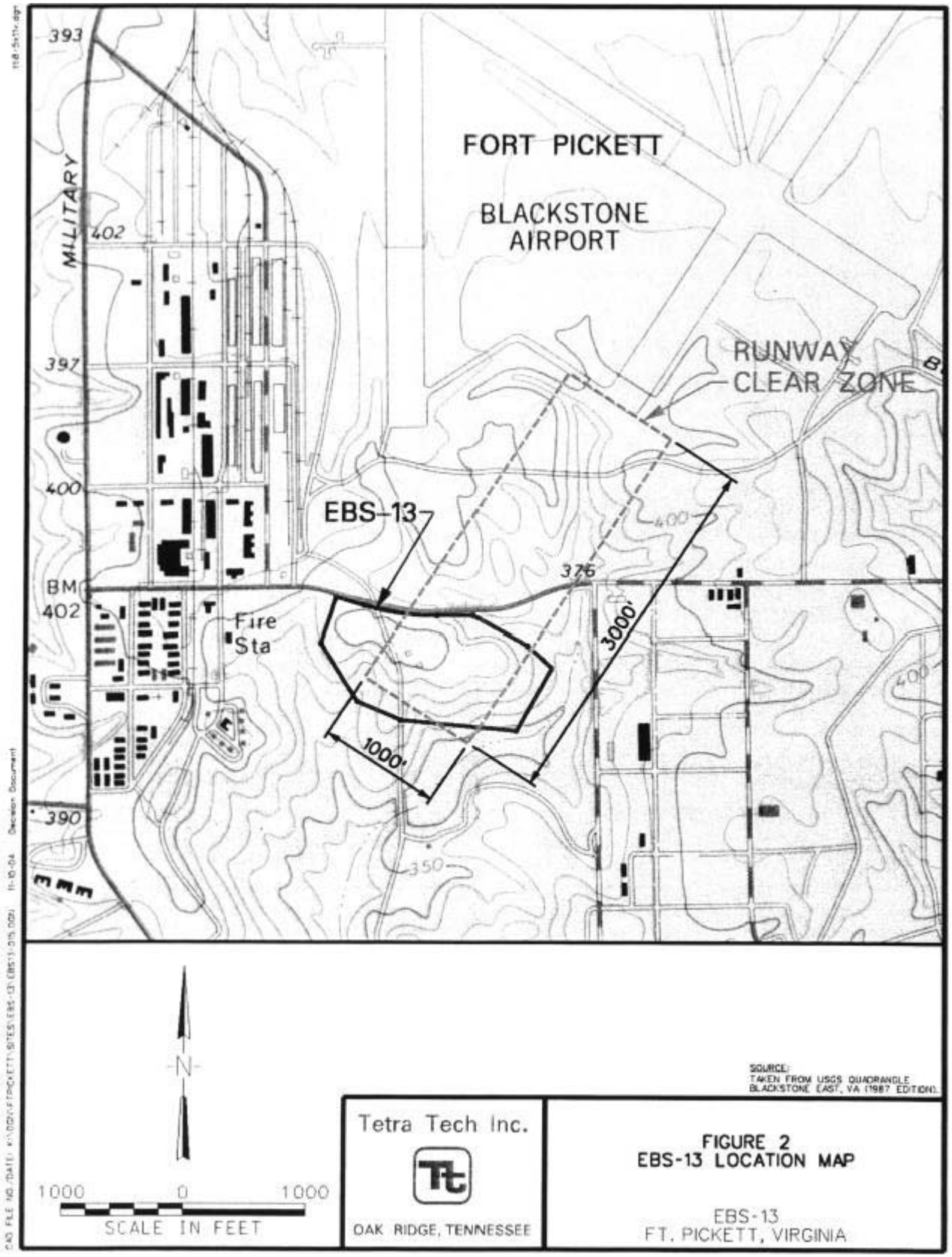
The EBS-13 site is located on an 800-foot (ft)-long topographic ridge that includes two spurs sloping to the southeast and east (Figure 2). The elevation of the site ranges from 363 ft above mean sea level (MSL) at the southern limit where the ground slopes down into a stream valley, to 404 ft MSL near the northwest portion of the site. The central and southern portions of the site are wooded. A 30 x 50-ft concrete slab from a former building structure is located on the west side of the site. From this slab 100 ft to the southeast, there is another 20 x 50-ft concrete slab. A smaller concrete slab and fence enclosure on the northwest side is an equipment decontamination pad constructed for the TCRA. There is a dilapidated 15- x 35-ft metal and wooden shed located on the eastern boundary. Based on historical aerial photographs and site topography, it appears that the upland areas of the site (elevated ridges extending to the east and south) were used for debris disposal and storage, while the bordering steeper slopes were not used for disposal.

Surface water runoff is directed in a radial fashion towards the northeast, east, southeast, and south directions. A small, unnamed, intermittent creek exists just beyond the east and south sides of the site at the base of the ridge.

Groundwater in the region of Fort Pickett is present within a multi-aquifer system, with aquifers existing in the sand, gravel, saprolite, or rock fractures. Unfractured bedrock and/or locally impermeable sediments can separate the producing zones laterally and vertically. The original rock texture is generally impermeable. Groundwater flow throughout the installation is primarily governed by surface topography and the direction of drainage discharging to the many on-post streams. Regional recharge is the direct result of rainfall at the site. Groundwater flow under the EBS-13 site tends to be south and east toward the intermittent streams at the base of the ridge.

Based on known history of the site, contamination most probably occurred through historic storage and disposal practices in the FRC. Fill material containing soil, burned debris, and metal debris cover portions of the site. This area was designated as the “high-density” area based on the presence of significant subsurface metallic debris, which remains at the site. The potential exists for MPPEH to be present within subsurface soils in the designated “high-density” area of the site. Near the center of historic operations of the site, exploratory trenches determined that fill material existed in this area in lenses up to 12 ft thick in some locations. The fill material contained MPPEH such as used practice rockets and anti-aircraft round casings, soil with ash material, melted glass, metal debris, concrete fragments, and wire. On the northwest side of the site, a former pit previously used to discard paint (referred to hereafter as the former paint pit) contained cans of old paint and apparent motor oil. Likewise, fill material containing burned debris and household waste was also considered a potential source of contamination.

Due to its proximity to the Blackstone Army Airfield and designation as a Runway Clear Zone (RCZ), the only uses or activities that are currently permitted in the area include transportation, communication lines, utility easements, resource production and extraction, open land use, agriculture (including livestock grazing but excluding feedlots and intensive animal husbandry), and water areas (includes hunting and fishing) (Department of the Army 1999).


393
MILITARY
402
397
400
BM
402
Fire
Sta
390
FORT PICKETT
BLACKSTONE
AIRPORT
RUNWAY
CLEAR ZONE
EBS-13
400
375
3000'
1000'
350
N
1000 0 1000
SCALE IN FEET
SOURCE:
TAKEN FROM USGS QUADRANGLE
BLACKSTONE EAST, VA (1987 EDITION).
Tetra Tech Inc.
OAK RIDGE, TENNESSEE
FIGURE 2
EBS-13 LOCATION MAP
EBS-13
FT. PICKETT, VIRGINIA

## 5.3 SAMPLING STRATEGY / FIELD INVESTIGATIONS

The characterization of EBS-13 consisted of several phases of soil, surface water, sediment, and groundwater sampling. The phases were a PA/SI and TCRA, a Phase I RI, a Phase II RI, and a Supplemental RI and IRA. Following the field activity, an FS was prepared using the information gathered during the RI.

### 5.3.1 Environmental Baseline Study

As mentioned in Section 2 of this Decision Document, Woodward-Clyde conducted an EBS of the base in 1997 (Woodward-Clyde 1997). The survey identified 311 BRAC parcels based on environmental conditions or concerns. Additionally, ERI conducted an Aerial Photographic Analysis of the base (ERI 1997) and the BCT conducted field surveys which resulted in the identification of additional parcels.

The EBS identified the FRC (i.e., EBS-13) as a parcel of property that was not suitable for transfer and that would require further site investigation.

### 5.3.2 Preliminary Assessment/Site Inspection and Time Critical Removal Action

As a result of the EBS, Roy F. Weston, Inc. (Weston) conducted a PA/SI of selected Areas of Concern (AOC) including EBS-13 (Weston 2001) to determine if these parcels could be closed under a "no further action" classification or, if warranted, an RI/FS or removal action. The PA/SI included site inspections, limited media sampling, and risk-based screening of analytical data. As part of the PA/SI, Weston reviewed the ERI Aerial Photographic Analysis document (Weston 2001).

Site reconnaissance of the EBS-13 parcel performed during the PA/SI revealed partially exposed MPPEH, areas of stressed vegetation, burned debris, and a large metal debris pile with automobile parts, tank tracks, and 55-gallon steel drums. Two of the 55-gallon drums were stained and contained a dark residue that had the appearance of a petroleum-based material. It appeared that fill material was moved to the site, unloaded, and spread downslope to create a larger work zone.

Based on information gathered, the BCT determined that a three-acre area on the northwest side of the FRC was an immediate threat to human health and the environment due to potential releases from the drums and bulk containers, and the threat of metal contamination from the tank tracks and metal debris piles. To address this concern the BCT prescribed a TCRA for the three acres.

The TCRA was implemented by GTI in September 1999 (GTI 2000). Four debris piles and two 55-gallon drums were removed and disposed. The two drums contained a greasy, solid material. One of the drums also contained some liquid. The contents of the drums were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) organics and inorganics, ignitability, corrosivity, reactivity, explosives, and oil and grease. Results indicated oil and grease and 2,4,6- TNT residue in the solids and benzene, carbon tetrachloride, and chloroform in the liquid. The drums were packaged and disposed of at the Michigan Disposal Waste Treatment Plant.

Following removal of the debris piles, four exploratory trenches were excavated in two areas thought to contain additional buried debris. The trenches revealed decomposing rubbish, glass, office trash, burned material, ash, metal debris, brick, porcelain, and MPPEH. Over 8,700 items certified as Munitions Debris (MD) were removed from surface debris piles and areas outside of the "high-density" area during investigations and the TCRA. No unexploded ordnance (UXO) was observed. Excavated soil was analyzed for TCLP organics and inorganics, ignitability, corrosivity, reactivity, explosives, oil and grease, paint filter test, and total petroleum hydrocarbons. Results indicated the soil was non-hazardous. Approximately 299.5 tons of the soil was disposed of at the Brunswick Waste Management Facility.

Based on results of the PA/SI and TCRA, the BCT decided to perform an RI/FS of the site.

### 5.3.3 Phase I Remedial Investigation

Initially, a Phase I RI of EBS-13 was performed by EA (EA 2000a) to assess the presence or absence of soil and groundwater contamination and to identify possible specific areas of concentrated contamination. The Phase I RI field investigation included the following tasks:

- UXO survey.
- Topographic survey.
- Geophysical conductivity survey.
- 129 hand-auger soil borings for the collection and analysis of surface and subsurface soil samples.
- 11 cone-electrometer test (CPT) borings for geologic characterization.
- Installation of 11 temporary well points in the CPT holes to sample groundwater.
- Sampling and analysis of groundwater from five well points.
- Field screening of soil and groundwater samples: organic vapors (photoionization detector [PID]), PCBs and explosives (colorimetric and immunoassay test kits), metals (X-ray fluorescence), and VOCs (onsite gas chromatograph [GC]).
- On-site GC analyses included benzene, toluene, ethyl benzene, and xylenes (BTEX); and chlorinated compounds methylene chloride, trans-1, 2-dichloroethylene (DCE), cis-1,2- cis-1,2-DCE, 1,1- DCE,1,1,1-trichloroethane (1,1,1-TCA), carbon tetrachloride, trichloroethylene (TCE), and tetrachloroethylene (PCE).
- Off-site laboratory QA /QC testing of sample duplicates consisting of 10 percent of soil samples (27 samples and two duplicates) and groundwater samples (one sample and one duplicate). Soil and groundwater sample analyses included explosives (Method 8330), and compounds listed on the USEPA target compound list (TCL) and target analyte list (TAL): VOCs (Method 8260), SVOCs (Method 8270), pesticides (Method 8081), PCBs (Method 8082), PAHs (Method 8270 using selective ion monitoring), metals (SW846), and cyanide (SW846). Only the surface soil samples were analyzed for dioxin/furans by Method 8290. Soil samples were analyzed also for grain size and total organic carbon (TOC). All six groundwater samples and duplicate were analyzed for total TAL metals.

The Phase I RI was completed in December 1999. Evaluation of the Phase I RI revealed the need for additional characterization of the EBS-13 site resulting in the preparation of a Phase II RI Work Plan (EA 2000b).

### 5.3.4 Phase II Remedial Investigation

The objective of the Phase II RI was to assess the nature and extent of COPCs, particularly in areas of interest defined from the Phase I RI findings.

To evaluate possible soil contamination, surface samples were collected at 77 locations, and 75 subsurface soil samples were collected from direct-push soil borings performed at 46 locations. In each boring, a sample was collected from the bottom and from the interval containing the highest PID readings or, in the absence of elevated PID readings, from the middle of the boring. This sampling protocol was modified at some locations based on investigation requirements. Soil samples were analyzed for VOCs, SVOCs, pesticides, PCBs, PAHs, metals, explosives, and dioxin/furans. Selected samples were analyzed for pH and TOC to assess soil conditions at the site as they may affect fate and transport of COPCs.

Test pits were excavated at 33 locations to confirm the presence or absence of buried material. One subsurface soil sample was collected from each of four test pits and submitted for laboratory analysis of TCL VOCs, SVOCs, PAHs, pesticides, PCBs, explosives, dioxin/furans, TALmetals, and pH.

Fourteen permanent monitoring wells were also installed during this effort. Permeability tests were performed on the wells to be used in fate and transport evaluations. Two rounds of groundwater sampling from the wells were conducted and the samples analyzed for VOCs, SVOCs, pesticides, PCBs, PAHs, and total metals and some for dissolved metals.

Surface water and stream sediment samples were collected from six locations on the adjacent creeks. The water samples were analyzed for TCL organics, TAL metals, PAHs, dioxin/furans, explosives, and hardness. For each surface water sample, two

TAL metals samples were submitted and analyzed: one total metals and one field filtered for dissolved metals. The stream sediment samples were analyzed for dioxins/furans, explosive compounds, VOCs, SVOCs, pesticides, PCBs, PAHs, metals, and simultaneously extracted metals and acid-volatile sulfide.

Sampling and analyses for the Phase II RI were performed in accordance with the Phase II RI Work Plan (EA 2000b) with revisions according to BCT comments. Severn-Trent Laboratories performed the sample analyses.

Phase II RI field investigation was completed on May 9, 2001. Upon evaluation of the Phase II RI data by USEPA and VDEQ, data gaps were identified in the determination of the nature and extent of COPCs. As a result, a supplemental RI, including additional site characterization sampling, was implemented.

### 5.3.5 Supplemental Remedial Investigation and Interim Removal Action

Tetra Tech began the Supplemental RI field investigation on January 6, 2003. Geophysical surveys were performed on 24.6 acres of EBS-13 to ensure comprehensive coverage and identify any additional small buried anomalies. Ten shallow subsurface soil samples were collected and analyzed for VOCs, SVOCs, PAHs, pesticides, PCBs, total metals, cyanide, dioxin/furans, and explosives. Six temporary groundwater monitoring wells were installed, and the groundwater sampled and analyzed for VOCs. Two additional permanent groundwater monitoring wells were also installed. Groundwater from the two wells was sampled and analyzed for VOCs, SVOCs, pesticides, PCBs, PAHs, and total metals and some for dissolved metals. An additional 22 test pits were excavated to remove and certify the material as MD.

In conjunction with Supplemental RI field activities, an IRA was conducted on the contents of a paint disposal pit identified in the Phase II RI. The IRA involved excavating soil and debris in an area approximately 17 ft x 20 ft down to approximately 5 ft below ground surface (bgs). Based on the small quantity of soil excavated (86.5 tons), the analytical results of the previous TCRA, and the high possibility that the waste was hazardous, the soil was disposed of as hazardous waste by Environmental Quality Company at their disposal facility in Wayne County, Michigan.

Soils from the walls and floor of the excavation were sampled and analyzed for VOCs, SVOCs, pesticides, dioxins/furans, explosives, and metals. The analytical results exceeded risk-based criteria (RBC) concentrations, suggesting that contamination extended vertically beyond the excavated depth. The pit was backfilled with clean soils and revegetated.

All sampling and analyses were performed in accordance with the Supplemental RI Work Plan (Tetra Tech 2003). Test America, Inc. performed the sample analyses.

### 5.3.6 Feasibility Study

The FS was prepared (completed in April 2004) to develop, screen, and evaluate potential remedial alternatives for soil and groundwater at the EBS-13 area of Fort Pickett. The FS used the results of the RI to identify remedial action objectives (RAOs), constituents of concern (COCs), and to develop, screen, and evaluate remedial alternatives for the site.

RAOs were identified for surface soil and groundwater based on the results of the RI, particularly the human health and ecological risk assessments, as well as applicable or relevant and appropriate requirements (ARARs) and to be considered (TBC) criteria identified during the RI. For the FS, RAOs were formulated based on the following criteria:

- Unacceptable ecologic and human health risks;
- USEPA Region 3 risk-based criteria (RBC) values and 1/10 RBCs (non-carcinogenic) for soil and groundwater; and
- USEPA MCLs for groundwater.

The RAO selection process considered only COCs where risk is unacceptable and did not consider chemicals or media of interest that are within acceptable risk ranges. Results of the Ecological Risk Assessment indicated acceptable risks for ecological receptors and they are not considered further. For human health receptors, the carcinogenic and non-carcinogenic risk estimates for surface soil and groundwater (including potential for drinking surface water) showed unacceptable risk for some compounds. For surface soil, TEQ was the only COC that exceeds preliminary

remediation goals (PRGs). COCs for groundwater that exceeded PRGs included benzene, 4-methylphenol, and Aroclor 1016, which were primarily detected in MW-136. There were no subsurface soil, sediment, or surface water COCs because there were no exceedances of RBCs and/or PRGs.

Based on the COCs and their respective matrices, general response actions (GRAs) deemed implementable at EBS-13 included no action, institutional controls, monitored natural attenuation (MNA), *in situ* treatment, source removal, ex situ treatment, and disposal. Process options were evaluated using three criteria: effectiveness, implementability, and cost. The process options carried forward from the screening of technologies and process options were used to form preliminary remedial alternatives. Remedial alternatives were developed by matching the RAOs with different remediation strategies and degrees of remediation, and include:

- No Action.
- Source and Surface Soil Removal, and MNA.
- Source Removal, Surface Soil Cover, and MNA.
- Source Removal, Surface Soil Cover, and Enhanced Bioremediation.

The first strategy of no action would involve no additional effort to maintain the site, but would not reduce the risk associated with source materials leaching to groundwater or risks associated with the groundwater contamination.

The second strategy included source area removal at and in the vicinity of MW-136, which is contributing to groundwater contamination in this area (includes abandoning MW-136), surface soil removal where remedial levels (RLs) are exceeded, and MNA. Groundwater contamination levels and natural attenuation processes would be monitored on a regular basis, and the need for additional remedial actions would be evaluated if conditions changed or if contaminant levels did not decrease. This strategy would significantly reduce risk by removing the source of groundwater contamination, so that natural attenuation processes could reduce residual contamination to below PRGs, and removing the risk to the commercial worker from surface soils. The relative cost for this option is moderate.

The third strategy is similar to the second in that source removal and MNA are utilized for groundwater remediation. The difference is that for surface soils, a soil cover will be constructed over those areas where COC concentrations in surface soils exceed RLs, creating a barrier to exposure risk to the commercial worker. The relative cost for this option is moderate to low.

The fourth strategy is similar to the third strategy in that source removal and a surface soil cover are used. The difference in this strategy is that enhanced bioremediation would be used for groundwater in the vicinity of MW-136, which would consist of injection of oxygen release compound into the subsurface. Groundwater contamination levels and natural attenuation processes would be monitored on a regular basis, and the need for additional remedial actions would be evaluated if conditions changed or contaminant levels did not decrease. The relative cost for this option is moderate to high.

## 5.4 KNOWN AND SUSPECTED SOURCES OF CONTAMINATION

The source of contamination on the EBS-13 site in the area designated as the “high-density” area is the presence of significant subsurface metallic debris, which remains at the site. The potential exists for MPPEH to be present within subsurface soils within this area. Near the center of historic operations of the site, exploratory trenches determined that fill material existed in this area in lenses up to 12 ft thick in some locations. This fill material contained MPPEH such as used practice rockets and anti-aircraft round casings, soil with ash material, melted glass, metal debris, concrete fragments, and wire. On the northwest side of the site a filled trench contained cans of old paint and apparent motor oil. Likewise, fill material containing burned debris and household waste was also considered a potential source of contamination.

## 5.5 GROUNDWATER CONTAMINATION

Based on field investigations at EBS-13, the site is underlain by soil and highly weathered gneissic granite. Three overburden units were intercepted above dense, weathered bedrock. The depths of these layers generally follow the ground surface contours. There is a surficial layer of brown silt with little fine sand and clay, which is up to 16 ft thick, but typically is less than 6 ft thick. This surficial layer is very thin to absent on the upper elevations of the site. This soil is underlain by a red,

brown, or tan micaceous silty fine sand to sandy silt with few rock fragments. This unit is continuous across the site and ranges in thickness from 3 to 27 ft. This layer frequently contains a relic foliation from the original bedrock. Below the silty sand is an orange-brown, yellow, or tan, micaceous silty sand to sand with some rock fragments of quartz and feldspar with a relic foliation. This lower layer is highly weathered bedrock. Drilling refusal on dense bedrock occurred during well installation at four locations and ranged in depth from 13 to 26 ft. In general, the dense bedrock was encountered at shallower depths along the upper plateau and ridges of the site than on the lower side slopes. The bedrock did not appear to be highly fractured, but was dense and dry.

Groundwater was encountered in the overburden in the 14 Phase II wells. This water table aquifer, which is affected by site contaminated occurs in a thin saturated zone confined below by dense bedrock, which is periodically absent in the upper elevations of the site to over 15 ft thick at the low-elevation areas on the sides of the site. The extent of this aquifer is dependent on seasonal variations of precipitation. Groundwater contamination was limited to the samples collected and analyzed from MW-136, within the area of influence of the former paint pit.

# SECTION 6
## CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

### 6.1 LAND USES

Based on the Nottoway County LRA Reuse Plan, this property is zoned for industrial purposes. However, a portion of EBS-13 is located within the Blackstone Army Airfield RCZ due to its proximity to Runway 1-19, an Army instrument flight rules rotary wing runway, and Runway 4-22, an Army Class B runway. No activities are currently being conducted at the EBS-13 site.

Although access to over 20 acres of the site is restricted by a locked, 6 ft-high, barb-wire topped and posted fence which will be maintained by the Army until the site is transferred, it is possible for a persistent trespasser to gain access to the site.

Adolescent and adult trespassers are the most likely to access the site on a recreational (i.e., incidental) basis. Therefore, adult and adolescent trespassers were evaluated for incidental ingestion of, and dermal contact with, surface soil and for inhalation of particulates entrained in air from surface soil. Although it is unlikely that trespassers will contact deeper soil, potential exposures to volatile COCs in subsurface soil were also evaluated. Adult and adolescent trespassers were also evaluated for incidental ingestion of, and dermal contact with, surface water and sediments.

Because of EBS-13's location in an RCZ, prohibited land uses include:

- Residential;
- Industrial and Manufacturing;
- Commercial and Retail Trade;
- Personal and Business Services;
- Public and Quasi-Public Services (government services, medical services, etc.); and
- Outdoor Recreation (playgrounds, parks, golf courses, etc.).

The restrictions, based on proximity to the airfield (i.e., because the site is in the RCZ), are not relevant to the implementation of LUCs as part of the final remedial action at EBS-13 nor to the calculation of current or future exposure to the contaminated groundwater (i.e., the site's location within an RCZ is coincidental and totally independent of the LUCs being recommended for implementation as part of the selected remedy). The LUCs are required due to the presence of residual contamination and MPPEH, not the proximity of the site to the air field. The only uses or activities that are permitted in the RCZ include:

- Transportation (including highway and street right-of-ways);
- Communication lines and utilities;

- Resource production and extraction;
- Open land uses;
- Agriculture (includes livestock grazing but excludes feedlots and intensive animal husbandry);
- Permanent open spaces; and
- Water areas (includes hunting and fishing).

### 6.2 GROUNDWATER AND SURFACE WATER USES

The nearest public drinking-water wells are located more than four miles from Fort Pickett. There are no water-supply wells within at least 5,000 ft of EBS-13, based on available information. Most of the population within four miles of Fort Pickett, including the Town of Blackstone and Fort Pickett, utilize a public water system. The water source for this system is a surface water intake on the Nottoway River near the southwestern boundary of Fort Pickett.

There is a small residential area located along West Entrance Road outside the post, approximately 5,000 ft west of EBS-13, that is not served by the public water system and is assumed to use wells for a water supply (USACE 2000). This area is located west of Hurricane Branch, a major stream on the western border of Fort Pickett.

There are three private drinking water wells on Fort Pickett and several private wells located off the post. The Fort Pickett wells are located at Building SW101 in the southwest corner of the post, Building NW100 on the northern boundary, and Building NW4072 located near EBS-308 about 10,000 ft north of EBS-13. The well at NW4072 was installed circa 1990 and is approximately 150-ft deep, open within the bedrock aquifer. The well at SW101 is located outside the BRAC excess property, within the Virginia Army National Guard (VAARNG) installation. The wells at NW4072 and NW100, which serve single residences, have been sampled by CENAO in accordance with USEPA Region 3 standards and procedures. Results of this sampling have been provided to the USEPA and VDEQ.

Another three supply wells located at the Virginia Polytechnic Institute (VPI) Cultural Research Center (near EBS-308 about 1,000 ft northeast of Building 4072) were intended for research activities including providing water to adjacent ponds, but have not been used recently by VPI due to insufficient yield (Weston 2001). Research activities associated with the ponds have not been conducted. One well is capped and the other two have pumps and piping systems. The wells have been sampled and results were presented in the Zone I PA/SI Addendum Report (Weston 2001). These wells are approximately 150 ft deep and open within the bedrock aquifer.

Future beneficial uses of the groundwater and surface water have not been determined.

# SECTION 7
## SUMMARY OF SITE RISKS

### 7.1 OVERVIEW AND OBJECTIVES

The RI/FS included both a Baseline Human Health Risk Assessment (BHHRA) and an Ecological Risk Assessment (ERA) to address the potential current and future risks posed to human health and the environment associated with EBS-13. Contaminant fate and transport was evaluated to determine potential contaminant migration and off-site impacts from COPCs. Exposure and toxicity assessments for the COPCs were evaluated to determine risk values and indices for the selected receptors, media, and contaminants.

The Risk Assessment for the site presented in the RI Supplemental Report (February 2004) and information presented in the FS (March 2004) for EBS-13 at the Paint Pit area indicated that there exists an unacceptable risk for human health receptors in groundwater for some VOCs and SVOCs. Therefore, the risk driver for this remedial action is the removal of the source of groundwater contamination at the paint pit area. LUCs will be implemented as part of this remedy in order to address human health concerns associated with contaminated groundwater, until such time as groundwater is restored for unrestricted use, and the safety concerns associated with the potential future contact with MPPEH (e.g., buried shell casings).

The BHHRA, based on exposure to surface soil, subsurface soil, total soil (combined surface and subsurface soil) and groundwater evaluated risk for the residential adult and child, construction worker, and commercial worker. The ERA was based on exposure to surface soil and shallow subsurface soil. Because transportation and utility uses are currently allowed, a limited-use commercial worker and a construction worker were considered likely and were evaluated for the site. Hunting and fishing are also allowed within the area of the site, which necessitated the need to also evaluate the recreational adult and child receptors. For completeness and comparison purposes only, a residential scenario (adult and child) were also evaluated for this site. Because carcinogenic risks are evaluated on a lifetime risk basis, the adult and child calculated risks are combined to account for potential lifetime residential and recreational exposure to the site.

## 7.2 CONTAMINANT FATE AND TRANSPORT

Potential COPC transport pathways developed as part of the RI include air transport, surface runoff, sediment transport, and the horizontal movement of groundwater by advection.

Considering site topography and COPCs that were found in surface soil, there is the potential for offsite transport of COPCs by surface water erosion of soil and sediment. No COPCs were identified in the nearby stream water and sediment located east and south of the site when considering COPC sources at the site and excluding upstream sample results.

The groundwater migration route was conceptually identified as the exposure route where off-site exposure to groundwater could be possible, although based on the surrounding land use and absence of nearby water-supply wells, this route of exposure was considered highly unlikely. The aquifer is aerobic, resulting in the potential biodegradation of aromatic compounds. The paint disposal pit was identified as the source for organic contaminants observed in groundwater. The absence of a groundwater contaminant plume extending away from the paint disposal pit strongly suggests that less mobile COPCs are not migrating and mobile organic compounds are being naturally attenuated (i.e., biodegraded) in the aerobic groundwater.

## 7.3 IDENTIFICATION AND DELINEATION OF COPCS

In the Phase I, Phase II, and Supplemental RI investigations, sampling locations and analytes were chosen to characterize AOCs. Analytes were identified as COPCs in media due to exceedences of the RBC screening criteria or the ecotoxicity screening criteria. Additional analytes were identified as COPCs due to detection of an analyte that did not have a corresponding screening benchmark. These additional COPCs, although not indicative of a potential risk, would be included in the risk characterization.

The purpose of the COPC screening process is to eliminate chemicals for which no further risk evaluation is needed. COPCs were selected for each medium and residential/industrial scenario (e.g., arsenic in surface soil for residential use). COPCs for BHHRA are limited to those chemicals that exceed a selection criterion. The COPCs were defined as chemicals that were positively detected in an environmental medium at a maximum concentration exceeding screening values.

Most inorganics selected as COPCs in the various media were detected at concentrations that did not exceed their respective RBCs, but did exceed the adjusted RBCs [based on a Hazard Index (HI) of 0.1], including both COPCs in sediment.

Detected chemicals were also compared to USEPA's Soil Screening Guidance Soil Screening Levels (SSLs) for migration to groundwater and/or inhalation. Chemicals whose maximum concentration exceeded the soil screening level (SSL) included antimony, chromium, nickel, thallium, 3,3'-dichlorobenzidine, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, pentachlorophenol, alpha-BHC, beta-BHC, 2,4-dimethylphenol, carbazole, benzene, dibromochloromethane, ethylbenzene, methylene chloride, toluene, and xylenes, indicating that these chemicals may be of some risk to groundwater. Of these chemicals, current groundwater COPCs include nickel, thallium, beta-BHC, 2,4- dimethylphenol, benzene, ethylbenzene, toluene, and xylenes. Thallium, ethylbenzene, and xylenes had maximum concentrations less than federal MCLs.

## 7.4 ANALYTICAL REPORTING LIMITS ABOVE SCREENING CRITERIA

In a majority of surface soil samples collected during Phase II RI, the reporting limits for several SVOCs exceeded the residential RBC or ecotoxicity screening criteria. The non-detected SVOCs included chlorinated benzenes and phenolic compounds, which can be associated with a variety of uses or products including resins, intermediate compounds in pesticide manufacturing, solvents, lubricants, disinfectant, metal polishes, insecticide, rubber, wood preservative, fungicide, vehicle exhaust, chlorinated drinking water, etc. (Montgomery and Welkom 1990). Thus, it is possible that some or all of these compounds could be present at the site, given the variety of historic uses.

The reporting limits of 2-methyl-4,6-dinitrophenol in most surface soil, subsurface soil, surface water, and groundwater samples were above the RBCs. This compound is a herbicide and insecticide (Montgomery and Welkom 1990). N-nitrosodi- n-propylamine reporting limits also exceeded the RBCs in most surface soil, subsurface soil, surface water, and groundwater samples. N-nitrosodi-n-propylamine is documented to be a contaminant in the pesticide s-ethyl dipropylthiolcarbamate (EPTC) (Briggs 1992). Although there is a possibility that these two SVOCs may be present at the site due to past general pesticide use, the fact that EPTC has not been reported to be used at Fort Pickett and that these two SVOCs were not detected in any of the collected surface or subsurface soil samples makes the possibility of their presence negligible.

Similarly, 2,4-dinitrophenol, ecological screening criteria and/or human bis(2-chloroethyl)ether, hexachlorobenzene, and/or nitrobenzene reporting limits exceeded the RBCs in surface soil, subsurface soil, surface water, and/or groundwater samples. These compounds have been used in the preparation of wood preservatives and dyes (2,4-dinitrophenal), pesticides, fungicides (bis(2-chloroethyl)ether and hexachlorobenzene), and lubricating oils and thus may have been introduced to the site through general site practices.

## 7.5 ANALYTE CONCENTRATIONS EXCEEDING SSLS

Within surface and subsurface soil, the concentrations of several analytes were above the soil to groundwater SSLs for migration to groundwater.

These analytes in surface soil analytical results included the following: chloroform, carbazole, 3,3'-dichlorobenzidine, benz[a]anthracene, benzo[a]pyrene, naphthalene, 4,4'-DDT, heptachlor epoxide, beta-BHC, and arsenic. A majority of the organic compounds that reported concentrations exceeding the SSLs in surface soil occurred in SB149 and SB198.

For subsurface soil, one or more of the following analyte concentrations exceeded the SSL: 4 methyl-2-pentanone, BTEX, chloroform, 2,4-dimethylphenol, carbazole, dibenzofuran, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, naphthalene, dieldrin, heptachlor epoxide, 2,4-dinitrotoluene, the TEQ for dioxin/furans, antimony, arsenic, and manganese. All exceedances of SSLs for TCL organic compounds and explosives were confined to samples from SB138, SB166, SB172, SB173, SB174, TP-13, and TP-26 with the majority of the exceedances occurring in samples from TP-26 and SB136 within fill debris. The December 2000 and May 2001 sampling results for the 14 site monitoring wells contained concentrations of the identified soil compounds exceeding SSLs. 4-Methyl-2-pentanone, benzene, ethylbenzene, toluene, xylenes, 2,4-dimethylphenol, and arsenic were detected in MW-136, and benz[a]anthracene was detected in MW-130.

Arsenic and manganese were present in surface and subsurface soil across the site in concentrations similar to background (i.e., native soils not impacted by FRC activities).

## 7.6 BASELINE HUMAN HEALTH RISK ASSESSMENT

The BHHRA was conducted to characterize the risks to humans associated with the potential current or future exposures to chemicals in total soil (surface soil and subsurface soil), surface soil, subsurface soil, groundwater, surface water, and sediment within EBS-13 if no remedial action is taken and therefore, represents the "no action" alternative in an FS.

The BHHRA evaluated risk for the residential adult and child, construction worker, and commercial worker based on exposure to surface soil, subsurface soil, total soil (combined surface and subsurface soil), groundwater, and air.

## 7.7 EXPOSURE ASSESSMENT

An exposure assessment was performed to identify the pathways by which humans are potentially exposed to COPCs, the magnitude of the potential human exposure, and the frequency and duration of exposure.

The output of the exposure assessment (an estimate of COPC intake) is used in conjunction with toxicity criteria (i.e., cancer slope factors and reference doses) identified in the toxicity assessment to quantify risks and hazards to receptors during risk characterization

Hypothetical future resident adults and children were evaluated for potential risks associated with incidental ingestion of, dermal contact with, and inhalation of particulates entrained from surface and subsurface soil and the incidental ingestion of and dermal contact with surface water and sediments.

Future construction workers were evaluated for potential risk due to incidental ingestion of, dermal contact with, and inhalation of, particulates from surface and subsurface soil during excavation activities and incidental ingestion of and dermal contact with surface water and sediments. The construction worker was also evaluated for incidental ingestion and dermal contact with groundwater, assuming the construction worker could be exposed to shallow groundwater during excavation activities.

Future commercial workers were only evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates from surface soil since commercial workers typically are not involved in digging scenarios where exposure to subsurface soil or groundwater would occur.

As a conservative measure, the hypothetical future residential adult and child exposures to groundwater via tap water through ingestion and dermal pathways and through inhalation while showering and bathing were assessed.

Medium and Route EPCs were also calculated for COPCs in the EBS-13.

## 7.8 TOXICITY ASSESSMENT

The toxicity assessment for the COPCs examined information concerning the potential human health effects of exposure to COPCs. For each COPC, the goal of the toxicity assessment was to provide a quantitative estimate of the relationship between the magnitude and type of exposure and the severity or probability of human health effects. The toxicity values presented in this Decision Document are integrated with the exposure assessment to characterize the potential for the occurrence of adverse health effects.

For non-carcinogens, it is assumed that a dose exists below which no adverse health effects will be seen. Below this "threshold" dose, exposure to a chemical can be tolerated without adverse effects.

For carcinogens, risks are estimated as the probability that an individual will develop cancer over a lifetime as a result of exposure to the carcinogen.

## 7.9 RISK CHARACTERIZATION

Potential health risks resulting from exposure to noncarcinogenic compounds are estimated by comparing the reasonable maximum daily intake dose calculated for an exposure to an acceptable intake dose, such as a chronic or subchronic reference dose (RfD). The ratio of the exposure dose (intake) to the RfD is referred to as the hazard quotient (HQ):

$$HQ = Dose/RfD$$

If the HQ exceeds unity, there may be a potential health risk associated with exposure to that chemical (USEPA 1989). The Dose/RfD ratio is not a mathematical prediction of the severity or probability of toxic effects; it is simply a numerical indicator of the potential for adverse effects. The summation of HQs for several compounds is referred to as the HI.

Conservatively, a total HI for any exposure route is calculated by summing the Dose/RfD ratios (HQs) for the individual chemicals of concern (USEPA 1989). To provide a better indication of risks, Dose/RfD ratios are summed according to the target organ affected. For example, the Dose/RfD ratios for those chemicals affecting the liver should be summed separately from those chemicals affecting the central nervous system. A HI greater than 1 indicates potential adverse noncarcinogenic health effects (USEPA 1989).

The risk characterization evaluated the information obtained through the exposure and toxicity assessments to estimate His and incremental lifetime cancer risks (ILCRs). HIs equal to or less than 1 indicate that no adverse noncarcinogenic health effects are anticipated. The USEPA target increased lifetime cancer risk (ILCR) risk range is $1x10^{-4}$ to $1x10^{-6}$ or lower. The VDEQ ILCR goal is $1x10^{-6}$ or lower.

The following receptors were evaluated:

The trespasser (adolescent and adult),
The commercial worker,
The construction worker,
The recreator (adolescent and adult), and
The hypothetical future resident (adult and child).

A summary of the risk characterization for EBS-13 is summarized in the Risk Assessment for the site presented in the RI Supplemental Report (February 2004) and the Feasibility Study (March 2004) for EBS-13. This information indicates that in the area of the Paint Pit, there exists an unacceptable risk for human health receptors in groundwater for some VOCs and SVOCs. Therefore, the basis for this remedial action (i.e., the risk driver), is the removal of the source of potential groundwater contamination at the paint pit area.

The risk estimate for toxicity equivalent (TEQ) for dioxin across all pathways in surface soil in the surrounding areas outside of the Paint Pit area falls within the target risk range for VDEQ and the acceptable risk range for USEPA. In discussions with USEPA and VDEQ, it was agreed that no action would be required for the TEQ due to the negative short-term impacts associated with the removal action that would be required to remediate it, comparison to the potential benefits of conducting a removal action (i.e., the ecological habitat would be destroyed in order to further reduce risk). In addition to the actions taken to address the risk driver, LUCs will be implemented outside of the paint pit area to address the human health concerns associated with contaminated groundwater and the safety concerns associated with the potential future contact with MPPEH.

## 7.10 ECOLOGICAL RISK ASSESSMENT

An ERA was also conducted based on exposure to surface soil. An ERA was performed for surface soil, shallow subsurface soil, sediment, and surface water associated with EBS-13. Media/COPC/receptor of concern combinations having potential risk were identified as a result of the ERA.

For surface soils, approximately 30 metals and organic chemicals were identified as COPCs. The identified ROCs for soils were terrestrial plants, soil invertebrates, mammals (meadow vole, short-tailed shrew, Eastern cottontail, and red fox), and birds (American robin and American kestrel). Risks to terrestrial plants from exposure to COPCs in surface soil at EBS-13 are acceptable. Risks to soil invertebrates from surface soil were only found for chromium and zinc. Acceptable food-web risk was found for the American kestrel and red fox. Based on the refined food web for American robin, no observed adverse effect level Hazard Quotient (HQs) for dioxin TEQ, aluminum, chromium, lead, DDE, DDT, mercury and zinc ranged from 1.05 to 8.6; however, lowest observed adverse effect level HQs for these same chemicals were less than 1.0. Consequently, adverse effects to robins from exposure to these chemicals in surface soil at EBS-13 are unlikely. The meadow vole, short- tailed shrew, and Eastern cottontail appear to be at risk from exposure to aluminum. However, the aluminum found at EBS-13 represents a naturally occurring element. Site pH values found are high enough to expect that aluminum is not mobile and available for uptake and the inception of toxic effects.

Ecological receptors identified which may be exposed to COPCs in stream sediment included benthic invertebrates, mallard ducks, belted kingfishers, and raccoons. There is an acceptable risk to benthic invertebrates, mallard ducks, raccoons, and belted kingfishers for all COPCs in steam sediments.

# SECTION 8
## BASIS FOR ACTION

This remedial action is being initiated to address the human health risk at EBS-13 due to exposure to contaminants present in the groundwater in the immediate vicinity of monitoring well MW-136. The response action selected in this Decision Document is necessary to protect public health, welfare, and the environment from releases of hazardous substances into the environment.

# SECTION 9
## REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) were developed during the FS and were formulated to consider only those compounds where risk was unacceptable and did not consider chemicals or media of interest that were within acceptable risk ranges. For this reason, compounds detected in surface water, sediment, surface soil, and shallow subsurface soil were not considered for ecological receptors. The carcinogenic and non-carcinogenic risk estimates for total soil and groundwater show unacceptable risk for some compounds for human health receptors.

The RAOs for this action are the following:

- Remove the source of groundwater contamination in the vicinity of MW-136;
- Reduce the concentration of contaminants in groundwater in the area of MW-136; and
- Prevent potential exposure to contaminated groundwater by implementing LUCs until such time as the groundwater remediation is complete.

The basis and rationale for the RAOs are based on the current and reasonably anticipated future land use and potential beneficial groundwater use. The anticipated future land use of the property is for industrial purposes. The RAOs were selected to protect human health based on identified risks from contaminated groundwater and eliminate future groundwater impacts from the source material. The groundwater will most likely not be utilized in the future for a potable water source (due to the presence of a treated water system within the area), however, the RAOs are technically achievable and cost effective.

Accomplishing the RAOs will protect human health by preventing exposure, reducing risks, and eliminating future groundwater impacts from the source material.

# SECTION 10
## REMEDIAL ACTION ALTERNATIVES

The remedial alternative selection process is used to identify and plan the implementation of CERCLA remedial actions that eliminate, reduce, or control risks to human health and the environment (40 CFR 300). The FS process, as defined in the NCP, develops remedies to protect human health and the environment, maintain protection over time, and minimize untreated waste. Section 121 of CERCLA states a statutory preference for remedies that will permanently and significantly decrease toxicity, mobility, or volume through treatment and provide for long-term protection. The primary requirements for the final remedy are that it protect human health and the environment and comply with ARARs. The NCP defines the following preferences in developing remedial action alternatives:

- Use of treatment to address the principal site threats, wherever practical.
- Use of engineering controls (e.g., containment) for waste that poses a relatively low long-term threat and for which treatment is not practical.

- Use of a combination of remedial actions, as appropriate, to achieve protection of human health and the environment.
- Use of institutional controls (e.g., deed restrictions) to supplement engineering controls for short- and long-term management to prevent or limit exposures to hazardous substances.
- Use of an innovative technology that offers the potential for comparable or better treatment performance/implementability, fewer adverse impacts than other technologies, or lower costs than demonstrated technologies for similar levels of performance.
- Restoration of environmental media, such as groundwater, to their beneficial uses whenever practicable and within a reasonable timeframe. When not practical, the USEPA expects prevention of further migration of the contaminant plume, prevention of potential human and environmental exposures, and evaluation of further risk reduction.

## 10.1 PROPOSED REMEDIAL ALTERNATIVES

**Alternative 1 -** *No Action*: This alternative includes no remedial activities and is required to provide a comparative baseline against which other alternatives can be evaluated. Under this alternative, Fort Pickett would release control of the EBS-13 site. All contamination remaining would be left in place, with no engineering or institutional controls to reduce future exposure to humans or the environment. The existing media monitoring and institutional controls would be discontinued. Site fencing would not necessarily be maintained.

**Alternative 2 -** *Source Removal at MW-136, Surface Soil Removal and Monitoring Groundwater for Natural Attenuation, and implementation of LUCs*: Prior to any source removal activities, monitoring well MW-136 would be abandoned because it is located in the source area to be removed. The abandonment will be conducted per VDEQ guidelines.

Also, prior to source removal activities, samples will be collected from the area of staining near MW-136 observed during the TCRA to determine if the materials will be classified as hazardous or non-hazardous. The source removal would be conducted by excavation at and in the vicinity of MW-136. To help natural attenuation processes remediate any soil contamination beneath the bottom of the excavation, enhanced bioremediation may be conducted by adding granular fertilizer or oxygen-release compound (ORC) to the base of the excavation prior to backfilling. During excavation of source material, the upper 1.5 ft of the area, which is clean fill, will be stockpiled to be placed back in the excavation. Excavated materials are anticipated to be hazardous.

The third component of this alternative consists of removal of surface soil where TEQ concentrations (for dioxin) exceed PRGs. Prior to removal, a more accurate extent of TEQ exceedences would be determined by collecting pre-excavation confirmation surface soil samples (to 0.5 ft bgs) in the vicinity of TEQ exceedences. After a more accurate extent of TEQ exceedences is known, the areas where the exceedences occurred will be cleared of vegetation and the upper 6 inches of soil will be removed. The excavated soil will be replaced with clean backfill, and the area re-vegetated. Based on the low concentrations in surface soil samples, excavated soil is anticipated to be non-hazardous.

The groundwater remedial component of this alternative is MNA, which would be utilized to monitor the reduction of contaminant concentrations in the groundwater by natural attenuation processes.

LUCs will be implemented to reduce risk from exposure to contaminated groundwater (i.e., the risk driver), and to reduce the safety risk from exposure to MPPEH (e.g., buried shell casings).

**Alternative 3 -** *Source removal at MW-136, Soil Cover and Monitoring Groundwater for Natural Attenuation, and implementation of LUCs:* Implementation of this alternative removes the source of contamination to groundwater at MW-136, and MNA is used to remediate the residual groundwater contamination. The difference in this alternative is that soil covers (up to 12 inches of fill/topsoil) are used instead of excavation at the areas where surface soils exceed PRGs for human receptors. The use of LUCs are included to reduce risk from exposure to contaminated groundwater (i.e., the risk driver), and to reduce the safety risk from exposure to MPPEH.

**Alternative 4** - *Source Removal at MW-136, Surface Soil Cover, Enhanced Bioremediation and Groundwater Monitoring, and implementation of LUCs*: This alternative is very similar to Alternative 3 in that it removes the source of contamination to groundwater at MW-136, and soil covers and LUCs are used to address areas where surface soils exceed PRGs for human receptors. However, instead of allowing existing natural attenuation processes to reduce groundwater

concentrations, enhanced bioremediation through the introduction of oxygen via ORC injections would be used to increase the degradation rate, and the attenuation processes would be monitored.

# SECTION 11
## COMPARATIVE ANALYSIS OF ALTERNATIVES

A description of the nine evaluation criteria, with an assessment of each alternative (Alternatives 1 through 4) in terms of the criteria is listed below.

**Criterion 1: Overall Protection of Human Health and the Environment** - determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

- Alternative 1 -The "no action" alternative would not be protective of human health.
- Alternatives 2, 3, and 4 - Alternatives 2, 3 and 4 meet all elements of the RAOs.

**Criterion 2: Compliance with Applicable or Relevant and Appropriate Requirements** - evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

- Alternative 1, - CERCLA Sect. 121 cleanup standards, including compliance with ARARs, apply to remedial actions that the agency determines should be taken under CERCLA Sects. 104 and 106 authority. Thus, the "no action" alternative does not comply with ARARs.
- Alternatives 2, 3, and 4 - There are no chemical-specific ARARs for TEQ in surface soil and several COCs in groundwater. Where chemical-specific ARARs are not present for a specific contaminant, the TBC USEPA Region III RBC values were used. Alternatives 2, 3, and 4 meet these requirements. All action-specific ARARs could be met under these alternatives.

**Criterion 3: Long-Term Effectiveness and Permanence** - considers the ability of an alternative to maintain protection of human health and the environment over time.

- Alternative 1 - Over the long term, natural attenuation processes would likely be effective at reducing risk from surface soil and groundwater contamination.
- Alternative 2 - Future exposure risk will be addressed in Alternative 2 by removing sources to groundwater and removing surface soils. Monitoring the groundwater would help to assure there is no movement of dissolved contamination in the groundwater and that concentrations are decreasing.
- Alternative 3 - Alternative 3 will remove sources to groundwater and cover surface soils that provide an exposure risk. MNA would help to assure there is no movement of dissolved contamination in the groundwater and that concentrations are decreasing.
- Alternative 4 - This alternative would address future risk by removing the sources to groundwater, reducing concentrations in the groundwater, and covering surface soil where exposure risk is present. Monitoring the groundwater would help assure there is no movement of dissolved contamination in the groundwater and that concentrations are decreasing.

**Criterion 4: Reduction of Toxicity, Mobility, or Volume through Treatment** - evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

- Alternative 1 - Implementation of the no action alternative would not reduce toxicity, mobility, or volume of contaminants.
- Alternative 2 - This alternative provides a reduction in toxicity, mobility, and volume of contaminants in soil and groundwater through removal and treatment of source materials and surface soils exceeding PRGs.
- Alternative 3 - Alternative 3 provides for a reduction in toxicity, mobility, and volume of contaminants in soil and groundwater through removal and treatment of source materials.

- Alternative 4 - Reduction in toxicity, mobility, and volume of contaminants in soil and groundwater will be provided in Alternative 4 through removal of the source materials. The enhanced natural attenuation processes will also reduce residual contamination in groundwater.

**Criterion 5: Short-Term Effectiveness -** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

- Alternative 1 - Short-term risk to workers and the community, and short-term environmental impacts would not occur.
- Alternatives 2, 3, and 4 -Alternatives 2, 3, and 4 would protect the community during remedial action through engineered and institutional controls. By planning construction and staging in accordance with industry and Occupational Safety & Health Administration (OSHA) codes and requirements and Army regulations, exposure and accidental risks to workers would be controlled to acceptable levels. By removing contamination from the site, this remedy is highly effective in the short tern for soils.

**Criterion 6: Implementability -** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

- Alternative 1 - Because no action would be taken under this alternative, it is inherently implementable.
- Alternative 2 - Alternative 2 (MW-136 abandonment, source and surface soil removal, soil excavation, etc.) could be easily accomplished by Tetra Tech and its subcontractors. All actions under this alternative would be implemented on site, and thus do not require permits. Remedial actions would require the use of standard drilling and construction trades and materials, in addition to bioremedial substances, all of which would be readily available.
- Alternative 3 - Abandonment of MW-136 could be accomplished by a licensed driller. All proposed source removal actions would be performed by standard construction equipment. A commercially available granular fertilizer or ORC could be used for biostimulation at the base of the excavation. Placement of a soil cover would be easily implemented with commercially available materials. All actions under this alternative would be implemented on site, and thus do not require permits.
- Alternative 4 - Overall, Alternative 4 would be easy to implement with the use of a licensed driller and standard construction equipment, and commercially available materials. Injection points would be installed using available direct-push procedures. The injection system would be constructed using readily available equipment. *All actions under this alternative would be implemented on site, and thus do not require permits.*

**Criterion 7: Cost -** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to accurate within a range of +50 to -30 percent.

- Alternative 1 - No costs would be associated with implementation of this alternative.
- Alternative 2 - Total remedial action under Alternative 2, including capital and operation and maintenance (O&M) costs and direct and indirect costs, can be accomplished for approximately $640,302.
- Alternative 3 - The total cost to complete this alternative, including capital and O&M costs and direct and indirect costs, would be approximately $593,603.
- Alternative 4 - Alternative 4 cost, including capital and O&M costs and direct and indirect costs, would be approximately $668,874.

**Criterion 8: State Acceptance -** considers whether the State agrees with the Army and USEPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

This criterion will be addressed in the Decision Document after final development of the Proposed Plan by regulatory agencies and the public.

**Criterion 9: Community Acceptance -** considers whether the local community agrees with the Army and USEPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

# SECTION 12
## PRINCIPAL THREAT WASTE

Per the definition and requirements of the NCP (NCP 300.430(a)(1)(iii)(A)), there are no liquids, areas contaminated with high concentrations of toxic compounds, and highly mobile materials wastes present at EBS-13 that are defined as "principal threats" for which treatment is likely to be the most appropriate remedy.

# SECTION 13
## SELECTED REMEDY

### 13.1 SUMMARY OF RATIONALE FOR SELECTED REMEDY

Based on information available at this time, the BCT, comprised of members from USEPA Region 3, VDEQ, and the BRAC Atlanta Field Office, believes the preferred alternative would be protective of human health and the environment, comply with ARARs identified in the RI and further refined in the FS, be cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. The proposed remedy would also meet the statutory preference for the selection of a remedy that involves treatment as a principal element. The proposed remedy can change in response to public comment or new information.

No significant direct unavailable adverse impacts to other operating unit remediation or future land use of the site would accrue under this alternative.

### 13.2 DESCRIPTION OF SELECTED REMEDY

The preferred alternative for EBS-13 is Alternative 2, minus the third component of this alternative (i.e., without the removal of surface soil where TEQ concentrations for dioxin exceeded PRGs). In discussions with USEPA and VDEQ, it was agreed that no action would be required for the TEQ due to the negative short-term impacts associated with the removal action that would be required to remediate it, comparison to the potential benefits of conducting a removal action (i.e., the ecological habitat would be destroyed in order to further reduce risk). This alternative therefore recommends source removal at MW-136, followed by enhanced bioremediation and groundwater monitoring for the remediation of groundwater. The preferred alternative meets the RAOs when subjected to a comparative analysis (to highlight the key advantages, disadvantages, and tradeoffs among the alternatives) by utilizing the nine NCP identified CERCLA evaluation criteria applied during the FS. The preferred alternative includes performing the following activities in the paint pit area.

- The existing well (MW-136) will be plugged and abandoned in accordance with the VDEQ requirements in order to facilitate the removal of contaminated soil surrounding the well. ,
- The soil in the area of MW-136 (i.e., the source of the groundwater contamination) will be removed. This soil removal, anticipated to require the removal and off-site disposal of 40 to 80 cubic yards ($yd^3$) of contaminated soil, will eliminate much of the remaining human health risk associated with soils at the site.
- The addition of a supplemental source of oxygen (the source of additional oxygen will be provided by nitrate from fertilizer) in the excavation will stimulate biological degradation of organic contaminants in the groundwater (primarily BTEX) beneath the paint pit excavation and accelerate the return of the immediate groundwater environment to more characteristically oxidized conditions.

Because human health and ecological risks (based on potential future land use) associated with other soils at EBS-13 are negligible (i.e., risks associated with soils that are not associated with the paint pit area and will be left after the source of groundwater contamination near well MW-136 is removed), the preferred alternative (developed jointly with USEPA) recommends leaving the current grass and wooded land cover in the area intact, leaving the surrounding surface soils undisturbed, and implementing LUCs to address risk concerns associated with exposure to contaminated groundwater, until the groundwater is restored for unrestricted use, and safety concerns associated with exposure to MPPEH.

Groundwater monitoring will continue until:

- Semi-annually until results from TT-01 and TT-02 indicate no measurable concentrations of VOCs and generally oxidizing conditions in the aquifer; or
- Measurable concentrations of dissolved nitrate appear in groundwater samples from TT-01 or TT-02 within a few months; or
- The first 5-year review.

A review of the implementation of this remedy will occur no less often than each five years after the initiation the remedial action to assure that human health and the environment are being protected by the remedial action that was implemented. The reviews will be conducted in accordance with the CERCLA five-year review guidance. If groundwater monitoring continues until the first five-year review, the evaluation of the remediation at that point will also include an assessment to determination whether to continue or discontinue semi-annual groundwater monitoring.

The final remediation, at the point that it is determined that the remediation is complete, will ultimately comply with the ARARs identified as part of the selected remedy, i.e., compliance with the USEPA National Primary Drinking Water Standards for benzene, ethylbenzene, toluene, and xylenes (with MCLs of 0.005, 0.7, 1, and 10 ppm respectively).

### 13.2.1 Summary of Land Use Controls

The preferred alternative (developed jointly with VDEQ and USEPA) also recommends leaving the surface and subsurface soils undisturbed, and implementing LUCs. The use of LUCs meets USEPA's expectation that engineering controls, such as containment, be implemented for waste that poses a relatively low long-term threat or where treatment is impracticable per NCP 300.430(a)(1)(iii)(B).

The objectives for the LUCs that will be implemented at EBS-13 are to:

1. Prohibit residential reuse of the site in order to prevent exposure to MPPEH;
2. Prohibit exposure to contaminated groundwater; and
3. Prohibit excavation or disturbance of subsurface soils to prevent exposure to MPPEH.

These LUCs are for post-transfer use by future property owners and users in the areas where the contaminant concentrations for groundwater exceed the PRGs, and the areas where the potential for MPPEH exists. Additional details pertaining to the LUCs applicable to EBS-13 will be included in the Land Use Control Remedial Action Work Plan which is Appendix A of the Remedial Action Work Plan for EBS-13.

The implementation of LUCs prohibiting the disturbance of soil (LUC objectives #1 and #3) area not driven by risk associated with residual contaminants, but rather by the presence of buried (uncontaminated) debris (i.e., MPPEH)

The Army, as the executing agent for environmental restoration activities at Fort Pickett, will be responsible for implementing, maintaining, and monitoring the LUCs at Fort Pickett until the time of transfer. Upon the Army's conveyance of the property, Nottoway County, and its successors, will maintain and monitor the LUCs to ensure compliance with the LUC performance objectives.

## 13.3 SUMMARY OF ESTIMATED COSTS

The total estimated costs for the action alternatives are:

Alternative 1- $0
Alternative 2- $640,302
Alternative 3- $593,603
Alternative 4- $668,874

The estimated cost for the preferred alternative is $433,000, based on the anticipated excavation and disposal costs for the volume of soil to be removed (anticipated to be 40 to 80 $yd^3$), and the operation and maintenance costs associated with the site (e.g., groundwater monitoring, fence maintenance until the time of transfer, site inspections, etc.). This estimate is less than the total cost for remedial action alternative 2 because it does not include costs associated with the third component of this alternative (removal of surface soil where TEQ concentrations exceeded PRGs).

### 13.4 EXPECTED OUTCOME OF SELECTED REMEDY

Implementing the remedial action described in this Decision Document will reduce the actual and threatened releases of hazardous substances from this site. The action will remove the primary AOC and threat to groundwater at the former paint disposal pit (i.e., the risk driver) located in the west-central portion of the site. The response action selected and documented in this Decision Document, is necessary to protect the public health, welfare, and the environment from releases of hazardous substances into the environment.

# SECTION 14
## STATUTORY DETERMINATION

The remedy selected satisfies the requirements of CERCLA §121, and to the extent practical the NCP, and is based upon the RI/FS conducted for the EBS-13 site. The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

# SECTION 15
## DOCUMENTATION OF SIGNIFICANT CHANGES TO PROPOSED PLAN

### 15.1 SUMMARY OF CHANGES TO PREFERRED ALTERNATIVE

The selected remedy is the same one identified as the recommended alternative in the final PP.

# SECTION 16
## RESPONSIVENESS SUMMARY

The Tetra Tech RI/FS report and the Proposed Plan for the FRC EBS-13 at Fort Pickett, Virginia, were made available to the public on August 31, 2004. They can be found at the Fort Pickett information Repository located at the BRAC Environmental Office, 2193 Military Road, Pickett Park, Fort Pickett, Virginia. The notice of availability was published in the *Blackstone Courier Record* on August 11, 2004. A public comment period was held from August 16, 2004, to September 16, 2004. In addition, a public meeting was held on August 31, 2004, to present the proposed plan to a broader community audience beyond those that had already been involved at the site. There were no public attendees at this meeting, nor comments from the public during the comment period.

The Army also presented the Proposed Plan and the preferred alternative at its June 29, 2004, RAB meeting. The selected remedy was discussed and agreed upon by all RAB meeting attendees.

# SECTION 17
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