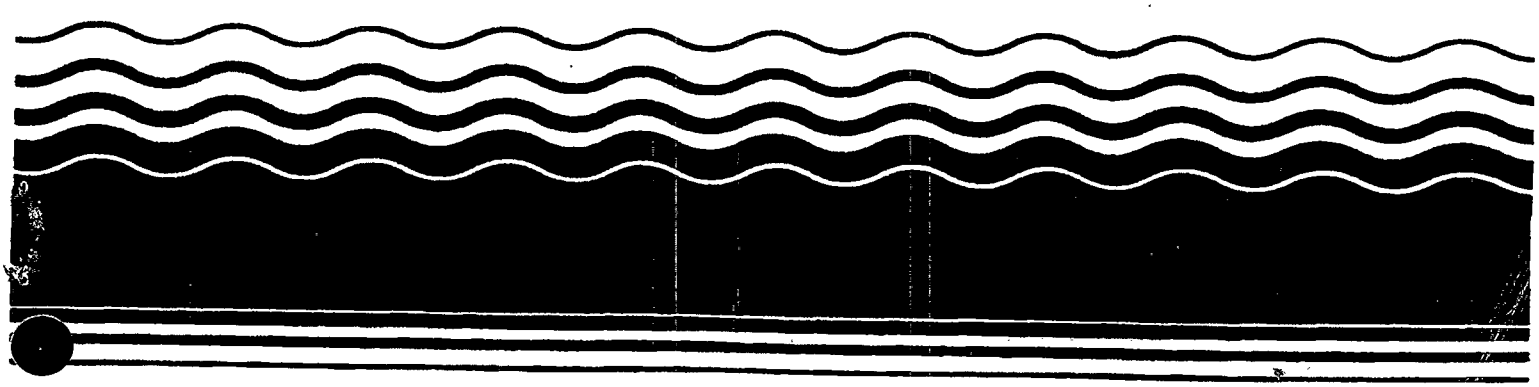
PB99-963911
EPA541-R99-015
1999

EPA Superfund
Record of Decision:

USA Vint Hill Farms Station
AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, & 33
Warrenton, VA
7/1/1999



FINAL
DECISION DOCUMENT
AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, AND 33; SITE-WIDE GROUNDWATER; SOUTH RUN AT AREEs 1 AND 2; AND OTHER SITE DRAINAGES
VINT HILL FARMS STATION
WARRENTON, VIRGINIA

Prepared for:
U.S. Army Communications-Electronics Command

Prepared by:
IT Corporation
Edgewood, Maryland

June 1999

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ABBREVIATIONS AND ACRONYMS

AAFES	Army, Air Force Exchange Service
AREE	Area Requiring Environmental Evaluation
AST	aboveground storage tank
AWQC	Ambient Water Quality Criteria
bgs	below ground surface
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
CECOM	Communications-Electronics Command
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
DD	Decision Document
EEQ	environmental effects quotient
ENPA	Enhanced Preliminary Assessment
EPIC	Environmental Photographic Interpretation Center
ERA	Ecological Risk Assessment
ER-L	effects range-low
ft	feet
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICF KE	ICF Kaiser Engineers, Inc.
IMMC	Intelligence Materiel Management Center
MCL	maximum contaminant level
MSL	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
ppb	parts per billion
ppm	parts per million
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SI	Site Inspection
SOV	soil organic vapor
SRI	Supplemental Remedial Investigation
STP	Sewage Treatment Plant
TPH	total petroleum hydrocarbon
TRV	toxicity reference value
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VDEQ	Virginia Department of Environmental Quality
VHFS	Vint Hill Farms Station
VOC	volatile organic compound
WSRT	western South Run tributary

DECLARATION FOR THE DECISION DOCUMENT
REMEDIAL ALTERNATIVE SELECTION

Site Name and Location

Areas Requiring Environmental Evaluation (AREEs) 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; Site-wide Groundwater; South Run at AREEs 1 and 2; and Other Site Drainages
Vint Hill Farms Station
Warrenton, Virginia

Statement of Basis and Purpose

This Decision Document (DD) presents a determination that no action is necessary to protect human health and the environment for soil at AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages at Vint Hill Farms Station (VHFS), Warrenton, Virginia. This determination was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This document was prepared as a joint effort between the U.S. Army, the Virginia Department of Environmental Quality (VDEQ), and the U.S. Environmental Protection Agency (USEPA). The no action decision is supported by documents contained in the Information Repository.

Description of the Selected Remedy

No action is the selected remedy for AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages. The Baseline Risk Assessment (BRA), conducted as part of the investigation activities, supports the no action decision.

Declaration

The no action remedy selection is based upon the findings of the BRA which determined risks within USEPA's acceptable risk range for each of AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages. Therefore, the selected remedy is protective of human health and the environment. A five-year review will not be necessary for these AREEs, site-wide groundwater, South Run at AREEs 1 and 2, or the other site drainages.

Robert L. Nabors

ROBERT L. NABORS
Major General, USA
Commanding
U.S. Army Communications-Electronics Command

7/1/99
Date

DECISION SUMMARY

1.0 INTRODUCTION

The no action decision is based on the Phase I Reuse Area Remedial Investigation (RI) Report (USAEC, 1998) and the Phase II Reuse Area RI Report (USACE, 1999) which include Baseline Risk Assessments (BRAs) documenting the risks from contamination in the soil at Areas Requiring Environmental Evaluation (AREEs) 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages. In the BRAs, it was determined that the soils at AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33 do not pose unacceptable risks to human health and the environment. Therefore, the soils at these AREEs require no action to be protective of human health and the environment. Also in the BRAs, it was determined that the site-wide groundwater, surface water and sediment in South Run at AREEs 1 and 2, and surface water and sediment in the other site drainages do not pose unacceptable risks to human health and the environment. Therefore, site-wide groundwater, South Run at AREEs 1 and 2, and other site drainages require no action to be protective of human health and the environment.

2.0 SITE BACKGROUND

Vint Hill Farms Station (VHFS) is part of the U.S. Army Communications - Electronics Command (CECOM) and, while active, primarily functioned as an Army installation engaged in communications intelligence. VHFS is located approximately 40 miles southwest of Washington, D.C., in Fauquier County, Virginia, as shown on Figure 1. The installation occupies approximately 701 acres of land near the town of Warrenton, Virginia. Approximately 150 acres of the installation are improved grounds in the southern portion of the property used for industrial operations, administration buildings, and residential housing. Approximately 94 acres in the eastern portion of the property are mature hardwood forest, and the majority of the remaining 457 unimproved and semi-improved acres in the northern portion of the property are used for stationary and mobile antenna operation sites.

VHFS was designated for closure in March, 1993, under the Base Realignment and Closure (BRAC) Act. Pursuant to the decision to close the installation, an Enhanced Preliminary Assessment (ENPA) and a Community Environmental Response Facilitation Act (CERFA) investigation of VHFS were conducted by Science Applications International Corporation (SAIC) to assess the environmental condition of the installation. The ENPA and CERFA investigations were completed in April and May, 1994, respectively. The ENPA identified 42 AREEs from the review of installation records, aerial photographs, installation personnel interviews, federal and state regulatory records, and visual inspection. Of these 42 AREEs, 27 were recommended for further investigation.

These 27 AREEs were investigated from September, 1994, to June, 1995, as part of the Site Inspection (SI) conducted by SAIC. The objective of the SI was to determine the presence or absence of contamination and the chemical nature of any detected contamination. The final SI Report (USAEC, 1996), which was completed in June, 1996, identified 24 AREEs which required further investigation. In addition, four new AREEs were identified during site reconnaissance to warrant further investigation subsequent to the SI. AREEs that were determined to warrant further investigation were investigated as part of the Phase I and Phase II reuse area RIs, and the Supplemental Remedial Investigation (SRI) conducted by ICF Kaiser Engineers, Inc. (ICF KE). The purposes of these reports were to evaluate: 1) the nature and extent of contamination; and 2) the level of risk posed to human health and the environment. The final RI Reports for the Phase I and Phase II reuse areas (USAEC, 1998; USACE, 1999) were completed in April, 1998, and January, 1999, respectively. The draft SRI Report (USACE, 1998) was completed in November, 1998.

Sixteen AREEs and three other sites were identified in the SI and RIs as having contamination which poses no unacceptable human health risks and/or significant adverse ecological effects:

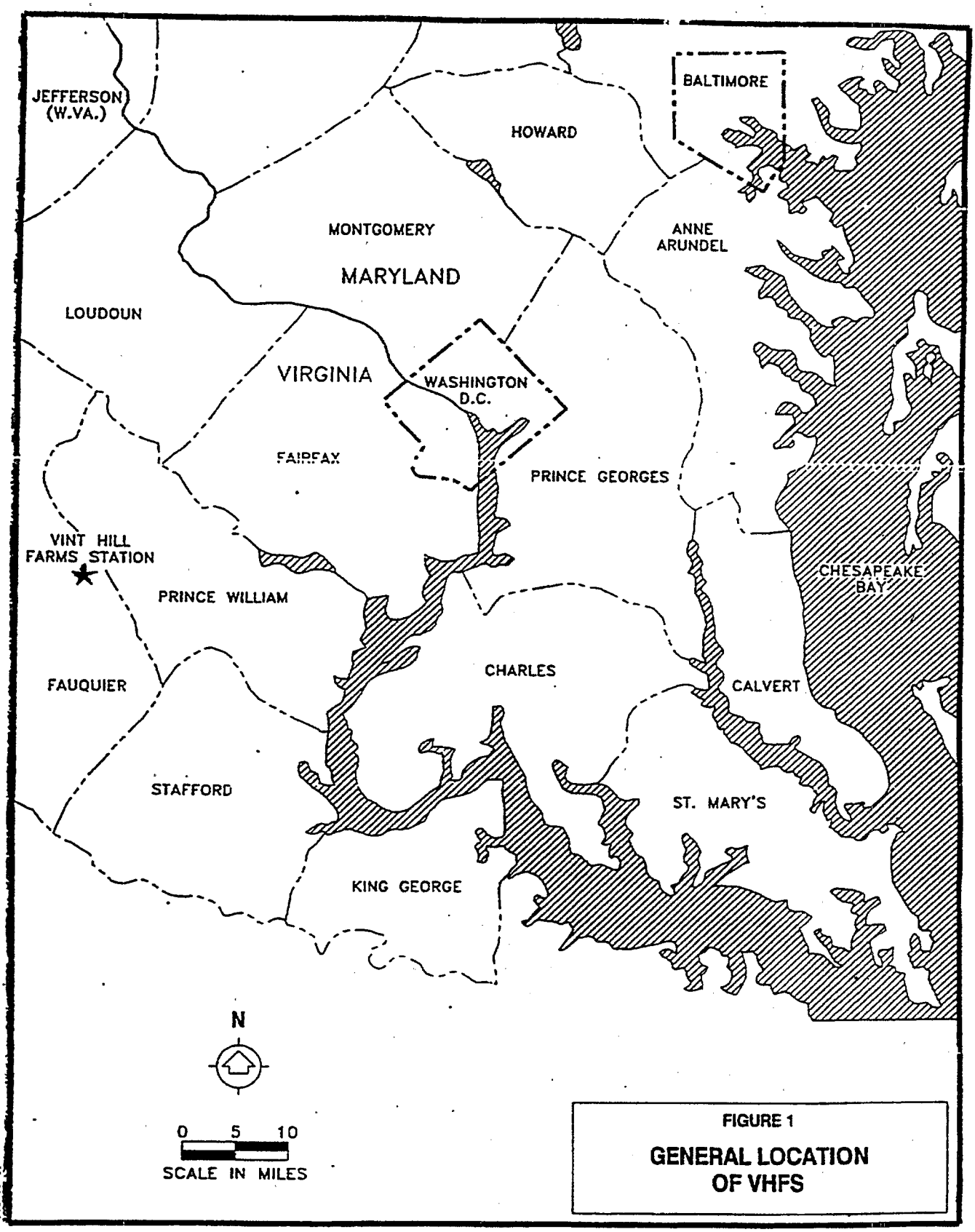

FIGURE 1

GENERAL LOCATION OF VHFS

- AREE 3 – Warehouse;
- AREE 5 – Environmental Photographic Interpretation Center (EPIC) Building;
- AREE 7 – Electrical Equipment Facility Pretreatment Tank;
- AREE 10 – Former Photographic Wastewater Lagoon;
- AREE 16-2 – Possible Firefighter Training Pit;
- AREE 17 - Dump # 3;
- AREE 18 – Grease Pit;
- AREE 20 – Incinerator Septic Tank and Leach Field;
- AREE 24 – Transformer Storage Area;
- AREE 25 – Sugar Tree;
- AREE 26 – Outdoor Wash Racks;
- AREE 29-1 – Salvage Yard;
- AREE 29-2 – Possible Sludge Disposal Area;
- AREE 29-3 – Possible Disposal Area;
- AREE 30 – Motor Pool;
- AREE 33 – Household Debris Pile;
- Site-Wide Groundwater;
- South Run at AREE 1 (Dump #1) and AREE 2 (Sewage Treatment Plant [STP]); and
- Other Site Drainages.

The locations of these AREEs are shown on Figure 2.

3.0 SITE CHARACTERISTICS

3.1 Site Topography

VHFS is located within the Piedmont Plateau physiographic province, approximately 20 miles west of the Fall Line. The Fall Line is a physiographic boundary that separates the folded and faulted crystalline rocks of the Piedmont Plateau physiographic province from the unconsolidated sediments of the Atlantic Coastal Plain physiographic province. The topography of the Piedmont Plateau in the vicinity of VHFS consists of gently rolling hills with slopes generally less than 10%. Surface elevations on the installation vary from 335 to 430 feet (ft) above mean sea level (MSL).

3.2 Adjacent Land Use

Land use in the immediate vicinity of VHFS consists mainly of agriculture (mostly horse farms) and residential areas. With the exception of a few residences to the north, the majority of residential development is located to the south of VHFS. A small county recreation park is located adjacent to VHFS along South Run.

3.3 Surface Water Hydrology

VHFS is located in the Occoquan watershed. Most of VHFS drains to South Run via intermittent tributaries and drainage ditches, as shown on Figure 2. South Run is a small Class III Virginia stream which discharges into Lake Manassas, a recreation and drinking water reservoir built on Broad Run for the City of

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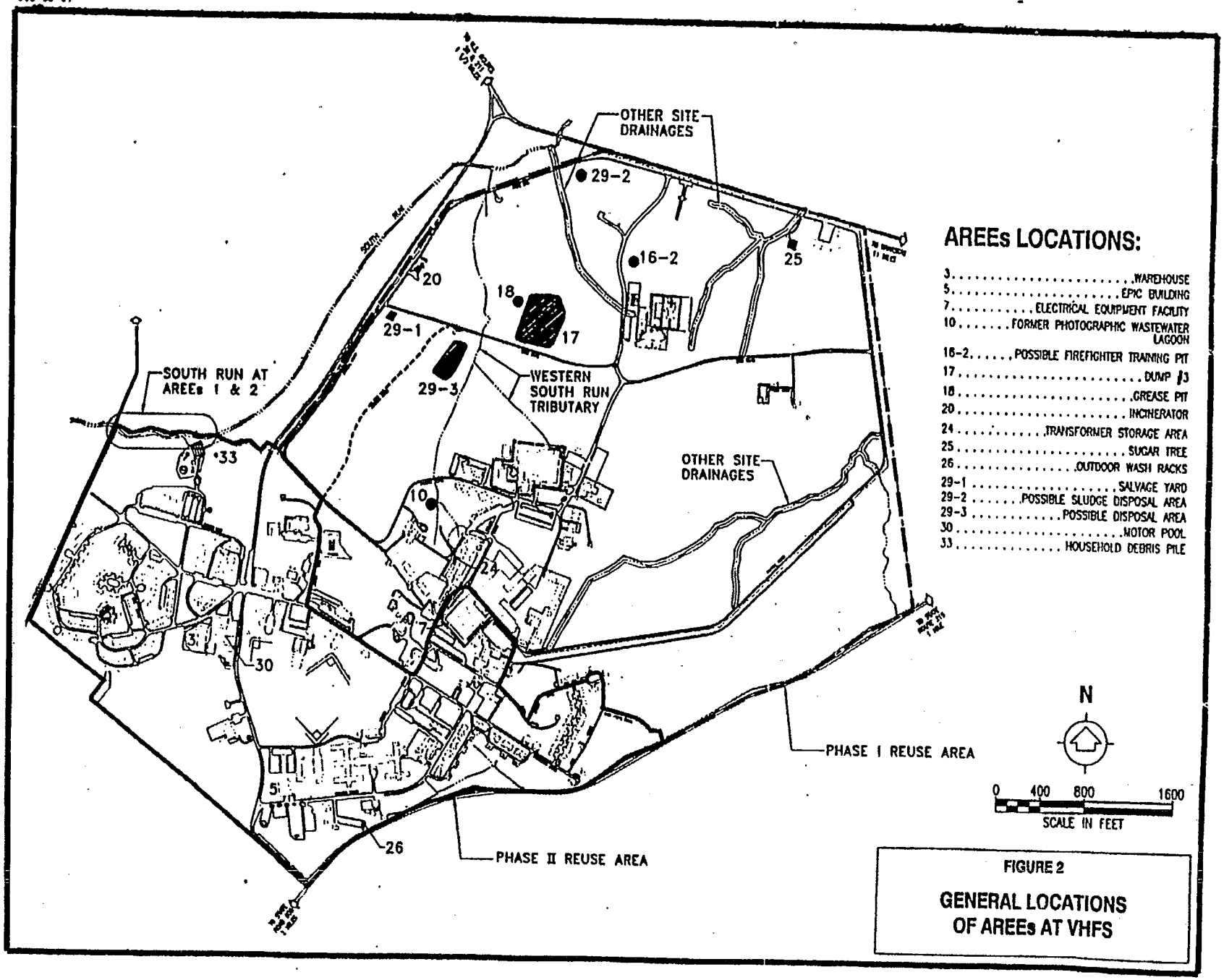

AREEs LOCATIONS:

3 . . . . . WAREHOUSE
5 . . . . . EPIC BUILDING
7 . . . . . ELECTRICAL EQUIPMENT FACILITY
10 . . . . . FORMER PHOTOGRAPHIC WASTEWATER LAGOON
16-2 . . . . . POSSIBLE FIREFIGHTER TRAINING PIT
17 . . . . . DUMP #3
18 . . . . . GREASE PIT
20 . . . . . INCINERATOR
24 . . . . . TRANSFORMER STORAGE AREA
25 . . . . . SUGAR TREE
26 . . . . . OUTDOOR WASH RACKS
29-1 . . . . . SALVAGE YARD
29-2 . . . . . POSSIBLE SLUDGE DISPOSAL AREA
29-3 . . . . . POSSIBLE DISPOSAL AREA
30 . . . . . MOTOR POOL
33 . . . . . HOUSEHOLD DEBRIS PILE

FIGURE 2

GENERAL LOCATIONS OF AREEs AT VHFS

Manassas. Lake Manassas discharges to Broad Run, which drains to the Occoquan Reservoir. Drainage for the southern portion of the installation flows south and east to Kettle Run. Kettle Run converges with Broad Run approximately 10 miles downstream from Lake Manassas.

3.4 Geology/Hydrogeology

The central portion of VHFS is underlain by folded sedimentary rocks of the Catharpin Creek Member which consists of sandstone, arkosic sandstone, siltstone, shale, and claystone. Intrusions of basalt, oriented northeast to southwest, cut the bedrock in the central and western portions of the VHFS installation. The northeastern flank of VHFS is underlain by intrusions of diabase. Quaternary alluvium is present along the major drainage channels within the installation.

The overburden is thickest (20-40 ft) in the southern regions of the site and thins to 0-10 ft in the northern areas. The overburden consists primarily of saprolite (a chemical and physical weathering product of the underlying bedrock) which underlies lesser amounts of clayey and silty soils.

Groundwater at VHFS occurs in fractured bedrock and to a lesser extent in the overburden. The bedrock aquifer is semi-confined, with the unfractured bedrock and saprolite acting as confining units. Recharge to the fractured bedrock aquifer occurs at outcrop areas and from percolation from the overburden along fractures. In the overburden, the aquifer is unconfined.

4.0 SITE HISTORY AND INVESTIGATION FINDINGS

The RIs for these sites were conducted to evaluate the nature and extent of contamination associated with past site activities. Environmental samples collected and analyzed during the RIs were used in conjunction with the results from the SI and the SRI to assess the condition of each of the areas. The environmental media investigated included surface soil (0 to 2 ft below ground surface [bgs]), subsurface soil (greater than 2 ft bgs), surface water, sediment, and groundwater. Analytical results were compared to background concentrations and regulatory screening levels to determine if environmental media had been adversely impacted by site activities. A brief description of each of the areas and the significant findings of the RIs, SI, and SRI are presented in the following paragraphs. A detailed presentation of the samples collected and the analytical results can be found in the SI Report (USAEC, 1996), the Phase I Reuse Area RI Report (USAEC, 1998), the Phase II Reuse Area RI Report (USACE, 1999), and the SRI Report (USACE, 1998) available in the Information Repository. Comments received from the U.S. Environmental Protection Agency (USEPA) on the final Phase I Reuse Area RI Report and on the final Phase II Reuse Area RI Report regarding these sites along with the U.S. Army's responses are provided in Attachments 1 and 2, respectively.

4.1 AREE 3 – Warehouse

The Warehouse (Building 309) was used as a vehicle maintenance area from 1943 to 1967. Two sets of pits, which formerly were used for the hydraulic lifts and grease pit, were filled with concrete in 1967. The Warehouse also may have been used for the temporary offloading of drums of oil, grease, solvent, paint, acid, and industrial organic chemicals. Three areas of possible contamination have been identified at the Warehouse: the hydraulic lift pit; the grease pit; and the outlet of a floor drain located at the south end of the building, in a former lavatory. Drain pipes from a sink and water fountain run underneath the floor into the floor drain. The overflow from the floor drain discharges to the field south of the Warehouse.

Surface soil samples were collected at the drain outlet; and subsurface soil samples were collected beneath the drain outlet, grease pit, and hydraulic lifts. Benzo(a)pyrene, a polynuclear aromatic hydrocarbon (PAH), was detected in samples taken at the drain outlet at levels above the risk-based concentrations (RBC) established by the USEPA Region III for screening analytical results. Benzo(a)pyrene was detected above the residential soil RBC (0.087 parts per million [ppm]) in a surface soil sample at a concentration of 0.155 ppm, and above the industrial soil RBC (0.78 ppm) in a subsurface soil sample at a concentration of 2.9 ppm. Total petroleum hydrocarbon (TPH) was detected (25.9 to 40.5 ppm) below the State's TPH soil action level for

underground storage tanks (USTs) of 100 ppm in soil samples collected underneath the hydraulic lifts. No contamination was observed in subsurface soil samples collected along the perimeter of the hydraulic lifts and the grease pit.

4.2 AREE 5 – EPIC Building

The EPIC Building was used for photographic operations from 1958 to 1995. From 1958 to 1968, wastewater generated during the photographic process was discharged from the building via a 6-inch industrial sewerline constructed of vitrified clay to the Former Photographic Wastewater Lagoon (AREE 10). In 1966, the first silver recovery units were installed for wastewater pretreatment. In 1968, the lagoon at AREE 10 was dredged to recover silver in the sediment and then filled. Wastewater was then diverted through the industrial sewerline directly into the western South Run tributary (WSRT). In 1973, an ion-exchange system was installed to remove cyanide, ammonia, phenols and silver from the photographic wastewater before being discharged through the industrial sewerline to WSRT. This practice continued until 1983 when the photographic wastewater was diverted to the VHFS STP. Leakage was suspected in the sewerline that carried the EPIC wastewater to AREE 10 and WSRT due to its age and the nature of the acidic wastewater.

The interior of the 2,700-foot sewerline at AREE 5 was inspected by closed-circuit television to reveal locations of cracks and other points where leakage would most likely occur. These locations were then selected for soil boring placement. Results from the subsurface soil samples collected near the sewerline did not show contamination from photographic wastewater. In order to characterize potential contamination from the sewerline, an effluent sample was collected at the outfall of the sewerline into WSRT. Effluent results indicated that silver exceeded the Ambient Water Quality Criteria (AWQC); however, the silver concentration was qualified with a B, indicating blank contamination. Based on the results of subsurface soil and sewerline effluent sampling and analysis, it does not appear that the EPIC sewerline has impacted subsurface soil or is an ongoing source of contamination to WSRT.

4.3 AREE 7 – Electrical Equipment Facility Pretreatment Tank

The Electrical Equipment Facility (Building 2400) was used for classified military activities associated with the Intelligence Materiel Management Center (IMMC) including black and white photo developing, metal etching, and graphics work from 1965 to 1995. In 1978, a concrete pretreatment tank containing a layer of rock and a layer of sand was installed to filter wastewaters generated in Building 2400 before discharging to the sanitary sewer. Wastes discharged to the pretreatment tank included chromic acid from metal etching, painting wastewater, and photographic wastewater (that was first neutralized in the neutralization pit). The floor drainage system also discharged spills of process chemicals and floor wash water from Building 2400 into the pretreatment tank between 1978 and 1990. Prior to 1978, the floor drains discharged directly to WSRT. The sand sludge removed from the pretreatment tank was disposed of in the Sludge Disposal Area (AREE 13) prior to 1981, and was managed as hazardous waste (based on chromium, silver, and lead content) off site starting in 1981. The pretreatment tank was closed in 1995, and no cracks in the concrete walls or stained soils were found when it was removed in 1997. The neutralization pit closed in May, 1990, and is being remediated according to the requirements of the Resource Conservation and Recovery Act (RCRA) under the purview of the Virginia Department of Environmental Quality (VDEQ).

Subsurface soil samples were collected around the perimeter of the pretreatment tank which indicated that operation of the pretreatment tank had not impacted the subsurface soil.

4.4 AREE 10 – Former Photographic Wastewater Lagoon

The Former Photographic Wastewater Lagoon was an earthen holding pond approximately 90 ft in diameter and 4-4.5 ft deep. Photographic wastewaters from the EPIC Building were discharged to the lagoon from 1958 to 1968. The photographic wastewater was acidic and contained significant amounts of silver and cyanide. The lagoon and WSRT were connected naturally such that overflow from the lagoon discharged

directly into WSRT. In 1968, flow problems developed in the lagoon, and it was dredged to recover silver from the sediments. The lagoon was then filled, and effluent was diverted directly to WSRT.

Subsurface soil samples were collected from within the area of the lagoon. The primary inorganics of concern, silver and cyanide, were not detected in the subsurface soil samples with the exception of one sample that contained silver well below the residential soil RBC. These results support the conclusion that most of the contaminated sediments from the former lagoon were removed during the 1968 dredging.

Surface soil samples were not collected at AREE 10 because the lagoon had been dredged and backfilled such that any residual contamination would be present at the base of the former lagoon (i.e., 4–4.5 ft bgs) and not at the soil surface.

4.5 AREE 16-2 – Possible Firefighter Training Pit

Site history indicated that a Firefighter Training Pit was used at VHFS; however, the exact location of the pit is not known with certainty. AREE 16-2 represents one possible location of the Firefighter Training Pit. The Firefighter Training Pit was used monthly by the VHFS Fire Department for training in the mid-1970s. The unlined pit was approximately 50 ft in diameter and 3 ft deep. During training activities, the pit was partially filled with petroleum and natural gas odorant and then ignited. Solvents and other combustible materials may have also been used in the pit. In the mid-1980s the pit was filled with ½-inch gravel.

TPH field screening of the soil at AREE 16-2 was conducted to delineate the area of contamination and to determine where soil samples should be collected for laboratory analysis. Surface and subsurface soil samples were collected based on positive TPH results from the field screening. Surface and subsurface soil samples collected at AREE 16-2 contained arsenic at concentrations (up to 33.8 ppm) that exceeded its residential soil RBC (0.43 ppm) as well as its maximum background concentration (4.89 ppm to 5.4 ppm). Analytical results indicate that soils have not been adversely impacted by firefighter training activities because arsenic was the only contaminant that exceeded screening levels at AREE 16-2, and the arsenic concentrations were determined to be statistically within background levels..

4.6 AREE 17 – Dump #3

Dump #3 is a 318-foot by 390-foot area that has been in use since 1958 to dispose of compost materials and construction debris. Sludge from the STP and Former STP and small amounts of sandblasting waste containing lead paint from the Electrical Equipment Facility (AREE 7) also may have been disposed of in Dump #3.

Surface soil samples were collected at AREE 17. Minimal contamination due to pesticides and PAH was observed in the surface soil samples. The PAH benzo(a)pyrene (0.098 ppm – 0.632 ppm) was detected above its residential soil RBC (0.088 ppm) in the northern portion of AREE 17. The pesticide chlordane (1.36 ppm) was also found to exceed its residential soil RBC (0.49 ppm) at one sampling location. Arsenic (up to 19.5 ppm) exceeded its residential soil RBC (0.43 ppm) and maximum background concentration (4.89 ppm) at all surface soil locations sampled.

Test pits were excavated to locate buried debris, and subsurface soil samples were collected from the test pits to determine if the debris was contaminating the soil. Based on observations made during test pit excavation, the dump extends to depths up to 7 ft in some areas and is unlined. Based on the results of the test pit sampling, the subsurface soils at AREE 17 have not been impacted by previous disposal activities at the site.

Although site history indicates that small amounts of sandblasting waste containing lead paint may have been disposed at AREE 17, there were no elevated lead levels in the soil samples collected at AREE 17. In addition, groundwater samples collected in the vicinity of AREE 17 indicate that groundwater has not been impacted by the disposal activities.

4.7 AREE 18 – Grease Pit

The grease pit was a 50-foot long by 2-foot wide by 4-foot deep trench used to dispose of kitchen grease, oily rags and possibly motor oil. The pit was covered with fill material in 1981 and has not been used since that time.

Surface and subsurface soil samples were collected at AREE 18. Manganese (3,100 ppm) and arsenic (10.1 ppm maximum) were the only analytes that exceeded both residential soil RBCs (1,800 ppm and 0.43 ppm, respectively) and maximum background concentrations (2,970 ppm and 4.89 ppm, respectively) in surface soil samples. In subsurface soil, arsenic (up to 14.7 ppm) was the only analyte to exceed both its residential soil RBC (0.43 ppm) and its maximum background concentration (5.4 ppm).

4.8 AREE 20 – Incinerator Septic Tank and Leach Field

The Incinerator (Building 282) was used from 1973 to 1985 to burn household and office garbage, and medical waste. Some hazardous wastes (e.g., solvents, pesticides, and waste oil) were also burned in the Incinerator. The Incinerator was temporarily closed from 1985 to 1987 for renovations. The Incinerator was operated for 4 months in 1987 until it was shut down permanently in July, 1987, when a series of explosions in the furnace damaged the structure. The Incinerator has its own septic system, which consists of a 500-gallon septic tank and a 135-foot leach field. The septic system is connected to the sinks and toilets in the Incinerator building. All floor washings were discharged to the septic system. Although there is no record of hazardous wastes having been disposed of in the septic system, any spills of liquid hazardous wastes inside the Incinerator building could have also discharged via the floor drains to the septic system.

Subsurface soil samples collected from the septic system leach field indicated that subsurface soils had not been impacted by the operation of the Incinerator septic system.

4.9 AREE 24 – Transformer Storage Area

AREE 24, the Transformer Storage Area, is located west of Building 272 in the engineering compound. It is an unbermed asphalt area that was used to store polychlorinated biphenyl (PCB) transformers (PCBs in oil greater than 500 ppm) and PCB-contaminated transformers (PCBs in oil between 50 and 500 ppm) before their removal by Aptus Environmental Services in 1990. The area is currently used for general storage of materials on pallets, including new "non-PCB" transformers. The area has also been used to store drums containing oil and fuel filters. No spills of transformer cooling oil were observed or recorded in this area.

Surface soil samples were collected for PCB field screening and laboratory analysis. PCBs were not detected during the field screening or subsequent laboratory analysis. TPH was detected below the State's TPH soil action level of 100 ppm in the laboratory samples. Evaluation of the field screening and laboratory analysis results indicate that surface soil has not been impacted from PCB transformer storage activities at AREE 24.

4.10 AREE 25 – Sugar Tree

AREE 25, Sugar Tree, is located in the northeastern portion of VHFS, just south of Route 215. AREE 25 is an area where small amounts of paint and solvents may have been disposed; however, no stressed vegetation or other evidence of contamination has been observed in the area. At one point, a 200-gallon diesel aboveground storage tank (AST) was located in this area for approximately six months for vehicle fueling during construction of a sewage lift station.

Soil organic vapor (SOV) surveys and surface and subsurface soil sampling were conducted at AREE 25. These studies indicated minimal impact from possible disposal of paint and solvents. At the former location of the diesel AST, however, TPH-diesel (930 ppm) was detected in excess of the State's TPH soil action level for USTs (100 ppm) in the duplicate surface soil sample sent to the laboratory. However, the primary surface soil sample and the duplicate surface soil sample were collected from different locations within a few inches

of one another, and TPH was not detected in the primary sample. The large disparity in results of samples taken so closely to one another indicates that contamination is probably in the form of drops from the diesel tank rather than a diesel spill.

4.11 AREE 26 – Outdoor Wash Racks

The Outdoor Wash Racks area includes two automobile wash areas: one southeast of Building 161 (former wash racks); and one southwest of Building 161 (current wash racks). The current wash racks were constructed in April, 1982, to replace the former wash racks. Each current wash rack has 10-inch concrete berms to prevent run-off and a ramped entrance to prevent run-on. Drains from the current wash racks led to a grit chamber, which discharged effluent to the sanitary sewer. Drains from the former wash racks discharged to the surrounding soils. In February, 1992, the grit chamber and adjacent sewage lift station were steam cleaned and all fluids and sediments were disposed. These fluids and sediments contained motor oil, gasoline, antifreeze, and cleaning solution residues. The concrete sides of the grit chamber were in good condition with no cracks or leaks evident.

Surface soil samples were collected from around both the current and former wash racks. Samples at the current wash racks were collected in close proximity to the grit chamber and in areas where overflows from the wash racks would discharge if the drains to the grit chamber were clogged. Metals were detected at both locations at levels below background concentrations. TPH was detected in surface soil samples from the locations where run-off from the parking area and current wash racks could overflow at concentrations of 23.4 ppm and 111 ppm (slightly above the State's TPH soil action level for USTs of 100 ppm).

4.12 AREE 29-1 – Salvage Yard

The Salvage Yard is located in the northwestern section of VHFS, near Route 652. It was active in the mid-1970s as a small fenced storage yard containing drums and debris. The ground in the enclosure was scarred and two mounds of material were identified in a 1977 aerial photograph. Aerial photographs from 1982 indicated that the facility had been removed. There has been no evidence, either by aerial photographs or from installation personnel, indicating that hazardous materials were released or stored in this area.

Geophysical surveys and shallow test pit excavations conducted at AREE 29-1 identified assorted debris at the north-central edge of AREE 29-1. A subsurface soil sample was collected at the site of the buried debris which indicated that past storage practices and burial of inert debris at the salvage yard have not impacted subsurface soil.

4.13 AREE 29-2 – Possible Sludge Disposal Area

The Possible Sludge Disposal Area is located near the northernmost boundary of VHFS, near Route 215. Scarred ground and a pile of gray material, possibly sludge, were identified in the area in 1977 and 1978 EPIC aerial photographs. The ground in the area is very uneven, indicating that material may have previously been piled on the ground.

Surface soil samples were collected from the area which indicated that the piles identified in the area have not impacted surface soil. No sludge was present at the time of sampling.

4.14 AREE 29-3 – Possible Disposal Area

The Possible Disposal Area is located southeast of the fixed ammunition magazine. WSRT flows just to the east of the area. Review of 1950 aerial photographs indicated possible disposal activities based on ground scarring and the presence of mounds of material and possible equipment. Review of 1958 photographs indicated that the area was revegetating and an ammunition storage building had been constructed nearby. Neither aerial photographs, site visits, nor discussions with installation personnel provided evidence that hazardous materials had been released or stored in this area.

A geophysical survey was conducted to evaluate the potential for buried debris within the area. Test pits were excavated perpendicular to the magnetic anomalies. Subsurface soil samples collected from the test pits indicated that no soil contamination had occurred. Ground scarring observed in aerial photographs may be attributable to bedrock outcrops.

4.15 AREE 30 – Motor Pool

AREE 30 (Building 305) served as a motor pool for approximately 20 years. The building is now surrounded by asphalt; however, the asphalt parking lot was once gravel. According to VHFS personnel, vehicles were brought to the motor pool for maintenance and repair. Vehicle maintenance activities occurred on the gravel parking lot. A drainage grate is located at the eastern end of Building 305. In 1995, during repair of a gas line located adjacent to the drainage grate, a petroleum odor was detected in the soil surrounding the gas line.

Subsurface soil samples were collected in the area of the drainage grate. No contamination above screening levels was observed in the subsurface soil samples. The screening levels used included USEPA Region III RBCs, the USEPA screening level for lead in residential soil, Virginia's TPH soil action level for USTs, and maximum background concentrations.

4.16 AREE 33 – Household Debris Pile

The Household Debris Pile is located southeast of the STP in a predominantly wooded and vegetated area. The debris pile contains items including, but not limited to, aluminum and tin cans, glass bottles, pots and pans, and bricks. A house known to exist in this approximate location in 1938 may have been the source of the debris. The pile consists of two small mounds approximately 2 ft high. The larger mound has a 15-foot diameter, and the smaller mound has a 14-foot diameter.

A test pit was excavated in the larger debris mound, and one subsurface soil sample was collected from the test pit. The PAH benzo(a)pyrene (1.86 ppm in the duplicate sample) was the only compound that exceeded its industrial soil RBC (0.78 ppm). The benzo(a)pyrene concentration (0.0001 ppm) in the primary sample did not exceed the industrial soil RBC. Industrial soil RBCs were used to screen soil results at AREE 33 because the soil sample was collected from greater than 2 ft bgs (i.e., excavation workers are the most likely human receptor as discussed in Section 5).

4.17 Site-wide Groundwater

Site-wide groundwater was investigated to determine the character and composition of the aquifer, and to evaluate potential contamination at the various AREEs. The groundwater aquifer of concern at VHFS consists of groundwater in the overburden and in fractured bedrock which are interconnected (i.e., there is no defined confining unit). Groundwater in the western and central portions of VHFS generally flows to the north-northwest, while groundwater flows toward the east in the eastern portion of the facility. Groundwater at VHFS was sampled from a total of 43 monitoring wells at 14 different AREEs and 5 other site locations during the Phase I reuse area RI, Phase II reuse area RI, and SRI sampling events.

During the Phase I and II reuse area RIs, the following significant findings resulted:

- AREE 1 (Dump #1): the pesticide aldrin (0.006 ppb) exceeded its tap water RBC (0.0039 parts per billion [ppb]), but a TPH plume identified during the SI was not confirmed;
- AREE 2 (STP): the chlorinated volatile organic compounds (VOCs) bromodichloromethane (0.553 ppb) and chloroform (1.65 ppb) exceeded their tap water RBCs (0.17 ppb and 0.15 ppb, respectively) but were well below their Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs) (80 ppb and 80 ppb, respectively);

- AREE 5 (EPIC Building Industrial Sewerline): hexachlorobutadiene (0.265 ppb) and hexachlorobenzene (2.08 ppb) exceeded their tap water RBCs (0.14 ppb and 0.0066 ppb, respectively);

- AREE 9 (Vehicle Maintenance Area): benzene (9.43 ppb) exceeded its tap water RBC (0.36 ppb);

- AREE 10 (Former Photographic Wastewater Lagoon): chlorinated VOCs exceeded tap water RBCs but not MCLs; and

- AREE 28-5 (Former Service Station Abandoned USTs): benzene (1.2 ppb) exceeded its tap water RBC (0.36 ppb) but not its MCL (5 ppb).

It should be noted that the aldrin contamination at AREE 1, the chlorinated VOC contamination at AREE 2, the hexachloro-compound contamination at AREE 5, and the benzene contamination at AREE 9 were not confirmed during the SRI.

Bis(2-ethylhexyl)phthalate, a common field and laboratory contaminant, was detected in site and background samples above the tap water RBC. Bis(2-ethylhexyl)phthalate is believed to be an artifact of the low-flow sampling procedure and the sampling equipment used rather than a site-related contaminant. Known areas of groundwater contamination at AREE 4 (Auto Craft Shop) and AREE 27 (Army, Air Force Exchange Service [AAFES] Service Station) are currently undergoing corrective actions and, thus, have been segregated from site-wide groundwater.

4.18 South Run at AREEs 1 and 2

South Run is a small, Class III Virginia stream that begins in Fauquier County and flows northeast into Prince William County. South Run discharges into Lake Manassas, a recreational and drinking water reservoir built on Broad Run for the City of Manassas. AREE 1 (Dump #1) and AREE 2 (STP) are both located adjacent to South Run and are flanked by small tributaries that feed South Run. Seepage and run-off from AREE 1 and treated effluent discharged from the STP into South Run are possible sources of contamination.

Surface water and sediment samples were collected from South Run and its tributaries adjacent to AREEs 1 and 2 to determine the nature and extent of possible contamination. Dissolved copper and total iron were the only analytes detected above screening levels in the surface water samples, indicating that surface water has not been impacted by activities at AREEs 1 and 2. Metals, PAHs and pesticides exceeded their screening levels in the sediment samples. For example, the PAH anthracene and the pesticide chlordane (0.186 ppm and 0.213 ppm, respectively) exceeded their effects range-lows (ER-Ls) (0.085 ppm and 0.0005 ppm, respectively) in the sediment samples from South Run and its tributaries at AREEs 1 and 2. In addition, dioxins/furans, which do not have screening levels, were also detected in sediment samples.

4.19 Other Site Drainages

The other site drainages include the drainages in the northern portion of VHFS that remain dry throughout most of the year and only contain water immediately following storm events. Accordingly, these drainages are not expected to contain aquatic life except for a limited number of opportunistic species capable of withstanding periods of dryness. The surface water drainages at VHFS discharge to either South Run or Broad Run. Both South Run and Broad Run are likely to support aquatic invertebrates, amphibians, and several warm-water fish species.

Surface water samples were collected from the other site drainages during storm events to account for the possible movement of contaminants to downstream water bodies during storm events. During storm event sampling, total iron and aluminum exceeded AWQC and maximum background concentrations in most of the sample locations in the other site drainages. Aluminum (dissolved), zinc (total and dissolved), and

cadmium (dissolved) were also found to exceed AWQC and maximum background concentrations at isolated spots within the other site drainages.

Sediment samples were also collected from the other site drainages. Metals, PAHs, and pesticides were detected at concentrations above screening levels. The screening levels used were the more stringent of the ER–L and the No Effects Levels or Lowest Effects Levels for sediment which are protective of benthic organisms, and maximum background concentrations Arsenic exceeded its ER-L and maximum background concentration at nearly all of the sample locations. Zinc, chromium, iron, lead, and manganese were found in isolated samples above their ER-Ls and maximum background concentrations. 2-Methylnaphthalene (0.621 ppm), acenaphthene (0.911 ppm), anthracene (0.657 ppm), and pyrene (1.81 ppm) are a few of the PAHs that exceeded their ER-Ls (0.065 ppm, 0.15 ppm, 0.085 ppm, and 0.35 ppm, respectively). Pesticides exceeded their ER-Ls in samples collected near the headwaters of a drainage area in the southern portion of VHFS. Alpha-chlordane (0.034 ppm maximum), gamma-chlordane (0.025 ppm maximum), and chlordane (0.16 ppm maximum) exceeded their ER-Ls (0.005 ppm for each). Aldrin (0.0025 ppm), DDE (0.0051 ppm), and endrin (0.0072 ppm) also exceeded their ER-Ls (0.002 ppm, 0.002 ppm, and 0.00002 ppm, respectively).

5.0 SUMMARY OF SITE RISKS

BRAs were conducted as part of the RIs to assess the human health and ecological problems that could result if the contamination at the AREEs and in site-wide groundwater, South Run at AREEs 1 and 2, and the other site drainages was not remediated. The Human Health Risk Assessment (HHRA) was prepared to evaluate the magnitude of potential adverse effects on human health associated with current industrial/commercial and potential future residential exposures to site-related chemicals at the sites. The Ecological Risk Assessment (ERA) was conducted to characterize the potential threats to ecological receptors posed by contaminants at the sites.

The HHRA follows a four-step process:

- Selection of Chemicals of Potential Concern - identifies the contaminants of potential concern based on their toxicity, frequency of occurrence, and concentration by comparing the maximum concentrations of detected chemicals with RBCs which are health-protective chemical concentrations that are back-calculated using toxicity criteria, a $1x10^{-6}$ target carcinogenic risk or a 0.1 hazard quotient (HQ, defined below), and conservative exposure parameters;

- Exposure Assessment - identifies the potential pathways of exposure, and estimates the concentrations of contaminants to which people may be exposed as well as the frequency and duration of these exposures;

- Toxicity Assessment - determines the toxic effects of the contaminants; and

- Risk Characterization - provides a quantitative assessment of the overall current and future risk to people from site contaminants based on the exposure and toxicity information.

The HHRA evaluated health effects which could result from exposure to soil, groundwater, surface water, and sediment contamination in the Phase I and Phase II reuse areas of VHFS. The HHRA evaluated potential risks to current workers who could be exposed to contaminants in surface soil, and to current trespassers who could be exposed to contamination in surface soil, surface water, and sediment. In addition, the HHRA evaluated potential risks to hypothetical future adult residents who could be exposed to contaminants in groundwater and surface soil and to hypothetical future child residents who could be exposed to contaminants in groundwater, surface soil, surface water, and sediment. Potential risks to future excavation workers who could be exposed to contaminants in subsurface soil were also evaluated in the HHRA. Subsurface soil was only evaluated for excavation workers and not residents since residents would be unlikely to be exposed to subsurface soil. In addition, the concentrations of contaminants currently present in subsurface soil would not be representative of the concentrations that might be present if landscaping activities were to

occur which would involve mixing of subsurface soils with surface soil, clean topsoil, and other soil amendments. Therefore, it would not be appropriate to evaluate risks to residents using available subsurface soil data.

Potential carcinogenic (cancer-related) effects and noncarcinogenic effects (including various impacts on different organ systems, such as lungs, liver, etc.) were evaluated in the HHRA. Carcinogenic effects are expressed as the probability that an individual will develop cancer from exposure to the contaminants from each site. The evaluation of noncarcinogenic effects is based on the hazard index (HI), which is the summation of the HQs for individual chemicals. The HQ is a comparison of chemical-specific chronic exposure doses with the corresponding protective doses derived from health criteria. The USEPA recommends that remedial actions may be warranted at sites where the carcinogenic risk to any person is greater than $1x10^{-4}$ or the HI is greater than 1. A carcinogenic risk of $1x10^{-4}$ means that there is a potential of one additional person in a population of 10,000 developing cancer from exposure to contaminants at a site if the site is not remediated. A HI greater than 1 indicates a potential for noncarcinogenic health effects if the site is not remediated.

The ERA also follows a four-step process:

- Problem Formulation - develops information that characterizes habitats and potentially exposed species and identifies contaminants of concern, exposure pathways, and receptors;
- Exposure Assessment - estimates exposure point concentrations for selected indicator species;
- Ecotoxicologic Effects Assessment - identifies concentrations or doses of contaminants that are protective of indicator species; and
- Risk Characterization - estimates potential adverse effects from exposure to contaminants based on exposure and toxicity information.

The ERA evaluated ecological effects which could result from exposure to surface soil, surface water, and sediment contamination in the Phase I and II reuse areas of VHFS. The ERA evaluated potential adverse ecological effects to terrestrial plants and terrestrial invertebrates (represented by earthworms) exposed to contaminants in surface soil. In addition, potential adverse ecological effects to mammals (represented by shrews) and birds (represented by robins) through bioaccumulation in the food web and exposure to contaminants in surface soil were evaluated. Potential adverse ecological effects to aquatic life from exposure to contaminants in surface water and sediment were also evaluated in the ERA. Further, the potential adverse ecological effects to mammals (represented by minks) and birds (represented by herons) through bioaccumulation in the food web and exposure to contaminants in sediment were evaluated for South Run at AREEs 1 and 2.

The evaluation of significant potential adverse ecological effects is based on the Environmental Effects Quotient (EEQ). The EEQ is the ratio of the estimated exposure concentrations/doses for the chemicals of potential concern and the toxicity reference values (TRVs) for the ecological receptors. If the EEQ is greater than 1, there is a potential for adverse ecological effects to occur. As the magnitude of the EEQ becomes greater than 1, the potential for adverse ecological effects becomes more significant.

The results of the BRAs for the subject sites are presented in the following paragraphs. A detailed presentation of the BRAs can be found in the final Phase I Reuse Area RI Report (USAEC, 1998) and the final Phase II Reuse Area RI Report (USACE, 1999), available in the Information Repository.

5.1 AREE 3 - Warehouse

The HHRA concluded that, under both current industrial/commercial and potential future residential land-use conditions, the risks to workers, trespassers, residents, and excavation workers are acceptable for exposure to site-related contaminants at AREE 3. The highest estimated upper-bound excess lifetime cancer risk ($6X10^{-6}$) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the

highest noncarcinogenic risk (HI=2) is for child residents exposed to contaminants in surface soil by incidental ingestion. Although the HI associated with incidental ingestion exposures by child residents exceeded 1, inorganic compounds that were statistically determined to be within background levels accounted for the exceedance. Although industrial soil RBCs were exceeded by contaminants in subsurface soil as indicated in Section 4.1, the concentrations of contaminants yielded risks lower than those for residents exposed to surface soil; therefore, only the risks for residents are presented. The ERA determined that contaminants in surface soil at AREE 3 did not pose significant potential adverse ecological effects. Based on these results, no action is recommended at AREE 3.

5.2 AREE 5 - EPIC Building

No surface soil samples were collected at AREE 5 because the industrial sewerline is buried at least 5 ft bgs, so the HHRA only evaluated risks to future excavation workers. The highest estimated upper-bound excess lifetime cancer risk ($2X10^{-6}$) and the highest noncarcinogenic risk (HI=2) are for incidental ingestion of contaminated subsurface soils by excavation workers. Although the HI associated with incidental ingestion exposures by excavation workers exceeded 1, inorganic compounds that were statistically determined to be within background levels accounted for the exceedance. An ERA was not conducted for soil because surface soil data were not available. No chemicals of potential concern were selected from the results of the sewerline effluent sampling so neither a HHRA or an ERA was completed. Based on these results, no action is recommended at AREE 5.

5.3 AREE 7 – Electrical Equipment Facility Pretreatment Tank

A streamlined risk assessment was conducted for current industrial/commercial and potential future residential land uses at AREE 7. Human health risks were calculated only for the incidental ingestion pathway. The highest estimated upper-bound excess lifetime cancer risk ($5X10^{-6}$) is for child residents exposed to contaminants in soil through incidental ingestion, and the highest noncarcinogenic risk (HI=2) is for child resident exposures to contaminants in soil via incidental ingestion. Although the HI associated with incidental ingestion exposures by child residents exceeded 1, inorganic compounds that were statistically determined to be within background levels accounted for the exceedance. An ERA was not conducted as part of the streamlined risk assessment. Based on these results, no action is recommended at AREE 7 pending clean closure of AREE 7 under RCRA by VDEQ.

5.4 AREE 10 – Former Photographic Wastewater Lagoon

No surface soil samples were collected at AREE 10 because the lagoon was dredged and backfilled such that any residual contamination would be at the base of the former lagoon and not at the soil surface, so the HHRA only evaluated risks to future excavation workers. The highest estimated upper-bound excess lifetime cancer risk ($6X10^{-6}$) is for excavation workers exposed to contaminants in subsurface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. No ERA was conducted at AREE 10 because all samples were collected at depths of greater than 6 inches. Based on the results of the HHRA, no action is recommended at AREE 10.

5.5 AREE 16-2 – Possible Firefighter Training Pit

The HHRA determined that site-related contamination at AREE 16-2 does not pose an unacceptable human health risk under either current industrial/commercial or potential future residential land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($6X10^{-5}$) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. The ERA determined that surface soil at AREE 16-2 does not pose significant potential adverse ecological effects. Based on these results, no action is recommended at AREE 16-2.

5.6 AREE 17 – Dump #3

The HHRA concluded that under both current industrial/commercial and potential future residential land-use conditions, the risks to workers, trespassers, residents, and excavation workers are acceptable for exposure to contaminants. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($9X10^{-5}$) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for child residents exposed to site-related contaminants in surface soil by incidental ingestion and for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. The ERA determined that surface soil at AREE 17 does not pose significant potential for adverse ecological effects. Based on these results, no action is recommended at AREE 17.

5.7 AREE 18 – Grease Pit

The HHRA determined that, under both current industrial/commercial and potential future residential land-use conditions, site-related contamination at AREE 18 does not pose an unacceptable human health risk. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($2X10^{-5}$) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. The ERA determined that exposure to site-related contaminants at AREE 18 does not pose significant potential for adverse ecological effects. Based on these results, no action is recommended at AREE 18.

5.8 AREE 20 – Incinerator Septic Tank and Leach Field

A streamlined risk assessment was conducted for current industrial/commercial and potential future residential land uses at AREE 20. Risks were calculated only for the incidental ingestion pathway. The highest estimated upper-bound excess lifetime cancer risk ($7X10^{-6}$) and noncarcinogenic risk (HI = 0.7) were calculated for child residents exposed to contaminants in soil through incidental ingestion. The streamlined risk assessment did not include an ERA. Based on these results, no action is recommended for the AREE 20 septic tank and leach field.

5.9 AREE 24 – Transformer Storage Area

The HHRA concluded that, under both current industrial/commercial and potential future residential land-use conditions, the risks to workers, trespassers, and residents are acceptable for exposure to site-related contaminants in surface soil. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($1X10^{-5}$) is for child residents exposed to contaminants (i.e., aluminum) in surface soil by incidental ingestion, and the highest noncarcinogenic risk (HI=0.9) is for adult residents exposed to contaminants in surface soil by dermal absorption. The ERA determined that surface soil at AREE 24 poses no significant potential for adverse ecological effects. Based on these results, no action is recommended at AREE 24.

5.10 AREE 25 – Sugar Tree

Since TPH is not evaluated in either the HHRA or the ERA, and no other chemicals of potential concern were identified, no unacceptable risk was determined due to contaminants at AREE 25. Based on the BRA and the fact that only one sample of a duplicate pair was found to contain TPH above the State's TPH soil action level for USTs, no action is recommended at AREE 25.

5.11 AREE 26 – Outdoor Wash Racks

Streamlined risk assessments were conducted for current industrial/commercial and potential future residential land uses at both the current and former wash racks at AREE 26. Risks were calculated only for

the incidental ingestion pathway. The highest upper-bound excess lifetime cancer risk ($1X10^{-5}$) and noncarcinogenic risk (HI=1) were calculated for child residents exposed to contaminants in surface soil at the current wash racks. The streamlined risk assessment did not include an ERA. Based on these results, no action is recommended at AREE 26.

5.12 AREE 29-1 – Salvage Yard

No chemicals of potential concern were identified in the subsurface soil sample at AREE 29-1; therefore, the HHRA determined no unacceptable human health risk from exposure to contaminants in subsurface soil. An ERA was not completed because the AREE 29-1 sample was collected at a depth greater than 6 inches, thus eliminating the potential for exposure to ecological receptors. Based on these results, no action is recommended at AREE 29-1.

5.13 AREE 29-2 – Possible Sludge Disposal Area

The HHRA determined that site-related contamination in surface soil at AREE 29-2 does not pose unacceptable human health risks under either current industrial/commercial or potential future residential land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($6X10^{-6}$) is for child residents exposed to contaminants (i.e., aluminum) in surface soil by incidental ingestion, and the highest noncarcinogenic risks (HI=0.3) are for child residents exposed to site-related contaminants in surface soil by incidental ingestion and dermal absorption. The ERA found no significant potential for adverse ecological effects from surface soil at AREE 29-2. Based on these results, no action is recommended at AREE 29-2.

5.14 AREE 29-3 – Possible Disposal Area

The results of the HHRA indicated that, under both current industrial/commercial and potential future residential land-use conditions, the risk to workers, trespassers, residents, and excavation workers are acceptable for exposure to site-related contaminants. Discounting naturally-occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk ($8X10^{-5}$) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. An ERA was not conducted because all soil samples were collected at depths greater than 6 inches. Based on these results, no action is recommended at AREE 29-3.

5.15 AREE 30 – Motor Pool

Only subsurface soil samples were collected at AREE 30; therefore, an ERA was not conducted, and human health risks were only evaluated for future excavation workers. All analytes were detected below their screening levels (i.e., USEPA Region III industrial soil RBCs and the USEPA screening level for lead in residential soil) and were eliminated as chemicals of potential concern such that risks to excavation workers were determined to be acceptable. Based on these results, no action is recommended at AREE 30.

5.16 AREE 33 – Household Debris Pile

Only subsurface soil was sampled at AREE 33 because the purpose of the sampling was to determine if the household debris had impacted the native soils which were encountered at greater than 2 ft bgs; therefore, an ERA was not conducted, and human health risks were only evaluated for future excavation workers. The highest estimated upper-bound excess lifetime cancer risk ($9X10^{-7}$) is for excavation workers exposed to contaminants through incidental ingestion of subsurface soil. No noncarcinogenic risks were estimated because no noncarcinogenic chemicals of potential concern were identified. Based on these results, no action is recommended at AREE 33.

5.17 Site-Wide Groundwater

Risks associated with exposure to site-related contaminants in site-wide groundwater were only evaluated for future residents. An ERA was not conducted for groundwater. Discounting naturally-occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk ($7X10^{-4}$) is for adult residents exposed to contaminants in site-wide groundwater by dermal absorption, and the highest noncarcinogenic risk (HI=10) is for child residents exposed to contaminants in site-wide groundwater by dermal absorption. The contaminant that drove these unacceptable human health risks is bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate is a common laboratory and field contaminant that was detected in the majority of the on-site and background groundwater samples (i.e., is not site-related). Excluding bis(2-ethylhexyl)phthalate along with naturally-occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk ($9X10^{-5}$) is for adult residents exposed to contaminants in site-wide groundwater by ingestion, and the highest noncarcinogenic risk (HI=0.5) is for child residents exposed to contaminants in site-wide groundwater by ingestion. The site-related contaminants with the greatest impact on cancer risks and noncarcinogenic hazards are beryllium and barium, respectively. Remediation of the site-wide groundwater is not recommended based on the results of the HHRA.

5.18 South Run at AREEs 1 and 2

The HHRA determined that site-related contamination in the sediment and surface water of South Run at AREEs 1 and 2 does not pose unacceptable human health risks under either current industrial/commercial or potential future residential land-use conditions. Cancer risks were not estimated for exposure to surface water in South Run at AREEs 1 and 2 because no carcinogenic chemicals of potential concern were identified. The highest noncarcinogenic risks (HI = 0.004) associated with surface water in South Run at AREEs 1 and 2 were for child resident exposures by dermal absorption. For sediment in South Run at AREEs 1 and 2, the highest estimated upper-bound excess lifetime cancer risk ($1X10^{-5}$) is for child residents exposed to contaminants in sediment by incidental ingestion, and the highest noncarcinogenic risk (HI=9) is for child residents exposed to contaminants in sediment by incidental ingestion. Although the HI associated with incidental ingestion exposures to sediment in South Run at AREEs 1 and 2 by child residents exceeded 1, the exceedance was driven by metals believed to be naturally occurring. It should be noted that background metals were not discounted prior to calculating risks because statistical comparisons could not be conducted for sediment sample results because of the limited number of available background samples.

Results of the ERA for surface water in South Run at AREEs 1 and 2 indicate very little potential for adverse effects to aquatic life from the presence of chemicals in surface water. The ERA determined that there is potential for adverse effects to heron (EEQ = 19) and mink (EEQ = 54) from selenium in sediment from South Run at AREEs 1 and 2; however, the adverse effects are limited because selenium was only detected in one sediment sample. The greatest potential for adverse effects to benthic organisms is in the tributaries to South Run at AREEs 1 and 2 due to dioxin/furan congeners (primarily OCDD [EEQ=57]) and pesticides (primarily chlordane [EEQ=30] and DDT [EEQ=15]). The ERA estimated the potential for adverse effects to benthic organisms based on the assumption that a viable habitat for benthic organisms existed. However, the habitat for benthic organisms in the tributaries to South Run at AREEs 1 and 2 is limited and, therefore, the adverse effects are over-estimated by the ERA and are actually limited.

Based on these results, no action is recommended for South Run at AREEs 1 and 2.

5.19 Other Site Drainages

The HHRA determined that contamination in the sediment of the other site drainages does not pose an unacceptable human health risk under either current industrial/commercial or potential future residential land-use conditions. Human health risks associated with surface water in the other site drainages were not evaluated because these water bodies only contain flowing water during storm events thus limiting the potential for exposure. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($4X10^{-5}$) is for child residents through incidental ingestion of site-related contaminants in sediment in the other site drainages. The highest

noncarcinogenic risk ($HI = 1$) is for child residents exposed to site-related contaminants in sediment in the other site drainages through incidental ingestion.

The ERA determined that the contaminants in the surface water and sediments of the other site drainages do not pose significant potential for adverse ecological effects to aquatic life.

Based on these results, no action is recommended for the other site drainages.

6.0 SELECTED ALTERNATIVE

No action is selected by the U.S. Army for AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages because these sites do not pose unacceptable human health or ecological risks. USEPA and VDEQ concur with this decision. The estimated cost to implement this alternative is $0.

7.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages was released to the public on or about March 31, 1999 (see Attachment 3). This document was made available for public review in the Information Repository at the following location:

Fauquier County Library
Warrenton Branch - Reference Section
11 Winchester Street, Warrenton, VA
(540) 347-8750
Monday – Wednesday: 10:00 a.m. to 9:00 p.m.
Thursday – Saturday: 9:00 a.m. to 5:00 p.m.
Sunday: 1:00 p.m. to 5:00 p.m.

The notice of availability of the Proposed Plan (see Attachment 4) was published in The Fauquier Citizen, the Fauquier Times-Democrat, and the Manassas Journal Messenger during the week of March 29, 1999. A public comment period was held from April 1, 1999, through April 30, 1999. In addition, a public meeting was held on April 15, 1999, to present the Proposed Plan for AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages and to answer questions and receive public comments. The public meeting minutes have been transcribed, and a copy of the transcript is available to the public at the aforementioned location. A Responsiveness Summary, included as part of this Decision Document (DD), has been prepared to respond to the significant comments, criticisms, and new relevant information received during the comment period. Upon signing the DD, the U.S. Army will publish a notice of availability of this DD in The Fauquier Citizen, the Fauquier Times-Democrat, and the Manassas Journal Messenger, and place the DD in the Information Repository.

8.0 RESPONSIVENESS SUMMARY

The purpose of this Responsiveness Summary is to provide the public with a summary of citizen comments, concerns, and questions about AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 and 2; and other site drainages. A public meeting was held on April 15, 1999, to present the Proposed Plan and to answer questions and receive comments. At the public meeting, USEPA had a question regarding the Proposed Plan; the citizens present did not have any comments on the Proposed Plan. However, one citizen had a question regarding the use of radioactive materials at VHFS. No written public comments were received during the April 1, 1999, through April 30, 1999, public comment period. Written comments, however, were received from USEPA and VDEQ.

The Responsiveness Summary is divided into the following sections:

- Selected newspaper notices announcing dates of the public comment period and location and time of the public meeting;
- Comments raised during the public meeting on April 15, 1999;
- Public meeting attendance roster;
- Restoration Advisory Board Members; and
- Written comments received during the public comment period.

All comments and concerns summarized in this document have been considered by the U.S. Army in making a decision regarding the selected alternative.

8.1 Selected Newspaper Notices

A public notice announcing the availability of the Proposed Plan and the public meeting was published in The Fauquier Citizen, the Fauquier Times-Democrat, and the Manassas Journal Messenger during the week of March 29, 1999. This public notice is provided in Attachment 4.

8.2 Comments Raised During the Public Meeting on April 15, 1999

USEPA raised a comment during the public meeting. USEPA's question and the U.S. Army's response are presented below:

USEPA QUESTION: Is the explanation for bis(2-ethylhexyl)phthalate being found in background groundwater because it is a common laboratory contaminant used to make plastics pliable?

ARMY RESPONSE: Bis(2-ethylehexyl)phthalate is both a laboratory and a field contaminant. Bis(2-ethylhexyl)phthalate is used in plastic gloves and tubing to make them pliable. Plastic tubing is used to collect groundwater samples, and the bis(2-ethylhexyl)phthalate is picked up in the groundwater as it is pumped through the tubing. That is why it is found in the background groundwater samples as well as site groundwater samples.

During the public meeting, one citizen raised a question regarding the use of radioactive materials at VHFS. The citizen's question and the U.S. Army's response are presented below:

CONCERNED CITIZEN: Has the U.S. Army investigated the use of radioactive materials at VHFS? The citizen recollected that radioactive materials were used in the basement of a building located adjacent to the educational offices and catty-cornered to the mess hall.

ARMY RESPONSE: In 1996, the U.S. Army conducted a historical site assessment to establish the history of the handling of radioactive sources/commodities at VHFS including the location of these materials; the types of operations that used them; and any accidents, incidents, or leaks that may have occurred. During this assessment, it was determined that there was a high probability that a Radioactive Source Set had been stored in the basement of Building 160; this item was removed from VHFS in 1967. Subsequent to the assessment, a radiation survey was conducted in the buildings, rooms, and areas known to or which could have had radioactive materials on the premises (including the basement of Building 160) to determine if there was any residual radioactive contamination at VHFS. The findings of the assessment and the radiation survey were documented in "Industrial Radiation Historical Site Assessment and Final Status Radiation Survey" published

in August 1996 (U.S. Army CECOM, 1996). No radioactive contamination was detected during the radiation survey.

8.3 Public Meeting Attendance Roster

The public meeting was held on April 15, 1999, at the Former Headquarters Conference Room (Building 101) at VHFS. The members of the community that attended the public meeting included Pat White, Mary Noel McMullen, and William McMullen (see Attachment 5).

8.4 Active Restoration Advisory Board Members

1. Chris Kencik
2. Dean Eckelberry
3. John Mayhugh
4. Owen Bludau
5. Tim Tarr
6. Kevin Bell
7. Steve Mihalko
8. Robert Stroud
9. Joe Phelan

8.5 Written Comments Received During the Public Comment Period

No written comments were received from citizens during the public comment period. Written comments were received from USEPA and VDEQ during the public comment period and are provided in Attachment 6. The U.S. Army's responses to these comments are also provided in Attachment 6 and were distributed to the public during the public comment period. Most of the USEPA's comments suggested wording changes or requested clarification regarding specific information. Wording changes and clarifications requested by USEPA (see Attachment 6 for details) have been incorporated into this DD. Substantive comments and the U.S. Army's responses are presented below:

USEPA COMMENT: Is it appropriate to base decision-making on the draft SRI Report.

ARMY RESPONSE: The SRI Report does not include risk assessment. All risk conclusions were made based on the RIs. Therefore, the status of the SRI Report has no impact on the no action decision made for the subject sites.

USEPA COMMENT: Can we say that the property is okay for unrestricted future use if residential risk has not been evaluated for subsurface soil? If not, we'll need institutional controls, a remedy. Consider a scenario where the property is reused as residential and trees are planted, with the tree pits dug below 2 ft bgs. Subsurface soil could then sit at the surface and be consumed by a child.

ARMY RESPONSE: The U.S. Army's understanding of USEPA's position is that soil below 2 ft bgs only needs to satisfy target risk levels for excavation workers and not residents since residents would be unlikely to be exposed to subsurface soils. In addition, the concentrations of contaminants currently present in subsurface soil would not be representative of the concentrations that might be present if landscaping activities were to occur which would involve mixing of subsurface soils with surface soil, clean topsoil, and other soil amendments. Therefore, it would not be appropriate to evaluate risks to residents using available subsurface soil data.

USEPA/VDEQ COMMENT: Since AREE 7 is to be closed under RCRA, clean closure must be approved by the VDEQ's Office of Waste Permitting before a no action alternative can be selected for this AREE.

ARMY RESPONSE: The U.S. Army understands the requirement for clean closure of AREE 7 by VDEQ before a final no action decision can be made. A closure report has been submitted to VDEQ, and approval is pending. AREE 7 will not be transferred until clean closure approval is received from VDEQ.

USEPA COMMENT: Depths from 0-2 ft are defined as "surface soil" for the HHRA, and depths from 0-6 inches are defined as "surface soil" for the ERA. Internal inconsistency created.

ARMY RESPONSE: The USEPA protocols for HHRAs and ERAs differ with respect to the definition of "surface soils" to which receptors are exposed. ERAs only use data for surface soil samples collected from the 0-6 inch depth interval, while HHRAs use data for surface soil samples collected from the 0-2 ft depth interval. The U.S. Army followed USEPA's protocols.

USEPA COMMENT: Based on the potential for adverse effects to benthic organisms in the tributaries to South Run at AREEs 1 and 2 identified in the ERA, shouldn't an action alternative be evaluated?

ARMY RESPONSE: The ERA estimated the potential for adverse effects to benthic organisms based on the assumption that a viable habitat for benthic organisms existed. However, the habitat for benthic organisms in the tributaries to South Run at AREEs 1 and 2 is limited and, therefore, the adverse effects are over-estimated by the ERA and are actually limited. No action is warranted based on the existing conditions.

9.0 REFERENCES

U.S. Army Communications-Electronics Command (CECOM). 1996. Industrial Radiation Historical Site Assessment and Final Status Radiation Survey. Prepared for the CECOM Safety Office. Prepared by G.M. Lodde (LTC, AUS, Ret) and D.E. Craig (Ice-Solv, Inc.). August 1996.

U.S. Army Corps of Engineers (USACE). 1998. Supplemental Remedial Investigation Report. Vint Hill Farms Station. Draft Document. Prepared by ICF Kaiser Engineers, Inc. Edgewood, Maryland. November, 1998.

U.S. Army Corps of Engineers (USACE). 1999. Remedial Investigation Report. Vint Hill Farms Station Phase II Reuse Area Remedial Investigation. Final Document. Prepared by ICF Kaiser Engineers, Inc. Edgewood, Maryland. January, 1999.

U.S. Army Environmental Center (USAEC). 1996. Site Inspection Report with Supplemental Hydrogeologic Investigation. Vint Hill Farms Station. Warrenton, Virginia. Final Document. Prepared by Science Applications International Corporation, McLean, Virginia. June, 1996.

U.S. Army Environmental Center (USAEC). 1998. Remedial Investigation Report. Vint Hill Farms Station Phase I Reuse Area Remedial Investigation/Feasibility Study. Final Document. Prepared by ICF Kaiser Engineers, Inc. Edgewood, Maryland. April, 1998.

ATTACHMENT 1

RESPONSE TO USEPA COMMENTS ON THE FINAL PHASE I REUSE AREA RI REPORT

Response to Comments on the
Final Phase I Reuse Area RI Report, Vint Hill Farms Station
from USEPA Region III

RESOLUTION OF PREVIOUS COMMENTS

Comment 1

Comment: Regarding data validation, please explain why no J, K, or L qualifiers appear on any of the data. Since there was a discrepancy between the IRDMIS database and the SI report for a few values, please indicate the method used when determining accurate results for AREE 11.

Response: Since the data qualifiers had to be hand entered, only the qualifiers that affect the risk assessment and, therefore, the conclusions of the Phase I Reuse Area RI Report were entered into the database and presented in the report.

Since the Site Inspection (SI) Report was supposedly prepared using the IRDMIS database, the IRDMIS database information was used when a discrepancy was found between the IRDMIS database and the SI Report.

IMPACT OF NEW TOXICITY FACTORS ON RISK AT PHASE I

NOTE: The complete text of USEPA's comments including point-by-point impacts of the toxicity factor changes are provided in Attachment 1 to these responses. USEPA's comments are summarized herein to focus attention on the overall conclusions made by USEPA regarding the impact of the toxicity factor changes on the Final Phase I Reuse Area RI Report recommendations.

Comment 1

Comment: Toxicity factors for some chemicals have changed since April, when this report was submitted. In most cases, the changes would not alter the outcome of the risk assessment. However, in a few cases, the impacts on risk-management decisions could be significant. As we discussed during our conference call on December 2, 1998, in cases where toxicity factors could possibly change risk decisions a technical memo will be developed that rationalizes no further action decisions at selected AREEs. This technical memo should include rationalizations for AREEs 12, 13, 16-1, 27, 29-4 and groundwater wells that reveal high levels of bis(2-ethylhexyl)phthalate (BEHP).

a) For AREE 12 subsurface soil, future residential risks did exceed 1E-4 due to benzo[a]pyrene.

b) For AREE 13, aluminum, iron, and possibly vanadium also contributed.

c) For AREE 16-1 surface soil, risks did exceed NCP targets, due to arsenic, TCDD, and chromium. The concentrations of arsenic and TCDD at AREE 16-1 pose a total cancer risk of 2E-4 for the child/adult scenario. Chromium is a possible driver of an HI above 1.

d) For AREE 27, chromium and cadmium contribute to an HI above 1.

e) For AREE 29-4 surface soil, the aluminum HI of 1.4 was borderline.

f) For site-wide groundwater, the BEHP is a potential concern. Although phthalates are common laboratory contaminants, BEHP was detected in several wells at high levels that were not attributed to blank contamination. On the other hand, the presence of BEHP in background wells at similar levels implies that there may be a regional BEHP issue. As a base-closure issue, the groundwater BEHP could be important, since it exceeds both NCP target risks and the MCL.

Response: The U.S. Army appreciates USEPA's assessment of risks for the Phase I reuse area based on the recent toxicity factor changes. However, for the record, the U.S. Army cannot agree with the details of USEPA's assessment and the risk numbers presented without conducting the assessment itself. Reassessment of risks is not productive since the report is final based on the toxicity factors valid at the time the report was finalized and requested by USEPA in its comments on the Draft Phase I Reuse Area RI Report. Therefore, rather than addressing the specific numbers presented in USEPA's comments, the goal of these responses is to address the major conclusions made by USEPA during its assessment of the toxicity factor changes.

It is important to note that the toxicity factors used in USEPA's assessment were not available at the time the Phase I Reuse Area RI Report was being finalized and the remediation decisions were being made. Rather, the Phase I Reuse Area RI Report was prepared, and the remediation decisions made, based on the toxicity factors that were valid at the time (i.e., toxicity factors published in October, 1997). However, in light of the recent toxicity factor changes, the U.S. Army still believes that the no further action conclusions made in the Final Phase I Reuse Area RI Report are protective for the five AREEs identified in USEPA's comments and site-wide groundwater as discussed in the following paragraphs.

a) For AREE 12 (Dump #2) subsurface soil, the no further action decision is protective for two reasons. First, USEPA has previously established a policy position that only industrial exposures (i.e., construction workers) be considered when evaluating soils below 2 ft below ground surface (bgs). Therefore, the observation made by the USEPA toxicologist that the recently published toxicity factor changes cause future residential risks from exposure to subsurface soil at AREE 12 to exceed 1E-4 due to benzo[a]pyrene is not relevant. Construction worker exposures remain below the target risk levels even in light of the recent toxicity factor changes. Second, it is important to note that AREE 12 is a permitted construction debris landfill, and the U.S. Army intends to institute deed restrictions which will prevent exposure to subsurface soil.

b) For AREE 13 (Sludge Disposal Area), USEPA identified aluminum, iron, and possibly vanadium as compounds that contribute to elevated non-carcinogenic risk. As discussed in Section 8 of the Final Phase I Reuse Area RI Report, the soil samples from AREE 13 were collected from 1-3 ft bgs which straddles the surface/subsurface soil boundary (i.e., 2 ft bgs). To be conservative, these samples were evaluated as surface soil samples in the Human Health Risk Assessment (HHRA) and thus were statistically compared to surface soil background results which are based on samples collected from 0-0.5 ft bgs. However, a more appropriate comparison can be made using the background

subsurface soil sample results since surface soil was likely removed along with the sludge in 1992. Iron concentrations in background subsurface soil samples are highly variable, ranging from 9,360 µg/g to 180,000 µg/g. Aluminum concentrations in background subsurface soil samples range from 4,410 µg/g to 60,600 µg/g, and vanadium concentrations in background subsurface soil samples range from 44.3 µg/g to 531 µg/g. The variability of iron, aluminum, and vanadium concentrations in the background subsurface soil samples is most likely due to the variability of soils that were sampled. The composition of soil is primarily controlled by the composition of the bedrock from which it is formed. Figure 2-1 of the Final Phase I Reuse Area RI Report shows the geology of shallow bedrock across VHFS. For example, the background subsurface soils which have the highest iron concentrations (SB-BK-002 [91,000 µg/g at 3 ft bgs] and SB-BK-003 [180,000 µg/g at 5 ft bgs and 100,000 µg/g at 18.5 ft bgs]) are located in areas where intrusions of mafic material (i.e., basalt) have occurred. Mafic rocks are rich in iron and magnesium and will produce soils that are rich in iron and magnesium. Iron concentrations in soil at AREE 13 range from 75,200 µg/g to 230,000 µg/g. According to the Environmental Contamination Survey (USATHAMA, 1986), a mafic intrusion (Hickory Grove Basalt) bisects AREE 13, and the sludge disposal area lies over the geological contact area of the Catharpin Creek Member and the Hickory Grove Basalt. The high iron concentrations are most likely a product of the parent material from which the soil in this area is derived. In addition, it should be noted that the aluminum and vanadium concentrations at AREE 13 (53,300 µg/g to 73,100 µg/g for aluminum, and 221 µg/g to 317 µg/g for vanadium) are more comparable to the subsurface soil background ranges than they are to the surface soil background ranges. Furthermore and more importantly, aluminum, iron, and vanadium are not anticipated to be present in environmental media at AREE 13 based on site history. Other metals (e.g., silver, cadmium, lead, and mercury) which are more likely to be site-related contaminants based on site history were either not detected or were detected at concentrations below screening levels. Therefore, aluminum, iron, and vanadium are not site-related contaminants but rather are representative of background concentrations in soil derived from the type of bedrock present at AREE 13. No further action is a protective recommendation for AREE 13.

c) For AREE 16-1 (Possible Firefighter Training Pit) surface soil, USEPA found that the concentrations of arsenic and TCDD pose a total cancer risk of 2E-4 for the child/adult scenario. Even when ingestion and dermal absorption exposure routes are added as was done by USEPA, the cancer risk is borderline compared to the target risk of 1E-4. Based on the borderline cancer risk associated with arsenic and TCDD, the small size of the firefighter training pit (i.e., 50 ft diameter for one of the possible pits which was most likely AREE 16-2 based on terrain) for which typical exposure assumptions are exaggerated, and the uncertainty that AREE 16-1 truly represents a former firefighter training pit, no further action at AREE 16-1 is protective.

USEPA also found that chromium is a possible driver of a HI above 1 given the recently lowered (i.e., more stringent) toxicity factor for hexavalent chromium. It should be noted that there is a great deal of conservatism built into the calculation of the HI for chromium in surface soil at AREE 16-1 for the following reasons: 1) the HHRA is based on the conservative assumption that all chromium present at

AREE 16-1 is hexavalent chromium which is not supported by site history; and 2) the oral RfD for hexavalent chromium has an uncertainty factor of 900, which indicates high uncertainty associated with the RfD. Hexavalent chromium is typically found in the environment as a result of contamination from electroplating or conversion coating operations where hexavalent chromium is used in the process solutions. The residential soil risk-based concentration (RBC) for trivalent chromium, the form of chromium more commonly found in the environment when electroplating and conversion coating operations are not involved, is three orders of magnitude higher (i.e., less stringent) than the corresponding RBC for hexavalent chromium (i.e., 1.2E5 µg/g versus 2.3E2 µg/g). In the case of AREE 16-1, which was a possible firefighter training pit, operations that used hexavalent chromium were not conducted. In fact, operations using chromium in any form were not conducted.

In addition, although chromium at AREE 16-1 was not statistically within background, the data do not suggest widespread chromium contamination that would be present if the contamination was site-related. Four surface soil samples were collected at AREE 16-1 and yielded chromium at concentrations ranging from 27.2 µg/g to 59.9 µg/g, with an arithmetic mean concentration of 41.0 µg/g. Background concentrations in surface soil were detected at concentrations as high as 60 µg/g. A common sense review of the data in light of site history indicates that it is reasonable to find the chromium concentrations to be representative of background concentrations.

Based on the conservatism of the HI calculation for chromium, the lack of site history involving chromium, and the fact that the detected chromium levels are potential background levels, the no further action decision for AREE 16-1 is protective.

d) For AREE 27 (AAFES Service Station) surface soil, although cadmium and chromium both contribute to a HI above 1, chromium is the risk driver because of the recently lowered (i.e., more stringent) toxicity factor for hexavalent chromium. Therefore, this response focuses on chromium. As discussed in Section 8 of the Final Phase I Reuse Area RI Report, there is a great deal of conservatism built into the calculation of the HI for chromium in surface soil at AREE 27 for the following reasons: 1) the HHRA is based on the conservative assumption that all chromium present at AREE 27 is hexavalent chromium which is not supported by site history; and 2) the oral RfD for hexavalent chromium has an uncertainty factor of 900, which indicates high uncertainty associated with the RfD. Hexavalent chromium is typically found in the environment as a result of contamination from electroplating or conversion coating operations where hexavalent chromium is used in the process solutions. The residential soil RBC for trivalent chromium, the form of chromium more commonly found in the environment when electroplating and conversion coating operations are not involved, is three orders of magnitude higher (i.e., less stringent) than the corresponding RBC for hexavalent chromium (i.e., 1.2E5 µg/g versus 2.3E2 µg/g). In the case of AREE 27, which was a fuel and service station, operations that used hexavalent chromium were not conducted. In fact, operations using chromium in any form were not conducted.

In addition, although chromium at AREE 27 was not statistically within background, the data do not suggest widespread chromium contamination that

would be present if the contamination was site-related. Nine surface soil samples were collected at AREE 27 and yielded chromium at concentrations ranging from 24.8 µg/g to 75.5 µg/g, with an arithmetic mean concentration of 40.6 µg/g. Background concentrations in surface soil were detected at concentrations as high as 60 µg/g. A common sense review of the data in light of the site history indicates that it is reasonable to find the chromium concentrations to be representative of background concentrations.

Based on the conservatism of the HI calculation for chromium, the lack of site history involving chromium, and the fact that the detected chromium levels are potential background levels, the no further action decision for AREE 27 is protective.

e) For AREE 29-4 (Disposal Area) surface soil, USEPA calculated a HI for aluminum of 1.4 which they acknowledge is borderline. Based on the fact that the oral RfD for aluminum has an uncertainty factor of 100 and the HI is not significantly different from 1 even when ingestion and dermal absorption exposure routes are added, no further action at AREE 29-4 is protective.

f) For site-wide groundwater, the fact that BEHP is both a common laboratory contaminant and a common field contaminant is an important point. Although it is true that not all BEHP detections were blank qualified, the primary source of BEHP is the sampling equipment in combination with the sampling technique. BEHP is used as a plasticizer in the flexible tubing used to sample the wells. BEHP was detected in the equipment blanks prepared in the field at lower levels than was found in some of the groundwater samples primarily because of how the equipment blanks were prepared versus how the groundwater samples were collected. In the preparation of the equipment blanks, water was pumped through the sample tubing at a comparatively rapid rate which did not allow for significant leaching and accumulation of BEHP in the sample. Conversely, the low-flow groundwater monitoring well sampling method involved pumping of groundwater through the sample tubing at low flow rates. Many of the monitoring wells were slow producers and required pumping at very low flow rates. The low flow of water through the sample tubing during groundwater sampling increased the opportunity for BEHP to leach into the sample and concentrate. This finding is supported by the fact that elevated BEHP was found in site wells and background wells at similar levels. Neither site nor regional history support USEPA's suggestion that the BEHP found in the groundwater samples may represent a regional issue. Groundwater samples were analyzed for a wide range of constituents, and BEHP was the only constituent that exceeded screening levels in most of the wells. If the BEHP were the result of site or regional groundwater contamination, it would have been found in combination with other contaminants rather than alone. Therefore, the conclusion that the BEHP is present as a result of field contamination is appropriate, and no further action is a protective recommendation for site-wide groundwater at VHFS.

OTHER RISK-RELATED ISSUES

Comment 1:

Comment: Cancer risks were presented separately for children and adults. In order to estimate the lifetime cancer risk when exposure includes both childhood and adulthood, the risks would be:

(Adult cancer risk x 24/30) + (Child cancer risk).

Response: Remediation decisions have all been made based on separate adult and child exposures since this comment had not been made until well into the decision-making process (i.e., after the Final Phase I Reuse Area RI Report was submitted). Furthermore, this methodology is consistent with that used in other HHRAs performed for and accepted by USEPA Region III.

Comment 2:

Comment: The soil-to-skin adherence factors are generally reported at lower levels in the new Exposure Factors Handbook than previously (Section 7.1.2.3; Tables 7-16, 7-17, 7-19, 7-24). Therefore, it is possible that dermal soil risks are overestimated in this respect.

Response: The uncertainty associated with the soil-to-skin adherence factors and their impact on risk estimates is already discussed in the Uncertainty Section of the Final Phase I Reuse Area RI Report.

ATTACHMENT 1

DETAILED COMMENTS FROM USEPA REGARDING NEW TOXICITY FACTORS

IMPACT OF NEW TOXICITY FACTORS ON RISK AT PHASE I

Toxicity factors for some chemicals have changed since April, when this report was submitted. In most cases, the changes would not alter the outcome of the risk assessment. However, in a few cases, the impacts on risk-management decisions could be significant. As we discussed during our conference call on December 2, 1998, in cases where toxicity factors could possibly change risk decisions a technical memo will be developed that rationalizes no further action decisions at selected AREEs. This technical memo should include rationalizations for AREEs 12, 13, 16-1, 27, 29-4 and groundwater wells that reveal high levels of BEHP. To assist in the facilitation of this memo, EPA has provided a table in this letter that indicates the impacts of the toxicity changes on the final estimates of risk. The toxicity-factor changes would also impact other tables and sections of the RI, on which the final risk estimates are built. For informational purposes, the changes to those "building-block," non-summary sections are included in an attachment to this letter.

1. Table 7-155 (and pages 7-62 to 7-73):

   The table should not be split by route; total risks are more informative. Also, given the changes noted in the attachment, the risks on this table would be as follows:

MEDIUM/ LOCATION	WORKER CA. RISK	WORKER HI	ADULT RES. CA. RISK	ADULT RES. HI	CHILD RES. CA. RISK	CHILD RES. HI
SURFACE SOIL:						
AREE 9	--	--	--	1.9 c	--	6.5 a
AREE 11	3E-5	1.6 c	7E-5	4 a	5E-5	11
AREE 13	--	1.7 c	--	4	--	14
AREE 16-1	--	1.3	1E-4	2.7 a	1E-4	8
AREE 16-2	--	--	--	--	--	3.6 a
AREE 17	--	--	--	2 c	--	3 a
AREE 18	--	--	--	2 c	--	6 a
AREE 19	--	--	--	2.4 c	--	7
AREE 21	--	--	--	1.6 c	--	6 a
AREE 24	--	--	--	2.2 c	--	7 a
AREE 27	--	--	--	3	--	7.5
AREE 29-2	--	--	--	1.4 c	--	4.3 a
AREE 29-3	--	--	--	--	--	3.1 c
AREE 29-4	--	2.3 a	--	5 a	--	16
Groundwater	--	--	6E-4	8	3E-4	18

MEDIUM/ LOCATION	WORKER CA. RISK	WORKER HI	ADULT RES. CA. RISK	ADULT RES. HI	CHILD RES. CA. RISK	CHILD RES. HI
SEDIMENT:						
EASTERN	--	--	--	--	--	12 a
NORTHERN	--	--	--	--	--	10 a
WESTERN	--	--	--	--	1E-4	22
SUBSURFACE SOIL:						
AREE 12	--	1.8 c	1E-4	1.5 c	2E-4	5.1 a
Central AREEs	--	1.6 c	--	2 c	--	7 a
AREE 27	--	--	--	2 a	--	6.7 a

(Footnotes have the same meaning as in the original table.)

2. The conclusions on page 7-63 should be altered slightly:

   a) Add AREE 12 subsurface soil, benzo[a]pyrene.

   b) Add AREE 29-4 surface soil, aluminum.

   c) Add AREE 16-1 surface soil, arsenic, TCDD, and chromium.

   d) To AREE 13, add aluminum and possibly vanadium.

   e) To AREE 27, add cadmium.

3. Table 8-1:

   a) For AREE 12, future residential risks did exceed 1E-4 due to benzo[a]pyrene.

   b) For AREE 13, aluminum and possibly vanadium also contributed; the reason that no remediation is recommended is not clear.

   c) For AREE 16-1, risks did exceed NCP targets, due to arsenic, TCDD, and chromium. The reason for no remediation is not clear.

   d) For AREE 27, cadmium was also a contributor. The reason for no remediation, given the "yes" in unacceptable health risks, is not clear.

   e) For AREE 29-4, the aluminum HI of 1.4 was borderline.

   f) For site-wide groundwater, the bis(2-ethylhexyl)phthalate (BEHP) is a potential concern. Reported levels were not all attributed to blank contamination.

4. Section 8.1 should also include a discussion of AREE 12 subsoil, AREE 16-1 surface soil, AREE 29-4 surface soil, AREE 13 iron, aluminum, and vanadium (as elevated metals in a sludge

disposal area), and AREE 27 (for which the increase in the chromium toxicity factor has increased the HI, although the point about valence state is well taken).

5. Section 8.2 should not dismiss the BEHP lightly. Although phthalates are common laboratory contaminants, BEHP was detected in several wells at high levels that were not attributed to blank contamination. On the other hand, the presence of BEHP in background wells at similar levels implies that there may be a regional BEHP issue. As a base-closure issue, the groundwater BEHP could be important, since it exceeds both NCP target risks and the MCL.

6. Page ES-2: For AREE 12, subsoil cancer risks exceed 1E-4 for potential residential exposure. For AREE 13, it is not clear that no action should be taken for metals exceeding background levels in a sludge disposal area.

7. Page ES-3:

   a) The concentrations of arsenic and TCDD at AREE 16-1 pose a total cancer risk of 2E-4 for the child/adult scenario. Chromium is a possible driver of an HI above 1. Therefore, it is not clear that no action is appropriate.

   b) For AREE 27, chromium and cadmium contribute to an HI above 1.

8. Page ES-4:

   a) For AREE 29-4, the aluminum HQ is 1.4.

   b) For groundwater, further consideration should be given to the BEHP results.

   c) For the summary bullets, antimony and arsenic should be added to AREE 19. AREE 13 (aluminum, iron, and possibly vanadium) should be added. AREE 16-1 (arsenic, TCDD, and chromium) should be added. AREE 29-4 (aluminum) and AREE 12 subsurface soil (benzo[a]pyrene) may warrant inclusion. Groundwater BEHP should receive further consideration. AREE 27 (cadmium and chromium) may warrant inclusion.

OTHER RISK-RELATED ISSUES

9. Cancer risks were presented separately for children and adults. In order to estimate the lifetime cancer risk when exposure includes both childhood and adulthood, the risks would be:

   (Adult cancer risk x 24/30) + (Child cancer risk).

10. Appendix F: This appendix generates residential risks, but uses industrial RBCs to screen. If residential RBCs were used, then additional COPCs (with their EPCs shown here) would be identified:

    AREE 12: aluminum (16100 mg/kg), chromium (24.7 mg/kg), iron (40400 mg/kg), manganese (605 mg/kg), vanadium (95 mg/kg)

    Central AREEs: aluminum (18900 mg/kg), antimony (0.27 mg/kg), cadmium (0.4 mg/kg), chromium (27 mg/kg), manganese(2390 mg/kg), silver (0.44 mg/kg), vanadium (110 mg/kg)

    AREE 27: aluminum (15000 mg/kg), arsenic (12.2 mg/kg), chromium (46 mg/kg), iron (48000 mg/kg), manganese (950 mg/kg), vanadium (116 mg/kg)

For AREE 12, the residential cancer risks exceed 1E-4 due to benzo[a]pyrene. For all other residential subsoil scenarios, the cancer risks are below 1E-4 and the HIs are at or below 1 after background attribution and target organ separation.

11. The soil-to-skin adherence factors, are generally reported at lower levels in the new Exposure Factors Handbook than previously (Section 7.1.2.3; Tables 7-16, 7-17, 7-19, 7-24). Therefore, it is possible that dermal soil risks are overestimated in this respect.

ATTACHMENT: DETAILS ON RISK ASSESSMENT SECTIONS IMPACTED BY NEW TOXICITY FACTORS

1. Tables 4-2 and F-1: Screening RBCs for beryllium, chromium, vinyl acetate, 1,3-dichlorobenzene, 2-chloronaphthalene, bis(2-chloroethyl)ether, dibenzofuran, 2-methylnaphthalene, naphthalene, the chlordanes, toxaphene, dinoseb, and Aroclor 1016 have been updated. As will be seen, only the differences for beryllium, chromium, and chlordane are generally significant for Vint Hill. The 1,2,3,7,8-PeCDF RBCs were incorrect on this table. However, since the correct numbers were used elsewhere in the report, this is not a major issue.

2. Beryllium's RBC would be higher and it would no longer be a COPC, and chromium's RBC would be lower but its COPC status would not change, on Tables 4-3 through 4-6, Tables 5-2 through 5-9, Table 5-10 (chromium only), Table 5-11, Table 5-12, Tables 5-15 through 5-23, Tables 5-25 through 5-30, Tables 5-33 through 5-43, Table 5-45, Table 6-1, Table 7-2, and in Sections 4.2.1, 4.2.2, 4.2.3, 5.1.2, 5.1.4, 5.2.2, 5.2.4, 5.2.5, 5.3.2.1, 5.3.2.2, 5.3.4.1, 5.3.4.2, 5.4.4, 5.5.1, 5.7.4.2, 5.7.5.2, 5.8.4.1, 5.8.4.2, 5.9.2, 5.9.4, 5.10.4.1, 5.10.4.2, 5.10.5, 5.11.2, 5.11.3, 5.12.1, 5.14.2, 5.14.4, 5.15.4, 5.16.2, 5.17.4, 5.18.2, 5.18.4, 5.18.5, 5.19.2, 5.19.4, 5.19.5, 6.4.1.1, 6.4.2.1, and 7.1.1.4; also on page 7-6, 3rd paragraph.

   2-Methylnaphthalene's RBC would be lower, but its COPC status would not change, on Tables 5-2, 5-9, 5-19, 5-35, 5-41, 5-45, and 7-2, and in Sections 5.1.2, 5.3.4.1, 5.3.4.2, 5.8.4.1, 5.14.4, 5.18.4, 5.18.5, 5.19.4, and 5.19.5.

   Chlordane's RBC would be higher, but its COPC status would not change, on Tables 5-7, 5-11, 5-20, and 5-43, and in Sections 5.3.2.1, 5.3.2.2, 5.4.4, 5.8.4.2, 5.19.2, and 5.19.5. The COPC status of total chlordane would not change on Tables 5-8 and 5-9, and in Sections 5.3.4.1 and 5.3.4.2. Chlordane would no longer be a COPC on Table 5-19 and in Section 5.8.4.1.

   Naphthalene's RBC would be lower, but its COPC status would not change, on Tables 5-8, 5-9, 5-11, 5-19, 5-41; 5-42, 5-45, and 7-2, and in Sections 5.3.4.1, 5.3.4.2, 5.4.4, 5.8.4.1, 5.18.4, 5.18.5, 5.19.4, and 5.19.5.

3. On Tables 7-4 and 7-11 (also pp. 7-7 through 7-10), the COPC selections would change as follows:

   AREEs 9, 13, 19, 21, 24, 29-2, 29-3: beryllium no, chromium yes;

   AREEs 11, 16-1, 16-2, 18, 27, 29-4: beryllium no;

   AREE 17: chlordane no, beryllium no, chromium yes.

4. On Tables 7-6 and 7-11 (also on p. 7-12), the COPC selections for occupational use would change as follows: Central AREEs: beryllium no.

5. On Tables 7-8 and 7-11 (also on p. 7-12), the COPC selections would change as follows: chlordane no.

6. On Tables 7-10 and 7-11 (also on pp. 7-13 and 7-14), the COPC selections would change as follows:

   Eastern: beryllium no;

   Northern: beryllium no, chromium yes;

   Western: alpha-chlordane no, gamma-chlordane no, beryllium no.

7. Table 7-14:

Beryllium does not need to be a COPC for groundwater, surface soil AREE 9, surface soil AREE 11, surface soil AREE 13, surface soil AREE 16-1, surface soil AREE 16-2, surface soil AREE 17, surface soil AREE 18, surface soil AREE 19, surface soil AREE 21, surface soil AREE 24, surface soil AREE 27, surface soil AREE 29-2, surface soil AREE 29-3, surface soil AREE 29-4, subsurface soil central AREEs, eastern tributary sediment, northern tributary sediment, and western tributary sediment.

Chlordane does not need to be a COPC in AREE 17 surface soil or western tributary surface water. Alpha- and gamma-chlordane do not need to be COPCs in western tributary sediment.

Surface soil, AREE 9: The manganese EPC should be 2980 mg/kg, but this transcription error is negligible in terms of risk. Chromium should be added, with an EPC of 32.5 mg/kg.

Surface soil, AREE 13: Chromium should be added, with an EPC of 28.9 mg/kg.

Surface soil, AREE 17: Chromium should be added, with an EPC of 35 mg/kg.

Surface soil, AREE 19: Chromium should be added, with an EPC of 23 mg/kg.

Surface soil, AREE 21: Chromium should be added, with an EPC of 20 mg/kg.

Surface soil, AREE 24: Chromium should be added, with an EPC of 33.6 mg/kg.

Surface soil, AREE 29-2: Chromium should be added, with an EPC of 36.6 mg/kg.

Surface soil, AREE 29-3: The iron EPC should be 26000 mg/kg, but this transcription error is negligible. Chromium should be added, with an EPC of 24 mg/kg.

Subsurface soil, AREE 12: The EPCs should be 13 mg/kg for benz[a]anthracene, 13 mg/kg for benzo[a]pyrene, 16 mg/kg for benzo[b]fluoranthene, 3.8 mg/kg for dibenz[a,h]anthracene, and 9.5 for indeno[1,2,3-c,d]pyrene. However, these changes are negligible in terms of risk.

8. Table 7-25:

The new oral slope factors for the chlordanes are all 0.35 per mg/kg/day; the new oral RfDs are 5E-4 mg/kg/day.

The 1,2-dichloroethane target organs include the stomach and thymus.

The barium target organs include the kidney.

The new beryllium oral RfD is 2E-3 mg/kg/day with the intestines as the target organ; the oral slope factor has been withdrawn.

The new chromium oral RfD is 3E-3 mg/kg/day.

The inorganic mercury target organ is the immune system.

9. Table 7-26:

The new unit risk for chlordane is 1E-4 per ug/m^3; the new RfC is 7E-4 mg/m^3.

The 1,2-dichloroethane target organs include possible kidney effects.

The provisional aluminum RfC is 3.5E-3 mg/m^3.

The new beryllium RfC is 2E-5 mg/m^3.

The new chromium RfC is 1E-4 mg/m^3.

10. Table 7-27: As noted elsewhere in the report, adjusted slope factors are not calculated for the carcinogenic PAHs. The beryllium, chromium, and chlordane dermal numbers would change in accordance with their new oral numbers.

11. The risk drivers for AREE 9 surface soil would be iron, manganese, chromium, and vanadium, which are all similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 11 surface soil would be chromium, vanadium, mercury, iron, and chlordane, of which mercury and chlordane exceed background levels.

The risk drivers for AREE 13 surface soil would be aluminum, iron, chromium, and vanadium, of which only chromium is similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 16-1 surface soil would be arsenic, chromium, iron, manganese, vanadium, and TCDD, of which arsenic, TCDD, and chromium exceed background levels.

The risk drivers for AREE 16-2 surface soil would be iron and vanadium, both similar to background levels.

The risk drivers for AREE 17 surface soil would be iron, manganese, chromium, and vanadium, which are all similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 18 surface soil would be iron, manganese, and chromium, which are all similar to background levels.

The risk drivers for AREE 19 surface soil would be iron, antimony, chromium, arsenic, and vanadium, of which antimony and arsenic exceed background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 21 surface soil would be iron, manganese, chromium, and vanadium, all of which are similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 24 surface soil would be iron, manganese, chromium, and vanadium, all of which are similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 27 surface soil would be chromium, vanadium, cadmium, and iron, of which chromium and cadmium exceed background levels.

The risk drivers for AREE 29-2 surface soil would be iron and chromium, which are both similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 29-4 surface soil would be chromium, vanadium, beryllium, iron, aluminum, and manganese, of which only aluminum exceeds background levels.

The risk drivers for groundwater are manganese and bis(2-ethylhexyl)phthalate (BEHP), of which both are similar to background levels, although BEHP is not naturally occurring.

The risk drivers for western tributary sediment are arsenic, chromium, iron, manganese, and vanadium, of which arsenic exceeds background levels.

The risk drivers for eastern tributary sediment are iron, chromium, manganese, and vanadium, all of which are similar to background levels.

The risk drivers for northern tributary sediment are iron, manganese, chromium, and vanadium, all of which are similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 27 subsurface soil would be chromium, iron, and vanadium, all of which are similar to background, according to a Mann-Whitney test.

The risk drivers for AREE .12 subsurface soil would be iron, chromium, vanadium, and benzo[a]pyrene, of which only benzo[a]pyrene appears to exceed background levels (metals tested with Mann-Whitney).

The risk drivers for central subsurface soil would be chromium, iron, manganese, and vanadium, all of which are similar to background (chromium, vanadium, and manganese tested with Mann-Whitney).

12. For Tables 7-28 through 7-42 and Table 7-144, along with pages 7-38 through 7-40: Chromium would be added to some of these AREEs. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would remain below 1E-4 and all HIs would remain at or below 1.

13. For Tables 7-43 through 7-72 and Table 7-145, along with pages 7-40 through 7-43: Chromium would be added to some of these AREEs. Inhalation HQs could be calculated for aluminum. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would remain below 1E-4 and all HIs would remain at or below 1, when target organs are considered and background chemicals are excluded.

14. For Tables 7-73, 7-74, and 7-146, along with page 7-43: Chromium would be added to northern tributary sediment. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would remain below 1E-4 and all HIs would remain at or below 1, when target organs are considered and background chemicals are excluded.

15. For Tables 7-75 through 7-77 and 7-147, along with pages 7-44 and 7-45: Inhalation risks for the child would increase. Risks for chromium would increase, while risks for beryllium would decrease. The dermal risks for adults are likely to be overestimated, since the amount that volatilizes during showering was not subtracted from the EPC. The total cancer risk (ingestion, dermal, and inhalation) for adults, 24-year exposure, would be 6E-4; the total HI would be 8. The total cancer risk for children (ingestion and dermal) would be 3E-4; the total HI would be 18. The risk drivers are still manganese and BEHP, with manganese attributed to background.

16. For Tables 7-78 through 7-107 and 7-148, along with pages 7-45 through 7-53: Chromium would be added to some of these AREEs. Inhalation HQs could be calculated for aluminum. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would be less than 1E-4, and all HIs would be at or below 1 after consideration of target organs and background, except for the following:

At AREE 13, the iron HQ (ingestion + dermal) is 1.5; the vanadium HQ is 1.06, and these are potentially additive. Vanadium may not be attributable to background.

At AREE 16-1, the arsenic cancer risk is 5E-5; the TCDD cancer risk is 8E-5 (total 1E-4); the chromium HQ is 1.4. Chromium may not be attributable to background. The cancer risks on Table 7-148 should not be marked "b."

At AREE 27, the cadmium HQ is 0.21; the chromium HQ is 1.22; these are potentially additive.

17. For Tables 7-108 through 7-137 and Table 7-149, along with pages 7-45 through 7-53: Chromium would be added to some of these AREEs. Inhalation HQs could be calculated for aluminum. Inhalation risks would increase due to body-weight consideration. Risks for chromium would

increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would be less than 1E-4, and all HIs would be at or below 1 after consideration of target organs and background, except for the following:

At AREE 11, the mercury HQ is 1.8; the chlordane HQ is 2.7. The chlordane cancer risk is 4E-5. The cancer risk on Table 7-149 should not be attributed to background.

At AREE 13, the aluminum HQ is 1.2; the iron HQ is greater than 10; the vanadium HQ is 2.6. Vanadium may not be attributable to background.

At AREE 16-1, the arsenic cancer risk is 5E-5; the TCDD cancer risk is 7E-5 (total 1E-4); the chromium HQ is 2.5. Chromium may not be attributable to background. The cancer risks on Table 7-149 should not be marked "b."

At AREE 19, the antimony HQ is 1.5; the arsenic HQ is 1.4; these are potentially additive. The HIs on Table 7-149 should not be marked "e."

At AREE 27, the cadmium HQ is 0.4; the chromium HQ is 2.2; these are potentially additive. The HIs on Table 7-149 should not be marked "b."

At AREE 29-4, the aluminum HQ is 1.4; this was not attributed to background.

18. For Tables 7-138 through 7-141 and 7-150, along with pages 7-53 and 7-54: Beryllium risks would decrease, while risks for chromium would increase. However, all cancer risks would be less than 1E-4, and all HIs would be at or below 1 after consideration of target organs and background.

19. For Tables 7-142, 7-143, and 7-151, along with pages 7-54 and 7-55: Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would be less than 1E-4, and all HIs would be at or below 1 after consideration of target organs and background, except for the following:

    For western tributary sediment, the arsenic HQ is 2.5 and the arsenic cancer risk is 9E-5 (added to a chlordane risk of 1E-5). The cancer risk should not be marked "c" on Table 7-151.

20. Beryllium should not be a cancer driver on Tables 7-144 through 7-151.

21. Table 7-152, Section 7.1.4.3, Section 7.1.5.4: AREE 16-1 now has the highest cancer risk, and AREE 29-4 has the highest HI. The risks on this table would change as previously noted.

ATTACHMENT 2

RESPONSE TO USEPA COMMENTS ON THE FINAL PHASE II REUSE AREA RI REPORT

Response to Comments on the
Final Phase II Reuse Area RI Report, Vint Hill Farms Station
from USEPA Region III

RESOLUTION OF PREVIOUS COMMENTS

Comment 1, Comment 12

Comment: The change was made to Table 5-12 but not Section 5.2.4.1. This is a minor error (a text note concerning the chloroform RBC) and is not expected to affect the conclusions of the risk assessment.

Response: The text error is acknowledged. No further response is required since the conclusions of the risk assessment are not affected.

Comment 2, Comment 23

Comment: The third sentence of Section 5.10.5, which refers to screening levels rather than background, is contradicted by the findings of the RI in previous sections and should have been corrected. However, this is a minor issue which is not expected to affect the conclusions of the risk assessment.

Response: If a metal concentration exceeds the relevant RBC but does not exceed the maximum background concentration, the discussion text states that screening levels were not exceeded. Therefore, the text is not contradictory. No further response is required since the conclusions of the risk assessment are not affected.

Comment 3, Comment 24

Comment: Table 5-42: The original comment requested the addition of certain human health COPCs to this table. These chemicals were important because of their status as COPCs or (in the case of 24e) because of their potential to serve as a contaminant source for migration. Therefore, the requested changes should have been made to this table. However, there are tables that appear later in the report which indicate the site-related chemicals and risk drivers. Because the latter (i.e., Section 7 and 8) tables are more useful, Table 5-42 is not expected to greatly impact the usefulness of the risk assessment.

Response: Table 5-42 is not meant to be an exhaustive list of COPCs. Rather, Table 5-42 presents only the most significant investigation findings. COPCs are presented in the Section 7 tables.

Comment 4, Comment 26, 30

Comment: Aluminum and iron could easily be site-related, particularly when the sites in question involve general dumping or sewage treatment. However, the metals are addressed statistically later in the report, so that Section 6 is balanced by other parts of the RI.

Response: Section 6 is based on the general findings of the statistical background comparisons for metals presented in Section 7.

Comment 5, Comment 27

Comment: The findings of pesticides in groundwater were worthy of mention in the text and should have been added. However, the chemicals appear in data tables and this wording issue is not expected to affect the conclusions of the risk assessment.

Response: The pesticides in question (chlordane and heptachlor) were not mentioned in Sections 6.4.2 and 6.4.2.4 because they are not considered to be significant contaminants in groundwater at VHFS.

Comment 6 - Comment 29

Comment: The finding of thallium in sediment was worthy of mention in the text, particularly since this chemical was a risk driver, and it should have been added. However, discussion of sediment thallium appears elsewhere in the RI, and this wording issue is not expected to affect the conclusions of the risk assessment.

Response: Thallium was not discussed in Section 6.4.3.1 because it is not considered to be a significant contaminant in sediment at VHFS. No further response is required since the conclusions of the risk assessment are not affected.

Comment 7 - Comment 33

Comment: The PEF equation was added tc the report, but the SSL equation (SSL = ?) does not appear. The site-specific SSL equation, which combined PEF and VF and therefore cannot be determined by consulting the general guidance, should be provided.

Response: Residential SSLs were based on residential child exposure parameters for noncarcinogenic compounds and integrated child and adult exposure parameters for carcinogenic compounds. Industrial SSLs were based on industrial worker exposures for both noncarcinogenic and carcinogenic compounds. The following equations were used to develop the SSLs:

RESIDENTIAL

$$SSL_{nc} = \frac{THQ * BW * AT * Days * RfD_i}{EF * IR * ED * (1/VF + 1/PEF)}$$

$$SSL_{ca} = \frac{TR * AT * Days}{EF * IFA_{adj} * (1/VF + 1/PEF) * CSF_i}$$

INDUSTRIAL

$$SSL_{nc} = \frac{THQ * BW * AT * Days * RfD_i}{EF * IR * ED * (1/VF + 1/PEF)}$$

$$SSL_{ca} = \frac{TR * BW * AT * Days}{EF * IR * ED * (1/VF + 1/PEF) * CSF_i}$$

where:

$SSL_{(n)ca}$	=	(Non)cancer soil screening level (mg/kg);
THQ	=	Target hazard quotient (dimensionless);
TR	=	Target cancer risk (dimensionless);
BW	=	Body weight (kg);
AT	=	Averaging Time (yr);
Days	=	Conversion factor (d/yr);
RfD_i	=	Inhalation reference dose (mg/kg-d);
CSF_i	=	Inhalation cancer slope factor $(mg/kg-d)^{-1}$;

EF	=	Exposure frequency (d/yr);
ED	=	Exposure duration (yr);
IR	=	Inhalation rate (m^3/d);
IFA_{adj}	=	Age-adjusted inhalation factor (m^3-yr/d-kg);
PEF	=	Particulate Emission Factor (1.15 x10^9 m^3/kg); and
VF	=	Volatilization Factor (m^3/kg).

Comment #8 - Comment 35

Comment: The 1997 aluminum paper gives the same RfC (5E-3 mg/m^3) as the 1994 paper; however, the paper has been provided as requested. EPA's value of 1E-3 mg/kg/day is rounded from 1.4E-3 mg/kg/day.

Response: The U.S. Army is in receipt of the requested paper. The values identified in the comment were used the Final Phase II Reuse Area RI Report.

Comment 9 - Comment 36

Comment: The response to #36 was satisfactory, but it is not clear whether this explanation appears in the RI text.

Response: The explanation can be found on Page 7-7.

Comment 10 - Comment 35d, 75d, 76e, 77, 79, 80g, 81h, 83e, 84d, 106d, 107, 110, 112h, 113, etc.

Comment: The adjusted cancer risk (24 years of adulthood and 6 years of childhood) is commonly used in EPA risk assessments. This can be derived from the existing report using the following equation: [(Adult 30-year risk / 30) x 24] + (Child 6-year risk).

Response: As stated in the U.S. Army's original response, the methodology used in the Phase II Reuse Area HHRA to evaluate an adult for an exposure duration of 30 years and a child for the exposure duration of 6 years is consistent with the Phase I Reuse Area HHRA as well as other HHRAs performed for and accepted by USEPA Region III.

Comment 11 - Comments 58h, 59h, 60f, 61f, 62e, 63f, 64f, 65h, 66f, 67f, 68f, 69h, 70f, 72f, 74f, 77, 78e, 79, 80f, 81f, 82f, 83e, 84e, 85f, 87f, 88h, 89h, 90f, 91f, 92e, 93, 95f, 96b, 96e, 96d, 97e, 98e, 100f, 101h, 102b, 103e, 104e, 105f, 106h, 108e, 109e, 112h, 113

Comment: The ingestion and dermal risks should have been added as requested. This is standard risk assessment practice, particularly since the dermal risks are derived based on adjusted oral criteria. This issue is partly redeemed by the cumulative risks shown on Table 7-96. Fortunately, the total risks can easily be found by adding the route-specific risks displayed in the RI. Risk managers should be aware of this issue when quoting or addressing the risks.

Response: To be consistent with the Phase I Reuse Area HHRA, the incidental ingestion and dermal absorption risks and HIs were not totaled. As stated in the comment, risks managers can easily add incidental ingestion and dermal absorption risks by referring to the tables in Section 7. Discounting metals determined to be statistically within background levels, summing incidental ingestion and dermal absorption risks and HIs does not affect the conclusions of the risk assessment with respect to areas exceeding USEPA's target risk range for health protectiveness at Superfund sites.

Comment 12 - Comment 75d, 110

Comment: The groundwater risks are slightly overestimated because volatilization was not subtracted from the amount available for dermal exposure during showering. However,

the results are very close to EPA estimates (e.g., adult dermal HI of 4 vs. 5), and the bottom-line conclusions remain the same.

Response: Since the bottom-line conclusions of the risk assessment remain the same, no response is required.

Comment 13, Comment 106b

Comment: It should be noted that chromium and manganese are also risk drivers, although attributed to background. This information is not expected to greatly impact the conclusions of the risk assessment.

Response: The U.S. Army does not agree with listing background metals as risk drivers.

Comment 14, Comments 106c, 106d, 106e, 106g

Comment: It should be noted that vanadium and manganese are also risk drivers, although attributed to background. This information is not expected to greatly impact the conclusions of the risk assessment.

Response: The U.S. Army does not agree with listing background metals as risk drivers.

Comment 15, Comment 112a

Comment: The adult resident for AREE 1 has a total cancer risk of 1E-4.

Response: The U.S. Army agrees with this comment.

Comment 16, Comment 112e

Comment: The child resident dermal HI for AREE 14 is 1 (c), which is notable because the ingestion HI is greater than 1 (possible additive effects).

Response: Since all of the COPCs for surface soil at AREE 14 are metals statistically determined to be within background levels, additive effects are not a concern.

Comment 17, Comment 112f

Comment: For AREE 31, the child resident ingestion HI is 1.3 (d) and the dermal HI is 0.6 (d); the total HI exceeds 1.

Response: Although the U.S. Army does not agree with the values quoted in the comment, the Phase II Reuse Area RI Report did conclude that the risks associated with surface soil at AREE 31 exceeded USEPA's target risk range for health protectiveness at Superfund sites. Surface soil at AREE 31 has since been remediated.

Comment 18, Comment 112g

Comment: The child resident dermal HI for AREE 32 is 1.3 (c), which is notable because the ingestion HI is greater than 1 (possible additive effects).

Response: The only COPC which was not statistically determined to be within background levels in AREE 32 surface soil was aluminum. The total HI for aluminum (i.e., incidental ingestion plus dermal absorption) is 0.3. Therefore, additive effects are not a concern.

Comment #19, Comment #19

Comment: The following involve wording in the risk characterization section (now pp. 7-39 through 7-51):

a) Page 7-41, AREE 1 worker: the HI is actually less than 1 when separated by target organ;

b) Page 7-41, AREE 2 worker: the total HI is 1, but is less than 1 when separated by target organ;

c) Page 7-43 of the report was missing and should be provided;

d) Page 7-45, last paragraph; and page 7-46, 4th paragraph: no effects are assumed when the HI is equal to 1, contrary to the text statements that effects could be expected at HI = 1;

e) Page 7-46, AREE 1 adult resident: the total HI is 1;

f) Page 7-47, AREE 31 child resident: the total HI is approximately 1, but is 1 or less when separated by target organ;

g) Page 7-47, AREE 32 adult resident: the total HI is 1, but is less than 1 when separated by target organ;

h) Page 7-51, 1st paragraph, last sentence: it is more accurate to state that exposed children may have adverse effects, rather than that this is likely, given the levels found at most of these AREEs.

Response:

a) The U.S. Army agrees with this comment.

b) The U.S. Army agrees with this comment.

c) Page 7-43 is attached.

d) The U.S. Army acknowledges and agrees with this comment.

e) The U.S. Army believes this comment was meant to be on either AREE 4 or AREE 14. If this is the case, the U.S. Army agrees with this comment.

f) The U.S. Army agrees with this comment.

g) The U.S. Army agrees with this comment.

h) The U.S. Army acknowledges and agrees with this comment.

Comment 20, Comment 20

Comment: The page in question is now 7-56; it should be noted that chromium and dioxins and furans are also contributors to risk.

Response: The U.S. Army agrees that chromium and dioxins/furans also contribute to risk for AREE 1 surface soil although to a lesser extent than the contaminants listed.

Comment 21, Comments 21 (page 7-49); 21f (now page 7-56); 22b, 26, 27a, abc 7-99; footnote

Comment: It is difficult to determine whether the sediment metals are site-related, because the two nearest AREEs (1 and 2) are a dump and a sewage treatment plant, both of which could

be associated with a wide variety of contaminants, including metals. However, the similarity of the non-thallium metals to background and the low frequency of the thallium (one detection) are the strongest arguments for the facility's interpretation of the sediment metals pattern.

Response: Based on this comment, USEPA appears to agree with the arguments presented in the Phase II Reuse Area RI Report regarding metals in South Run sediment at AREEs 1 and 2 not being site-related.

Comment 22: Comment 122a

Comment: Table 8-1: For groundwater issues at AREE 1 and AREE 28-5, please refer to my review of the SRI. No further amendment of the Phase 2 RI is expected with respect to this issue.

Response: Comments regarding the SRI Report will be addressed separately. Since the comment indicates that no further amendment to the Phase II Reuse Area RI Report is required, no response is necessary.

Comment 23: Comments 124a, 127b

Comment: It is difficult to support the claim that iron is not site-related at AREE 2, because the on-site levels were statistically greater than background and because the nature of the site (sewage treatment plant) could be associated with a variety of metals. As noted in the report, there are also arguments to made against site attribution of iron, but in my view they are not conclusive. The facility should explain how and if the planned mercury remedy will address iron (whether incidentally or intentionally).

Response: Although the U.S. Army maintains that iron in AREE 2 surface soil is attributable to background, the planned remediation of surface soil at AREE 2 as a result of mercury contamination (i.e., excavation and off-site disposal) will also address iron in the surface soil.

ATTACHMENT 3

PROPOSED PLAN

Proposed Plan

AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33, and Site-wide Groundwater, South Run at AREEs 1 & 2, and Other Site Drainages Vint Hill Farms Station, Virginia

March 1999

INTRODUCTION

The U.S. Army has identified a preferred alternative to address contamination at selected Areas Requiring Environmental Evaluation (AREEs) and three other sites located on Vint Hill Farms Station (VHFS). The U.S. Army's preferred alternative at these areas is no further action.

This Proposed Plan is based on site-related documents contained in the VHFS Information Repository. The Information Repository can provide you with important information about VHFS and the affected areas. The Information Repository is located at:

Fauquier County Library
Warrenton Branch - Reference Section
11 Winchester Street, Warrenton, VA
(540) 347-8750
Monday - Wednesday: 10:00 a.m. to 9:00 p.m.
Thursday - Saturday: 9:00 a.m. to 5:00 p.m.
Sunday: 1:00 p.m. to 5:00 p.m.

The U.S. Army needs your comments and suggestions. The U.S. Army, the U.S. Environmental Protection Agency (USEPA) Region III, and the Virginia Department of Environmental Quality (VDEQ) encourage the public to review and comment on the action presented in the Proposed Plan. The public comment period begins on April 1, 1999, and closes on April 30, 1999. Please send your comments, postmarked no later than April 30, 1999, to:

Kevin Bell, Public Affairs Officer
Building 2500, Helms Road
Vint Hills Farm Station
Warrenton, VA 22187

In addition, you are invited to a public meeting regarding the investigation of the selected areas at VHFS. Representatives from the U.S. Army will report on the status of these areas and the U.S. Army's preferred alternative. The meeting is scheduled for:

Thursday, April 15, 1999 at 7:00 p.m.
Building 101 – Former Headquarters Conference Room
Vint Hill Farms Station, Warrenton, VA

Special provisions will be made for the handicapped and hearing impaired.

The remedy described in this Proposed Plan is the U.S. Army's preferred alternative for the selected areas. The U.S. Army may modify the preferred alternative or select another remedial alternative if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The U.S. Army, in consultation with USEPA and VDEQ, will make a remedy selection for the areas in a Decision Document after the public comment period has ended and the comments and information submitted during that time have been reviewed and considered.

The U.S. Army is issuing this Proposed Plan as part of its public participation responsibilities under Sections 113(k) and 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, commonly known as the "Superfund Program", and the National Environmental Policy Act of 1969 (NEPA). This Proposed Plan focuses on: AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; Site-wide Groundwater; South Run at AREEs 1 and 2; and Other Site Drainages. Other areas of VHFS that the U.S. Army plans to remediate are addressed by separate Proposed Plans.

SITE BACKGROUND

VHFS is part of the U.S. Army Communications - Electronics Command (CECOM) and, while active, primarily functioned as an Army installation engaged in communications intelligence. VHFS is located approximately 40 miles southwest of Washington, D.C., in Fauquier County, Virginia, as shown on Figure 1. The installation occupies approximately 701 acres of land near the town of Warrenton, Virginia. Approximately 150 acres of the installation are improved grounds in the southern portion of the property used for industrial operations, administration buildings, and residential housing. Approximately 94 acres in the eastern portion of the property are mature hardwood forest, and the majority of the remaining 457 unimproved and semi-improved acres in the northern portion of the property are used for stationary and mobile antenna operation sites.

The facility was designated for closure in March, 1993, under the Base Realignment and Closure (BRAC) Act. Pursuant to the decision to close the installation, an Enhanced Preliminary Assessment (ENPA) and a Community Environmental Response Facilitation Act (CERFA) investigation of VHFS were conducted by Science Applications International Corporation (SAIC) to assess the environmental condition of the installation. The ENPA and CERFA investigations were completed in April and May, 1994, respectively. The ENPA identified 42 AREEs from the review of installation records, aerial photographs, installation personnel interviews, federal and state regulatory records, and visual inspection. Of these 42 AREEs, 27 were recommended for further investigation.

These 27 AREEs were investigated from September, 1994, to June, 1995, as part of the Site Inspection (SI) conducted by SAIC. The objective of the SI was to determine the presence or absence of contamination and the chemical nature of any detected contamination. The final SI Report, which was completed in June, 1996, identified 24 AREEs which required further investigation. In addition, four new AREEs were identified during site reconnaissance to warrant further investigation subsequent to the SI. AREEs that were determined to warrant further investigation were investigated as part of the Phase I and Phase II reuse area Remedial Investigations (RIs) and the Supplemental Remedial Investigation (SRI) conducted by ICF Kaiser Engineers, Inc. (ICF KE). The purposes of these reports were to evaluate: 1) the nature and extent of contamination; and 2) the level of risk posed to human health and the environment. The final RI Reports for the Phase I and II reuse areas were completed in April, 1998, and January, 1999, respectively. The draft SRI report was completed in November, 1998, and is currently undergoing regulatory review.

Sixteen AREEs and three other sites were identified in the SI, RIs, and SRI as having contamination which poses no unacceptable human health risks and/or significant adverse ecological effects:

- AREE 3 – Warehouse;
- AREE 5 – Environmental Photographic Interpretation Center (EPIC) Building;
- AREE 7 – Electrical Equipment Facility Pretreatment Tank;
- AREE 10 – Former Photographic Wastewater Lagoon;
- AREE 16-2 – Possible Firefighter Training Pit;
- AREE 17 - Dump # 3;
- AREE 18 – Grease Pit;
- AREE 20 – Incinerator Septic Tank and Leach Field;

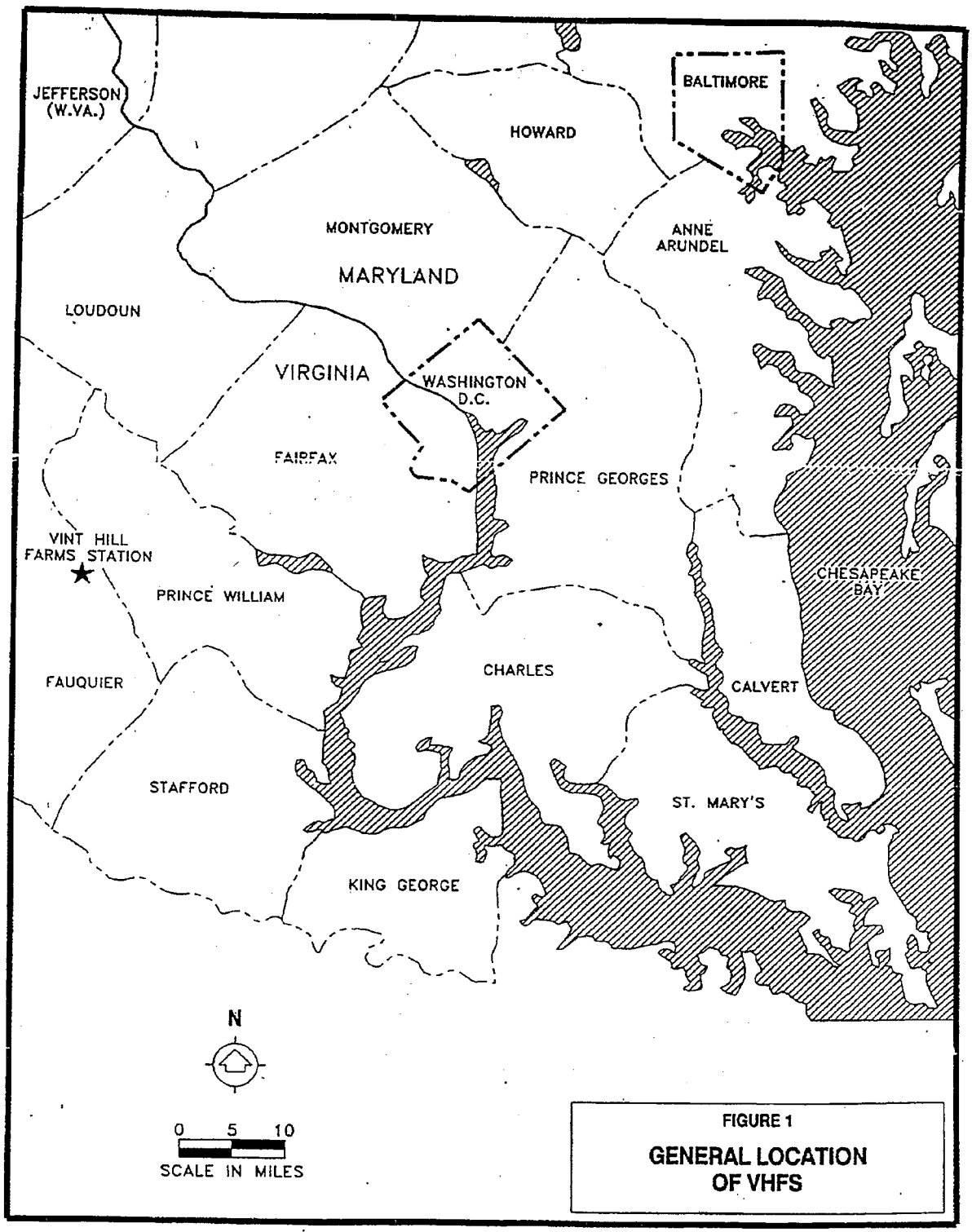

FIGURE 1

GENERAL LOCATION OF VHFS

- AREE 24 – Transformer Storage Area;
- AREE 25 – Sugar Tree;
- AREE 26 – Outdoor Wash Racks;
- AREE 28-1 – Salvage Yard;
- AREE 29-2 – Possible Sludge Disposal Area;
- AREE 29-3 – Possible Disposal Area;
- AREE 30 – Motor Pool;
- AREE 33 – Household Debris Pile;
- Site-Wide Groundwater;
- South Run at AREE 1 (Dump #1) and AREE 2 (Sewage Treatment Plant [STP]); and
- Other Site Drainages.

The locations of these AREEs are shown on Figure 2.

RESULTS OF THE REMEDIAL INVESTIGATION

The RIs for these sites were conducted to evaluate the nature and extent of contamination associated with past site activities. Environmental samples collected and analyzed during the RIs were used in conjunction with the results from the SI and the SRI to assess the condition of each of the areas. The environmental media investigated included surface soil (0 to 2 feet below ground surface [bgs]), subsurface soil (greater than 2 feet bgs), surface water, sediment, and groundwater. Analytical results were compared to background concentrations and regulatory screening levels to determine if environmental media had been adversely impacted by site activities. A brief description of each of the areas and the significant findings of the RIs, SRI, and SI are presented in the following paragraphs. A detailed presentation of the samples collected and the analytical results can be found in the final SI Report, final Phase I Reuse Area RI Report, final Phase II Reuse Area RI Report, and draft SRI Report now available in the Information Repository at the Fauquier County Library.

AREE 3 - Warehouse

The Warehouse (Building 309) was used as a vehicle maintenance area from 1943 to 1967. Two sets of pits, which formerly were used for the hydraulic lifts and grease pit, were filled with concrete in 1967. The Warehouse may have been used for the temporary offloading of drums of oil, grease, solvent, paint, acid, and industrial organic chemicals. Three areas of possible contamination have been identified at the Warehouse: the hydraulic lift pit; the grease pit; and the outlet of a floor drain located at the south end of the building, in a former lavatory. Drain pipes from a sink and water fountain run underneath the floor into the floor drain. The overflow from the floor drain discharges to the field south of the Warehouse.

Surface soil samples were collected at the drain outlet; and subsurface soil samples were collected beneath the drain outlet, grease pit and hydraulic lifts. Benzo(a)pyrene, a polynuclear aromatic hydrocarbon (PAH), was detected in samples taken at the drain outlet at levels above the risk-based concentrations (RBC) established by the USEPA Region III for screening analytical results. Benzo(a)pyrene was detected above the residential soil RBC (0.087 parts per million [ppm]) in a surface soil sample at a concentration of 0.155 ppm, and above the industrial soil RBC (0.78 ppm) in a subsurface soil sample at a concentration of 2.9 ppm. Total petroleum hydrocarbon (TPH) was detected (25.9 to 40.5 ppm) below the State's TPH soil action level for underground storage tanks (USTs) of 100 ppm in soil samples collected underneath the hydraulic lifts. No contamination was observed in subsurface soil samples collected along the perimeter of the hydraulic lifts and the grease pit.

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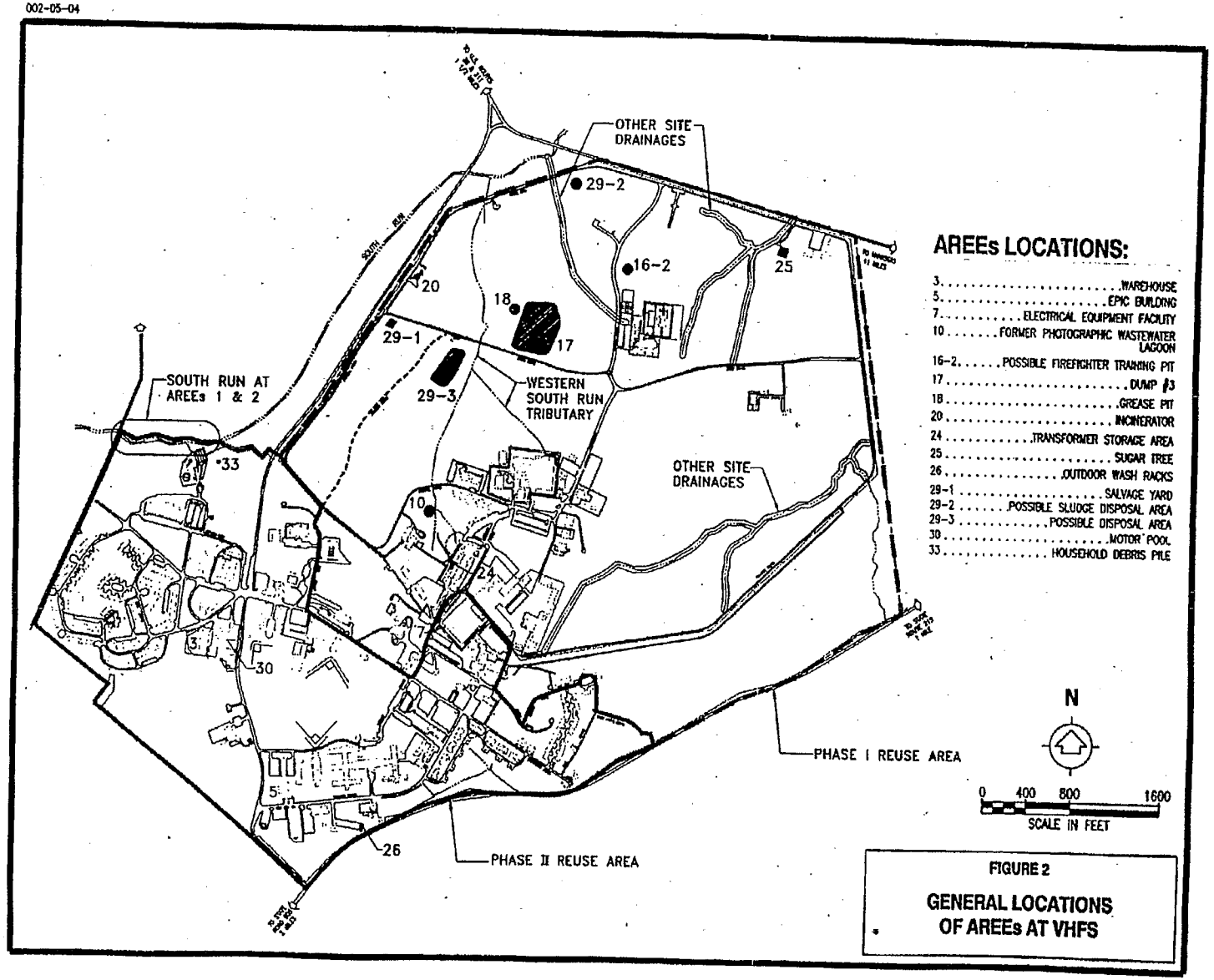

FIGURE 2

GENERAL LOCATIONS OF AREEs AT VHFS

AREE 5 – EPIC Building

The EPIC Building was used for photographic operations from 1958 to 1995. From 1958 to 1968, wastewater generated during the photographic process was discharged from the building via a 6-inch industrial sewerline constructed of vitrified clay to the Former Photographic Wastewater Lagoon (AREE 10). In 1966, the first silver recovery units were installed for wastewater pretreatment. In 1968, the lagoon at AREE 10 was dredged to recover silver in the sediment and then filled. Wastewater was then diverted through the industrial sewerline directly into the western South Run tributary (WSRT). In 1973, an ion-exchange system was installed to remove cyanide, ammonia, phenols and silver from the photographic wastewater before being discharged through the industrial sewerline to WSRT. This practice continued until 1983 when the photographic wastewater was diverted to the VHFS STP. Leakage was suspected in the sewerline that carried the EPIC wastewater to AREE 10 and WSRT due to its age and the nature of the acidic wastewater.

The interior of the 2,700-foot sewerline at AREE 5 was inspected by closed-circuit television to reveal locations of cracks and other points where leakage would most likely occur. These locations were then selected for soil boring placement. Results from the subsurface soil samples collected near the sewerline did not show contamination from photographic wastewater. In order to characterize potential contamination from the sewerline, an effluent sample was collected at the outfall of the sewerline into WSRT. Effluent results indicated that silver exceeded the Ambient Water Quality Criteria (AWQC); however, the silver concentration was qualified with a B, indicating blank contamination. Based on the results of subsurface soil and sewerline effluent sampling and analysis, it does not appear that the EPIC sewerline has impacted subsurface soil or is an ongoing source of contamination to WSRT.

AREE 7 – Electrical Equipment Facility Pretreatment Tank

The Electrical Equipment Facility (Building 2400) was used for classified military activities associated with the Intelligence Materiel Management Center (IMMC) including black and white photo developing, metal etching, and graphics work from 1965 to 1995. In 1978, a concrete pretreatment tank containing a layer of rock and a layer of sand was installed to filter wastewaters generated in Building 2400 before discharging to the sanitary sewer. Wastes discharged to the pretreatment tank included chromic acid from metal etching, painting wastewater, and photographic wastewater (that was first neutralized in the neutralization pit). The floor drainage system also discharged spills of process chemicals and floor wash water from Building 2400 into the pretreatment tank between 1978 and 1990. Prior to 1978, the floor drains discharged directly to WSRT. The sand sludge removed from the pretreatment tank was disposed of in the Sludge Disposal Area (AREE 13) prior to 1981, and was managed as hazardous waste (based on chromium, silver, and lead content) off site starting in 1981. The pretreatment tank was closed in 1995, and no cracks in the concrete walls or stained soils were found when it was removed in 1997. The neutralization pit closed in May, 1990, and is being remediated according to the requirements of the Resource Conservation and Recovery Act (RCRA) under the purview of VDEQ.

Subsurface soil samples were collected around the perimeter of the pretreatment tank which indicated that operation of the pretreatment tank had not impacted the subsurface soil.

AREE 10 – Former Photographic Wastewater Lagoon

The Former Photographic Wastewater Lagoon was an earthen holding pond approximately 90 feet in diameter and 4-4.5 feet deep. Photographic wastewaters from the EPIC Building were discharged to the lagoon from 1958 to 1968. The photographic wastewater was acidic and contained significant amounts of silver and cyanide. The overflow from the lagoon discharged to WSRT. In 1968, flow problems developed in the lagoon, and it was dredged to recover silver from the sediments. The lagoon was then filled, and effluent was diverted directly to WSRT.

Subsurface soil samples were collected from within the area of the lagoon. The primary inorganics of concern, silver and cyanide, were not detected in the subsurface soil samples with the exception of one sample that contained silver well below the residential soil RBC. These results support the conclusion that most of the contaminated sediments from the former lagoon were removed during the 1968 dredging.

AREE 16-2 – Possible Firefighter Training Pit

The Firefighter Training Pit was used monthly by the VHFS Fire Department for training in the mid-1970s. The unlined pit was approximately 50 feet in diameter and 3 feet deep. During training activities, the pit was partially filled with petroleum and natural gas odorant and then ignited. Solvents and other combustible materials may have also been used in the pit. In the mid-1980s the pit was filled with ½-inch gravel.

TPH field screening of the soil at AREE 16-2 was conducted to delineate the area of contamination and to determine where soil samples should be collected for laboratory analysis. Surface and subsurface soil samples were collected based on positive TPH results from the field screening. Surface and subsurface soil samples collected at AREE 16-2 contained arsenic at concentrations (up to 33.8 ppm) that exceeded its residential soil RBC (0.43 ppm) as well as its maximum background concentration (4.89 ppm to 5.4 ppm). Analytical results indicate that soils have not been adversely impacted by firefighter training activities.

AREE 17 – Dump #3

Dump #3 is a 318-foot by 390-foot area that has been in use since 1958 to dispose of compost materials and construction debris. Sludge from the STP and Former STP and small amounts of sandblasting waste containing lead paint from the Electrical Equipment Facility (AREE 7) also may have been disposed of in Dump #3.

Surface soil samples were collected at AREE 17. Minimal contamination due to pesticides and PAH was observed in the surface soil samples. The PAH benzo(a)pyrene (0.098 ppm – 0.632 ppm) was detected above its residential soil RBC (0.088 ppm) in the northern portion of AREE 17. The pesticide chlordane (1.36 ppm) was also found to exceed its residential soil RBC (0.49 ppm) at one sampling location. Arsenic (up to 19.5 ppm) exceeded its residential soil RBC (0.43 ppm) and maximum background concentration (4.89 ppm) at all surface soil locations sampled.

Test pits were excavated to locate buried debris, and subsurface soil samples were collected from the test pits to determine if the debris was contaminating the soil. Based on the results of the test pit sampling, the subsurface soils at AREE 17 have not been impacted by previous disposal activities at the site.

AREE 18 – Grease Pit

The grease pit was a 50-foot long by 2-foot wide by 4-foot deep trench used to dispose of kitchen grease, oily rags and possibly motor oil. The pit was covered with fill material in 1981 and has not been used since that time.

Surface and subsurface soil samples were collected at AREE 18. Manganese (3,100 ppm) and arsenic (10.1 ppm maximum) were the only analytes that exceeded both residential soil RBCs (1,800 ppm and 0.43 ppm, respectively) and maximum background concentrations (2,970 ppm and 4.89 ppm, respectively) in surface soil samples. In subsurface soil, arsenic (up to 14.7 ppm) was the only analyte to exceed both its residential soil RBC (0.43 ppm) and its maximum background concentration (5.4 ppm).

AREE 20 – Incinerator Septic Tank and Leach Field

The Incinerator (Building 282) was used from 1973 to 1985 to burn household and office garbage, and medical waste. Some hazardous wastes (e.g., solvents, pesticides, and waste oil) were also burned in the Incinerator. The Incinerator was temporarily closed from 1985 to 1987 for renovations. The Incinerator was operated for 4 months in 1987 until it was shut down permanently in July, 1987, when a series of explosions in the furnace damaged the structure. The Incinerator has its own septic system, which consists of a 500-gallon septic tank and a 135-foot leach field. The septic system is connected to the sinks and toilets in the Incinerator building. All floor washings were discharged to the septic system. Although there is no record of hazardous wastes having been disposed of in the septic system, any spills of liquid hazardous wastes inside the Incinerator building could have also discharged via the floor drains to the septic system.

Subsurface soil samples collected from the septic system leach field indicated that subsurface soils had not been impacted by the operation of the Incinerator septic system.

AREE 24 – Transformer Storage Area

AREE 24, the Transformer Storage Area, is located west of Building 272 in the engineering compound. It is an unbermed asphalt area that was used to store polychlorinated biphenyl (PCB) transformers (PCBs in oil greater than 500 ppm) and PCB-contaminated transformers (PCBs in oil between 50 and 500 ppm) before their removal by Aptus Environmental Services in 1990. The area is currently used for general storage of materials on pallets, including new "non-PCB" transformers. The area has also been used to store drums containing oil and fuel filters. No spills of transformer cooling oil were observed or recorded in this area.

Surface soil samples were collected for PCB field screening and laboratory analysis. PCBs were not detected during the field screening or subsequent laboratory analysis. TPH was detected below the State's TPH soil action level of 100 ppm in the laboratory samples. Evaluation of the field screening and laboratory analysis results indicate that surface soil has not been impacted from PCB transformer storage activities at AREE 24.

AREE 25 – Sugar Tree

AREE 25, Sugar Tree, is located in the northeastern portion of VHFS, just south of Route 215. AREE 25 is an area where small amounts of paint and solvents may have been disposed; however, no stressed vegetation or other evidence of contamination has been observed in the area. At one point, a 200-gallon diesel aboveground storage tank (AST) was located in this area for approximately six months for vehicle fueling during construction of a sewage lift station.

Soil organic vapor (SOV) surveys and surface and subsurface soil sampling were conducted at AREE 25. These studies indicated minimal impact from possible disposal of paint and solvents. At the former location of the diesel AST, however, TPH-diesel (930 ppm) was detected in excess of the State's TPH soil action level for underground storage tanks (USTs) (100 ppm) in the duplicate surface soil sample sent to the laboratory. However, the primary surface soil sample and the duplicate surface soil sample were collected from different locations within a few inches of one another, and TPH was not detected in the primary sample. The large disparity in results of samples taken so closely to one another indicates that contamination is probably in the form of drops from the diesel tank rather than a diesel spill.

AREE 26 – Outdoor Wash Racks

The Outdoor Wash Racks area includes two automobile wash areas: one southeast of Building 161 (former wash racks); and one southwest of Building 161 (current wash racks). The current wash racks were constructed in April, 1982, to replace the former wash racks. Each current wash rack has 10-inch concrete berms to prevent run-off and a ramped entrance to prevent run-on. Drains from the current wash racks led to a grit chamber, which discharged effluent to the sanitary sewer. Drains from the former wash racks discharged to the surrounding soils. In February, 1992, the grit chamber and adjacent sewage lift station were steam cleaned and all fluids and sediments were disposed. These fluids and sediments contained motor oil, gasoline, antifreeze, and cleaning solution residues. The concrete sides of the grit chamber were in good condition with no cracks or leaks evident.

Surface soil samples were collected from around both the current and former wash racks. Samples at the current wash racks were collected in close proximity to the grit chamber and in areas where overflows from the wash racks would discharge if the drains to the grit chamber were clogged. Metals were detected at both locations at levels below background concentrations. TPH was detected in surface soil samples from the locations where run-off from the parking area and current wash racks could overflow at concentrations of 23.4 ppm and 111 ppm (slightly above the State's TPH soil action level for USTs of 100 ppm).

AREE 29-1 – Salvage Yard

The Salvage Yard is located in the northwestern section of VHFS, near Route 652. It was active in the mid-1970s as a small fenced storage yard containing drums and debris. The ground in the enclosure was scarred and two mounds of material were identified in a 1977 aerial photograph. Aerial photographs from

1982 indicated that the facility had been removed. There has been no evidence, either by aerial photographs or from installation personnel, indicating that hazardous materials were released in this area.

Geophysical surveys and shallow test pit excavations conducted at AREE 29-1 identified assorted debris at the north-central edge of AREE 29-1. A subsurface soil sample was collected at the site of the buried debris which indicated that past storage practices and burial of inert debris at the salvage yard have not impacted subsurface soil.

AREE 29-2 – Possible Sludge Disposal Area

The Possible Sludge Disposal Area is located near the northernmost boundary of VHFS, near Route 215. Scarred ground and a pile of gray material, possibly sludge, were identified in the area in 1977 and 1978 EPIC aerial photographs. The ground in the area is very uneven, indicating that material may have previously been piled on the ground.

Surface soil samples were collected from the area which indicated that the piles identifed in the area have not impacted surface soil.

AREE 29-3 – Possible Disposal Area

The Possible Disposal Area is located southeast of the fixed ammunition magazine. WSRT flows just to the east of the area. Review of 1950 aerial photographs indicated possible disposal activities based on ground scarring and the presence of mounds of material and possible equipment. Review of 1958 photographs indicated that the area was revegetating and an ammunition storage building had been constructed nearby. Neither aerial photographs, site visits, nor discussions with installation personnel provided evidence that hazardous materials had been released in this area.

A geophysical survey was conducted to evaluate the potential for buried debris within the area. Test pits were excavated perpendicular to the magnetic anomalies. Subsurface soil samples collected from the test pits indicated that no soil contamination had occurred. Ground scarring observed in aerial photographs may be attributable to bedrock outcrops.

AREE 30 – Motor Pool

AREE 30 (Building 305) served as a motor pool for approximately 20 years. The building is now surrounded by asphalt; however, the asphalt parking lot was once gravel. According to VHFS personnel, vehicles were brought to the motor pool for maintenance and repair. Vehicle maintenance activities occurred on the gravel parking lot. A drainage grate is located at the eastern end of Building 305. In 1995, during repair of a gas line located adjacent to the drainage grate, a petroleum odor was observed in the soil surrounding the gas line.

Subsurface soil samples were collected in the area of the drainage grate. No contamination above screening levels was observed in the subsurface soil samples.

AREE 33 – Household Debris Pile

The Household Debris Pile is located southeast of the STP in a predominantly wooded and vegetated area. The debris pile contains items including, but not limited to, aluminum and tin cans, glass bottles, pots and pans, and bricks. A house known to exist in this approximate location in 1938 may have been the source of the debris. The pile consists of two small mounds approximately 2 feet high. The larger mound has a 15-foot diameter, and the smaller mound has a 14-foot diameter.

A test pit was excavated in the larger debris mound, and one subsurface soil sample was collected from the test pit. The PAH benzo(a)pyrene (1.86 ppm in the duplicate sample) was the only compound that exceeded its industrial soil RBC (0.78 ppm). The benzo(a)pyrene concentration (0.0001 ppm) in the primary sample did not exceed the industrial soil RBC.

Site-wide Groundwater

Site-wide groundwater was investigated to determine the character and composition of the aquifer, and to evaluate potential contamination at the various AREEs. Groundwater in the western and central portions of

VHFS generally flows to the north-northwest, while groundwater flows toward the east in the eastern portion of the facility. Groundwater at VHFS was sampled from a total of 43 monitoring wells at 14 different AREEs and 5 other site locations during the Phase I reuse area RI, Phase II reuse area RI, and SRI sampling events.

During the Phase I and II reuse area RIs, the following significant findings resulted:

- AREE 1 (Dump #1): the pesticide aldrin (0.006 ppb) exceeded its tap water RBC (0.0039 parts per billion [ppb]), but a TPH plume identified during the SI was not confirmed;
- AREE 2 (STP): the chlorinated volatile organic compounds (VOCs) bromodichloromethane (0.553 ppb) and chloroform (1.65 ppb) exceeded their tap water RBCs (0.17 ppb and 0.15 ppb, respectively) but were well below their Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs) (80 ppb and 80 ppb, respectively);
- AREE 5 (EPIC Building Industrial Sewerline): hexachlorobutadiene (0.265 ppb) and hexachlorobenzene (2.08 ppb) exceeded their tap water RBCs (0.14 ppb and 0.0066 ppb, respectively);
- AREE 9 (Vehicle Maintenance Area): benzene (9.43 ppb) exceeded its tap water RBC (0.36 ppb);
- AREE 10 (Former Photographic Wastewater Lagoon): chlorinated VOCs exceeded tap water RBCs but not MCLs; and
- AREE 28-5 (Former Service Station Abandoned USTs): benzene (1.2 ppb) exceeded its tap water RBC (0.36 ppb) but not its MCL (5 ppb).

It should be noted that the aldrin contamination at AREE 1, the chlorinated VOC contamination at AREE 2, the hexachloro-compound contamination at AREE 5, and the benzene contamination at AREE 9 were not confirmed during the SRI.

Bis(2-ethylhexyl)phthalate, a common field and laboratory contaminant, was detected in site and background samples above the tap water RBC. Bis(2-ethylhexyl)phthalate is believed to be an artifact of the low-flow sampling procedure and the sampling equipment used rather than a site-related contaminant.

Known areas of groundwater contamination at AREE 4 (Auto Craft Shop) and AREE 27 (AAFES Service Station) are currently undergoing corrective actions and, thus, have been segregated from site-wide groundwater.

South Run at AREEs 1 and 2

South Run is a small, Class III Virginia stream that begins in Fauquier County and flows northeast into Prince William County. South Run discharges into Lake Manassas, a recreational and drinking water reservoir built on Broad Run for the City of Manassas. AREE 1 (Dump #1) and AREE 2 (STP) are both located adjacent to South Run and are flanked by small tributaries that feed South Run. Seepage and run-off from AREE 1 and treated effluent discharged from the STP into South Run are possible sources of contamination.

Surface water and sediment samples were collected from South Run and its tributaries adjacent to AREEs 1 and 2 to determine the nature and extent of possible contamination. Dissolved copper and total iron were the only analytes detected above screening levels in the surface water samples, indicating that surface water has not been impacted by activities at AREEs 1 and 2. Metals, PAHs and pesticides exceeded their screening levels in the sediment samples. For example, the PAH anthracene and the pesticide chlordane (0.186 ppm and 0.213 ppm, respectively) exceeded their effects range-lows (ER-Ls) (0.085 ppm and 0.0005 ppm, respectively) in the sediment samples from South Run and its tributaries at AREEs 1 and 2. In addition, dioxins/furans, which do not have screening levels, were also detected in sediment samples.

Other Site Drainages

The other site drainages include the drainages in the northern portion of VHFS that remain dry throughout most of the year and only contain water immediately following storm events. Accordingly, these drainages are not expected to contain aquatic life except for a limited number of opportunistic species capable of withstanding periods of dryness. The surface water drainages at VHFS discharge to either South Run or Broad Run. Both South Run and Broad Run are likely to support aquatic invertebrates, amphibians, and several warm-water fish species.

Surface water samples were collected from the other site drainages during storm events to account for the possible movement of contaminants to downstream water bodies during storm events. During storm event sampling, total iron and aluminum exceeded AWQC and maximum background concentrations in most of the sample locations in the other site drainages. Aluminum (dissolved), zinc (total and dissolved), and cadmium (dissolved) were also found to exceed AWQC and maximum background concentrations at isolated spots within the other site drainages.

Sediment samples were also collected from the other site drainages. Metals, PAHs, and pesticides were detected at concentrations above screening levels. Arsenic exceeded its ER-L and maximum background concentration at nearly all of the sample locations. Zinc, chromium, iron, lead, and manganese were found in isolated samples above their ER-Ls and maximum background concentrations. 2-methylnaphthalene (0.621 ppm), acenaphthene (0.911 ppm), anthracene (0.657 ppm), and pyrene (1.81 ppm) are a few of the PAHs that exceeded their ER-Ls (0.065 ppm, 0.15 ppm, 0.085 ppm, and 0.35 ppm, respectively). Pesticides exceeded their ER-Ls in samples collected near the headwaters of a drainage area in the southern portion of VHFS. Alpha-chlordane (0.034 ppm maximum), gamma-chlordane (0.025 ppm maximum), and chlordane (0.16 ppm maximum) exceeded their ER-Ls (0.005 ppm for each). Aldrin (0.0025 ppm), DDE (0.0051 ppm), and endrin (0.0072 ppm) also exceeded their ER-Ls (0.002 ppm, 0.002 ppm, and 0.00002 ppm, respectively).

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

A Baseline Risk Assessment (BRA) was conducted as part of the RIs to assess the human health and ecological problems that could result if the contamination at the AREEs and in site-wide groundwater, South Run at AREEs 1 and 2, and other site drainages was not remediated. The Human Health Risk Assessment (HHRA) was prepared to evaluate the magnitude of potential adverse effects on human health associated with current and potential future (assuming residential development of the property) exposures to site-related chemicals at the sites addressed by this Proposed Plan. The Ecological Risk Assessment (ERA) was conducted to characterize the potential threats to ecological receptors posed by contaminants at the sites addressed by this Proposed Plan.

The HHRA follows a four-step process:

- Selection of Chemicals of Potential Concern - identifies the contaminants of potential concern based on their toxicity, frequency of occurrence, and concentration by comparing the maximum concentrations of detected chemicals with RBCs which are health-protective chemical concentrations that are back-calculated using toxicity criteria, a $1x10^{-6}$ target carcinogenic risk or a 0.1 hazard quotient (defined below), and conservative exposure parameters;
- Exposure Assessment - identifies the potential pathways of exposure, and estimates the concentrations of contaminants to which people may be exposed as well as the frequency and duration of these exposures;
- Toxicity Assessment - determines the toxic effects of the contaminants; and
- Risk Characterization - provides a quantitative assessment of the overall current and future risk to people from site contaminants based on the exposure and toxicity information.

The HHRA evaluated health effects which could result from exposure to soil, groundwater, surface water, and sediment contamination at sites addressed by this Proposed Plan. The HHRA evaluated potential risks

to current workers who could be exposed to contaminants in surface soil, and to current trespassers who could be exposed to contamination in surface soil, surface water, and sediment. In addition, the HHRA evaluated potential risks to hypothetical future adult residents who could be exposed to contaminants in groundwater and surface soil and to hypothetical future child residents who could be exposed to contaminants in groundwater, surface soil, surface water, and sediment. Potential risks to future excavation workers who could be exposed to contaminants in subsurface soil were also evaluated in the HHRA.

Potential carcinogenic (cancer-related) effects and noncarcinogenic effects (including various impacts on different organ systems, such as lungs, liver, etc.) were evaluated in the HHRA. Carcinogenic effects are expressed as the probability that an individual will develop cancer from exposure to the contaminants from each site. The evaluation of noncarcinogenic effects is based on the hazard index (HI), which is the summation of the hazard quotients for individual chemicals. The hazard quotient is a comparison of chemical-specific chronic exposure doses with the corresponding protective doses derived from health criteria. The USEPA recommends that remedial actions may be warranted at sites where the carcinogenic risk to any person is greater than $1x10^{-4}$ or the HI is greater than 1. A carcinogenic risk of $1x10^{-4}$ means that there is a potential of one additional person in a population of 10,000 developing cancer from exposure to contaminants at a site if the site is not remediated. A HI greater than 1 indicates a potential for noncarcinogenic health effects if the site is not remediated.

The ERA also follows a four-step process:

- Problem Formulation - develops information that characterizes habitats and potentially exposed species and identifies contaminants of concern, exposure pathways, and receptors;
- Exposure Assessment - estimates exposure point concentrations for selected indicator species;
- Ecotoxicologic Effects Assessment - identifies concentrations or doses of contaminants that are protective of indicator species; and
- Risk Characterization - estimates potential adverse effects from exposure to contaminants based on exposure and toxicity information.

The ERA evaluated ecological effects which could result from exposure to surface soil, surface water, and sediment contamination at the sites addressed by this Proposed Plan. The ERA evaluated potential adverse ecological effects to terrestrial plants and terrestrial invertebrates (represented by earthworms) exposed to contaminants in surface soil. In addition, potential adverse ecological effects to mammals (represented by shrews) and birds (represented by robins) through bioaccumulation in the food web and exposure to contaminants in surface soil were evaluated. Potential adverse ecological effects to aquatic life from exposure to contaminants in surface water and sediment were also evaluated in the ERA. Further, the potential adverse ecological effects to mammals (represented by minks) and birds (represented by herons) through bioaccumulation in the food web and exposure to contaminants in sediment were evaluated for South Run at AREEs 1 and 2.

The evaluation of significant potential adverse ecological effects is based on the Environmental Effects Quotient (EEQ). The EEQ is the ratio of the estimated exposure concentrations/doses for the chemicals of potential concern and the toxicity reference values (TRVs) for the ecological receptors. If the EEQ is greater than 1, there is a potential for adverse ecological effects to occur. As the magnitude of the EEQ becomes greater than 1, the potential for adverse ecological effects becomes more significant.

The results of the BRA for the sites addressed by this Proposed Plan are presented in the following paragraphs. A detailed presentation of the BRA can be found in the final SI Report, final Phase I Reuse Area RI Report, and final Phase II Reuse Area RI Report now available in the Information Repository at the Fauquier County Library.

AREE 3 - Warehouse

The HHRA concluded that, under both current and future land-use conditions, the risks to workers, trespassers, residents, and excavation workers are acceptable for exposure to site-related contaminants at AREE 3. The highest estimated upper-bound excess lifetime cancer risk ($6X10^{-6}$) is for child residents

exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risk (HI=2) is for child residents exposed to contaminants in surface soil by incidental ingestion. Although the HI associated with incidental ingestion exposures by child residents exceeded 1, inorganic compounds that were statistically determined to be within background levels accounted for the exceedance. The ERA determined that contaminants in surface soil at AREE 3 did not pose significant potential adverse ecological effects. Based on these results, no further action is recommended at AREE 3.

AREE 5 - EPIC Building

No surface soil samples were collected at AREE 5, so the HHRA only evaluated risks to future excavation workers. The highest estimated upper-bound excess lifetime cancer risk ($2X10^{-6}$) and the highest noncarcinogenic risk (HI=2) are for incidental ingestion of contaminated subsurface soils by excavation workers. Although the HI associated with incidental ingestion exposures by excavation workers exceeded 1, inorganic compounds that were statistically determined to be within background levels accounted for the exceedance. An ERA was not conducted for soil because surface soil data were not available. No chemicals of potential concern were selected from the results of the sewerline effluent sampling so neither a HHRA or an ERA was completed. Based on these results, no further action is recommended at AREE 5.

AREE 7 – Electrical Equipment Facility Pretreatment Tank

A streamlined risk assessment was conducted for current and future land uses at AREE 7. Human health risks were calculated only for the incidental ingestion pathway. The highest estimated upper-bound excess lifetime cancer risk ($5X10^{-6}$) is for child residents exposed to contaminants in soil through incidental ingestion, and the highest noncarcinogenic risk (HI=2) is for child resident exposures to contaminants in soil via incidental ingestion. Although the HI associated with incidental ingestion exposures by child residents exceeded 1, inorganic compounds that were statistically determined to be within background levels accounted for the exceedance. An ERA was not conducted as part of the streamlined risk assessment. Based on these results, no further action is recommended at AREE 7.

AREE 10 – Former Photographic Wastewater Lagoon

No surface soil samples were collected at AREE 10, so the HHRA only evaluated risks to future excavation workers. The highest estimated upper-bound excess lifetime cancer risk ($6X10^{-6}$) is for excavation workers exposed to contaminants in subsurface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. No ERA was conducted at AREE 10 because all samples were collected at depths of greater than 6 inches. Based on the results of the HHRA, no further action is recommended at AREE 10.

AREE 16-2 – Possible Firefighter Training Pit

The HHRA determined that site-related contamination at AREE 16-2 does not pose an unacceptable human health risk under either current or potential future land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($6X10^{-5}$) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. The ERA determined that surface soil at AREE 16-2 does not pose significant potential adverse ecological effects. Based on these results, no further action is recommended at AREE 16-2.

AREE 17 – Dump #3

The HHRA concluded that under both current and future land-use conditions, the risks to workers, trespassers, residents, and excavation workers are acceptable for exposure to contaminants. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($9X10^{-5}$) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for child residents exposed to site-related contaminants in surface soil by incidental ingestion and for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. The ERA

determined that surface soil at AREE 17 does not pose significant potential for adverse ecological effects. Based on these results, no further action is recommended at AREE 17.

AREE 18 – Grease Pit

The HHRA determined that, under both current and potential future land-use conditions, site-related contamination at AREE 18 does not pose an unacceptable human health risk. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($2X10^{-5}$) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. The ERA determined that exposure to site-related contaminants at AREE 18 does not pose significant potential for adverse ecological effects. Based on these results, no further action is recommended at AREE 18.

AREE 20 – Incinerator Septic Tank and Leach Field

A streamlined risk assessment was conducted for current and future land uses at AREE 20. Risks were calculated only for the incidental ingestion pathway. The highest estimated upper-bound excess lifetime cancer risk ($7X10^{-6}$) and noncarcinogenic risk (HI = 0.7) were calculated for child residents exposed to contaminants in soil through incidental ingestion. The streamlined risk assessment did not include an ERA. Based on these results, no further action is recommended for the AREE 20 septic tank and leach field.

AREE 24 – Transformer Storage Area

The HHRA concluded that, under both current and future land-use conditions, the risk to workers, trespassers, and residents are acceptable for exposure to site-related contaminants in surface soil. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($1X10^{-5}$) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risk (HI=0.9) is for adult residents exposed to contaminants in surface soil by dermal absorption. The ERA determined that surface soil at AREE 24 poses no significant potential for adverse ecological effects. Based on these results, no further action is recommended at AREE 24.

AREE 25 – Sugar Tree

Since TPH is not evaluated in either the HHRA or the ERA, and no other chemicals of potential concern were identified, no unacceptable risk was determined due to contaminants at AREE 25. Based on the BRA and the fact that only one sample of a duplicate pair was found to contain TPH above the State's TPH soil action level for USTs, no further action is recommended at AREE 25.

AREE 26 – Outdoor Wash Racks

Streamlined risk assessments were conducted for current and future land uses at both the current and former wash racks at AREE 26. Risks were calculated only for the incidental ingestion pathway. The highest upper-bound excess lifetime cancer risk ($1X10^{-5}$) and noncarcinogenic risk (HI=1) were calculated for child residents exposed to contaminants in surface soil at the current wash racks. The streamlined risk assessment did not include an ERA. Based on these results, no further action is recommended at AREE 26.

AREE 29-1 – Salvage Yard

No chemicals of potential concern were identified in the subsurface soil sample at AREE 29-1; therefore, the HHRA determined no unacceptable human health risk from exposure to contaminants in subsurface soil. An ERA was not completed because the AREE 29-1 sample was collected at a depth greater than 6 inches, thus eliminating the potential for exposure to ecological receptors. Based on these results, no further action is recommended at AREE 29-1.

AREE 29-2 – Possible Sludge Disposal Area

The HHRA determined that site-related contamination in surface soil at AREE 29-2 does not pose unacceptable human health risks under either current or potential future land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($6X10^{-6}$) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risks (HI=0.3) are for child residents exposed to site-related contaminants in surface soil by incidental ingestion and dermal absorption. The ERA found no significant potential for adverse ecological effects from surface soil at AREE 29-2. Based on these results, no further action is recommended at AREE 29-2.

AREE 29-3 – Possible Disposal Area

The results of the HHRA indicated that, under both current and future land-use conditions, the risk to workers, trespassers, residents, and excavation workers are acceptable for exposure to site-related contaminants. Discounting naturally-occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk ($8X10^{-5}$) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk (HI=0.9) is for excavation workers exposed to contaminants in subsurface soil by incidental ingestion. An ERA was not conducted because all soil samples were collected at depths greater than 6 inches. Based on these results, no further action is recommended at AREE 29-3.

AREE 30 – Motor Pool

Only subsurface samples were collected at AREE 30; therefore, an ERA was not conducted, and human health risks were only evaluated for future excavation workers. All analytes were detected below their screening levels and were eliminated as chemicals of potential concern such that risks to excavation workers were determined to be acceptable. Based on these results, no further action is recommended at AREE 30.

AREE 33 – Household Debris Pile

Only subsurface soil was sampled at AREE 33; therefore, an ERA was not conducted, and human health risks were only evaluated for future excavation workers. The highest estimated upper-bound excess lifetime cancer risk ($9X10^{-7}$) is for excavation workers exposed to contaminants through incidental ingestion of subsurface soil. No noncarcinogenic risks were estimated because no noncarcinogenic chemicals of potential concern were identified. Based on these results, no further action is recommended at AREE 33.

Site-Wide Groundwater

Risks associated with exposure to site-related contaminants in site-wide groundwater were only evaluated for future residents. An ERA was not conducted for groundwater. Discounting naturally- occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk ($7X10^{-4}$) is for adult residents exposed to contaminants in site-wide groundwater by dermal absorption, and the highest noncarcinogenic risk (HI=10) is for child residents exposed to contaminants in site-wide groundwater by dermal absorption. The contaminant that drove these unacceptable human health risks is bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate is a common laboratory and field contaminant that was detected in the majority of the on-site and background groundwater samples (i.e., is not site-related); therefore, remediation of the site-wide groundwater is not recommended based on the results of the HHRA.

South Run at AREEs 1 and 2

The HHRA determined that site-related contamination in the sediment and surface water of South Run at AREEs 1 and 2 does not pose unacceptable human health risks under either current or future land-use conditions. Cancer risks were not estimated for exposure to surface water in South Run at AREEs 1 and 2 because no carcinogenic chemicals of potential concern were identified. The highest noncarcinogenic risks (HI = 0.004) associated with surface water in South Run at AREEs 1 and 2 were for child resident

exposures by dermal absorption. For sediment in South Run at AREEs 1 and 2, the highest estimated upper-bound excess lifetime cancer risk ($1X10^{-6}$) is for child residents exposed to contaminants in sediment by incidental ingestion, and the highest noncarcinogenic risk (HI=9) is for child residents exposed to contaminants in sediment by incidental ingestion. Although the HI associated with incidental ingestion exposures to sediment in South Run at AREEs 1 and 2 by child residents exceeded 1, the exceedance was driven by metals believed to be naturally occurring.

Results of the ERA for surface water in South Run at AREEs 1 and 2 indicate very little potential for adverse effects to aquatic life from the presence of chemicals in surface water. The ERA determined that there is potential for adverse effects to heron (EEQ = 19) and mink (EEQ = 54) from selenium in sediment from South Run at AREEs 1 and 2; however, the adverse effects are limited because selenium was only detected in one sediment sample. The greatest potential for adverse effects to benthic organisms is in the tributaries to South Run at AREEs 1 and 2 due to dioxin/furan cogeners (primarily OCDD [EEQ=57]) and pesticides (primarily chlordane [EEQ=30] and DDT [EEQ=15]); however, adverse effects would be limited by the limited aquatic habitat provided by these small tributaries.

Based on these results, no further action is recommended for South Run at AREEs 1 and 2.

Other Site Drainages

The HHRA determined that contamination in the sediment of the other site drainages does not pose an unacceptable human health risk under either current or potential future land-use conditions. Human health risks associated with surface water in the other site drainages were not evaluated because these water bodies only contain flowing water during storm events thus limiting the potential for exposure. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk ($4X10^{-5}$) is for child residents through incidental ingestion of site-related contaminants in sediment in the other site drainages. The highest noncarcinogenic risk (HI = 1) is for child residents exposed to site-related contaminants in sediment in the other site drainages through incidental ingestion.

The ERA determined that the contaminants in the surface water and sediments of the other site drainages do not pose significant potential for adverse ecological effects to aquatic life.

Based on these results, no further action is recommended for the other site drainages.

PREFERRED ALTERNATIVE

No further action is recommended by the U.S. Army as the preferred alternative for AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33; site-wide groundwater; South Run at AREEs 1 & 2; and other site drainages because these sites do not pose unacceptable human health or ecological risks. The estimated cost to implement this alternative is $0.

ATTACHMENT 4

PUBLIC NOTICE

The United States Army at Vint Hill Farms Station, Virginia Invites Public Comment

ON RECENTLY PROPOSED ENVIRONMENTAL ACTIONS FOR VINT HILL FARMS STATION, AS A RESULT OF THE BASE CLOSURE PROCESS

• Please Come To Our •
• PUBLIC MEETING •
• Thursday, April 15, 1999 • 7:00 p.m. •
• Building 101 (Old Headquarters Bldg.), Conference Room •
• Vint Hill Farms Station, VA 20187 •

PURPOSE

TO DISCUSS AND PRESENT REMEDIAL ALTERNATIVES AND NO FURTHER ACTION PROPOSALS FOR THE SITES DISCUSSED BELOW.

BACKGROUND

Vint Hill Farms Station is part of the U.S. Army Communications - Electronics Command (CECOM) and, while active, primarily functioned as an Army installation engaged in communications intelligence. VHFS is located approximately 40 miles southwest of Washington, DC, Fauquier County, Virginia. The installation occupies approximately 701 acres of land in the town of Warrenton, Virginia. Approximately 150 acres of the installation are improved grounds in the southern portion of the property used for industrial operations, administration buildings, and residential housing. Approximately 94 acres on the eastern portion of the property are mature hardwood forest, and the majority of the remaining 457 unimproved and semi-improved acres in the northern portion of the property are used for stationary and mobile antenna operation sites. The facility was designated for closure in March 1993, under the Base Realignment and Closure (BRAC) Act.

SUMMARY

The U.S. Army, in consultation with the U.S. Environmental Protection Agency (USEPA) Region III and the Virginia Department of Environmental Quality (VDEQ), invites public comment on proposed plans for numerous sites at VHFS. Before selecting final remedies and making final no further action decisions, VHFS will consider all written and oral comments received during the public comment period of April 1 through April 30, 1999.

The U.S. Army is proposing remediation for the landfill at AREE 1 - Dump #1 and for the ash and oil found inside the AREE 20 – Incinerator Building. No further action is proposed for groundwater underlying the installation, a portion of the South Run near AREE 1 and AREE 2 Sewage Treatment Plant, and the three grassy drainage ditches.

Additionally, the U.S. Army is proposing no further action at the following Areas Requiring Environmental Evaluation (AREEs):

- **AREE 3 – Warehouse;**
- **AREE 5 – Environmental Photographic Interpretation Center (EPIC) Building;**
- **AREE 7 – Electrical Equipment Facility;**
- **AREE 10 – Former Photographic Wastewater Lagoon;**
- **AREE 13 – Sludge Disposal Area;**
- **AREE 14 – Skeet Range;**
- **AREE 16-1 – Possible Firefighter Training Pit;**
- **AREE 16-2 – Possible Firefighter Training Pit;**
- **AREE 17 – Dump #3;**
- **AREE 18 – Grease Pit;**
- **AREE 20 – Incinerator Septic Tank and Leach Field;**
- **AREE 24 – Transformer Storage Area;**
- **AREE 25 – Sugar Tree;**
- **AREE 26 – Outdoor Wash Racks;**
- **AREE 27 – AAFES Service Station;**
- **AREE 29-1 – Salvage Yard;**
- **AREE 29-2 – Possible Sludge Disposal Area;**
- **AREE 29-3 – Possible Disposal Area;**
- **AREE 29-4 – Disposal Area;**
- **AREE 30 – Motor Pool; and**
- **AREE 33 – Household Debris Pile.**

The U.S. Army will be accepting comments during a 30-DAY PUBLIC COMMENT PERIOD, which begins Thursday, April 1 & ends Friday, April 30, 1999.

WRITTEN COMMENTS MAY BE SUBMITTED TO THE FOLLOWING ADDRESS:

Kevin Bell, Public Affairs Officer
Vint Hill Farms Station
Building 2500, Helms Road
Warrenton, VA 20187

PROPOSAL

VHFS evaluated four remedial alternatives to address soil contamination at AREE 1:

ALTERNATIVE 1: No Action; **ALTERNATIVE 2: Excavation of Landfill;**
ALTERNATIVE 3: Clay Cap; **ALTERNATIVE 4: Liner Cap.**

Based on available information, VHFS prefers Alternative 4, which consists of constructing a liner cap over the AREE 1 landfill and implementing land use restrictions. This remedial alternative offers adequate protection of human health and the environment; providing both short- and long-term effectiveness by: 1) removing the potential for direct contact with the contaminated soil; and 2) reducing the mobilization of contaminants in soil to other media. Due to the complexity that would be required for a treatment system to effectively treat the wide variety of contaminants present, it was not practical to consider active treatment in terms of cost-effectiveness and the ability to implement. Capping of the landfill would be done in accordance with applicable Federal and Commonwealth of Virginia regulations.

VHFS evaluated two remedial alternatives to address the incinerator building at AREE 20:

ALTERNATIVE 1: No Action; **ALTERNATIVE 2: Ash and Oil Removal.**

Based on available information, VHFS prefers Alternative 2, which consists of the removal of ash and oil from the incinerator and its off-site disposal at a permitted facility. This remedial alternative is a permanent solution that offers long-term effectiveness since the contaminated materials are removed and transported off site for proper disposal. The removal and disposal of ash and oil would be done in accordance with applicable Federal and Commonwealth of Virginia regulations.

In addition, VHFS prefers no further action for AREEs 3, 5, 7, 10, 13, 14, 16-1, 16-2, 17, 18, 20, 24, 25, 26, 27, 29-1, 29-2, 29-3, 29-4, 30 and 33; the groundwater underlying the installation; the South Run at AREEs 1 and 2; and three grassy drainage ditches, because these areas pose no unacceptable human health or ecological risks.

FOR MORE INFORMATION

You can review the Proposed Plan and related technical documents at the Information Repository at the following location:

Fauquier County Library
Warrenton Branch - Reference Section
11 Winchester Street
Warrenton, VA 20186
Phone: (540) 347-8750

Hours M-W 10 a.m. - 9 p.m., Th.-Sat. 9 a.m. - 5 p.m., and Sun. 1 p.m. - 5 p.m.

ATTACHMENT 5

PUBLIC MEETING ROSTER

Vint Hill Farms Station

Public Meeting 7:00 P.M.

Recently Proposed Environmental Actions for Vint Hill Farms Station, as a Result of the Base Closure Process

If you wish to speak, please sign in on the lines below. Your name will be called in the order that it appears. Thank you.

NAME (Please Print)	ADDRESS (Please Print)	Received Recent Fact Sheet(s)? YES/NO	Place Name on Mailing List? Yes/No
Nora Zirps	The IT Group, Greensboro, NC	Yes	No
W Steven Huff	THE IT GROUP, EDGEWOOD, MD 21040	YES	No
Frank Spacek	County Court Reporters	Yes	NO
Wayne Phillips	VHFS - DynCorp	Yes	No
Joseph Phelan	COE - Baltimore	Yes	No
Lawrence Smith	HQ, US Army Comm-Electronics Command	Yes	No
Kevin Ben	Caretaker Force - VHFS	YES	No
Frank Graziano	HQ USArmy Material Command	Yes	NO
Pat White	Vint Hill EDA	yes	NO
Steve Mihalko	DEQ	yes	no
Bob Stroud	EPA - Region III 1650 Arch St. Phila, PA 19103	Yes	Yes

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Vint Hill Farms Station

Sign-In Sheet

Thursday, April 15, 1999
Public Meeting 7:00 P.M.

Recently Proposed Environmental Actions for Vint Hill Farms Station, as a Result of the Base Closure Process

If you wish to speak, please sign in on the lines below. Your name will be called in the order that it appears. Thank you.

NAME (Please Print)	ADDRESS (Please Print)	Received Fact Sheet(s)? Yes/No	Place Name on Mailing List? Yes/No
Mary Mae McMuller	7206 North Star Crest Dr. Warr VA 22186	✓	✓
William H. McMuller	7206 - N. STARCREST DR. WARRENTON,	✓	✓

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ATTACHMENT 6

WRITTEN COMMENTS FROM REGULATORS AND U.S. ARMY RESPONSES

After mailing recent Proposed Plans to the public, the U.S. Army received comments on the Proposed Plans from the U.S. Environmental Protection Agency (USEPA) and the Virginia Department of the Environment (VDEQ). In an ongoing effort to solicit the public's input on the proposed environmental actions at Vint Hill Farms Station (VHFS), the U.S. Army is distributing our responses to comments from USEPA and VDEQ to the public. Please note that the comments that are agreed to by the U.S. Army will be incorporated into the Decision Documents for the affected sites.

Response to Comments on the Proposed Plans for Vint Hill Farms Station from USEPA Region III

AREEs 13,14, 16-1, 27 and 29-4

Comment 1: Introduction, 1st sentence, "to address contaminated soil"

Comment: Delete "contaminated soil" so the sentence reads "alternative to address selected Areas Requiring ...

Response: The U.S. Army agrees with this suggested wording change.

Comment 2: Page 2, Site Background, 3rd & 4th paragraphs, "currently undergoing regulatory review" and "having soil contamination which poses no unacceptable"

Comment: If the report is still being reviewed, how can we rely on a report conclusion about risk?

Response: The SRI was conducted to fill data gaps identified in the RIs (e.g., the extent of the AREE 1 landfill). The SRI does not include risk assessment. All risk conclusions were made based on the RIs.

Comment 3: Page 5, AREE 13 description, 1st paragraph, "In 1982, total metals were determined ..." and "In 1992, the area was closed ..."

Comment: (1982) By whom? Any regulator involvement? (1992) By regulator or Army decision to stop?

Response: Based on available knowledge, AREE 13 was not regulated; therefore, decisions to spread sludge and later to remove the sludge and close the disposal area were presumably made by the U.S. Army.

Comment 4: Page 5, AREE 13 description, 2nd paragraph

Comment: As part of RI?

Response: Samples at AREE 13 were collected during the SI and the RI.

Comment 5: Page 5, AREE 14 description, 2nd paragraph

Comment: Nothing in the hit zone?

Response: The lead concentrations in the Hit Zone did not exceed the USEPA screening level for lead in residential soil of 400 ppm.

Comment 6: Page 5, AREE 16-1 description, Title

Comment: Why "possible" in heading but not text?

Response: Site history indicated that a Firefighter Training Pit was used at VHFS; however, the exact location of the pit is not known with certainty. AREEs 16-1 and 16-2 represent two possible locations of the Firefighter Training Pit.

Comment 7, Page 5, AREE 27 description, 1st paragraph, 4th line

Comment: Discharges or discharged?

Response: Discharges.

Comment 8, Page 6, 1st full paragraph

Comment: Mentions arsenic and lead but what about chromium (see page 9)?

Response: The contaminant assessment focused on contaminants that were a potential concern by themselves, while the baseline risk assessment (BRA) evaluated contaminants in combination to determine if they were a potential concern. Chromium in combination with cadmium was identified as a potential concern for impacts to the kidneys in the BRA.

Comment 9, Page 6, AREE 29-4 description, 1st paragraph, last sentence

Comment: Should stored be disposed?

Response: Yes.

Comment 10, Page 8, AREE 13 description

Comment: Current or future potential land-use conditions ... What are these? Maybe say "current industrial/commercial use or potential future residential use conditions", or unrestricted future land use conditions.

Isn't iron naturally occurring? If so, why wasn't it discounted?

Response: Current land use conditions are based on the current usage of the VHFS property; therefore, it would be appropriate to say "current industrial/commercial use conditions". Plans for future use of the VHFS property have not yet been finalized. It was conservatively assumed that residents would inhabit the VHFS property in the future; therefore, it would be appropriate to say "potential future residential use conditions".

Yes, iron is naturally occurring. However, when AREE 13 site iron concentrations and background iron concentrations are statistically compared, iron was not determined to be within background concentrations. This is why iron was not discounted initially. As discussed in the Proposed Plan, a closer look at the subsurface soil type present at AREE 13 supports the conclusion that the iron is naturally occurring.

Comment 11, Page 8, AREE 14 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 12, Page 8, AREE 15 description, 4th paragraph

Comment: "Soil in those ... was excavated." Removed and disposed off site?

Response: Yes, the excavated soil was removed and disposed off site.

Comment 13, Page 9, AREE 16-1 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 14, Page 9, AREE 16-1 description, 1st sentence

Comment: "contaminants" ... Are you referring to arsenic, TCDD?

Response: Yes.

Comment 15, Page 9, AREE 27 description

Comment: Current or future land-use conditions ... What are these?

Chromium not mentioned on page 6. What about arsenic?

Response: See response to Comment 10.

See response to Comment 8 regarding chromium.. Arsenic was not a risk driver at AREE 27.

Comment 16, Page 9, AREE 27 description, 1st paragraph, last sentence

Comment: "Therefore, the HI of 1.3 ..." instead of "therefore a HI of 1.3 ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 17, Page 9, AREE 27 description, 2nd paragraph

Comment: Start the sentence from "lead contamination" and insert "explained in the AREE 14 discussion" after IEUBK Model.

Response: The U.S. Army agrees with this suggested wording change.

Comment 18, Page 9, AREE 29-3 description

Comment: Current or future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 19, Page 9, AREE 29-3 description, 4th line, "exposed to contaminants"

Comment: Are you referring to aluminum, benzo(a)pyrene, beryllium, arsenic, and iron?

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. Benzo(a)pyrene and aluminum are the only two contaminants that meet these criteria.

AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33, and Site-wide Groundwater, South Run at AREEs 1 & 2, and Other Site Drainages

Comment 20, General

Comment: Is this a No Further Action or No Action Proposal?

Response: No Action.

Comment 21, Introduction, 1st sentence, "to address contamination at"

Comment: Delete "contamination at" so the sentence reads "alternative to address selected Areas Requiring ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 22, Page 2, Site Background, 3rd & 4th paragraphs, "currently undergoing regulatory review" and "having contamination which poses no unacceptable"

Comment: If the report is still being reviewed, how can we rely on a report conclusion about risk?

Response: See response to Comment 2.

Comment 23, Page 2, Site Background

Comment: I'm concerned because we can't necessarily say that property is okay for unrestricted future use. In which case, we'll need institutional controls, a remedy. See AREE-specific comments below.

Response: See responses to AREE-specific comments below. Based on these responses, unrestricted future use is okay.

Comment 24, Page 4, AREE 3 description, 3rd sentence

Comment: "The Warehouse also may have been ..." instead of "The Warehouse may have been ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 25, Page 4, AREE 3 description, 2nd paragraph

Comment: What about residential risk? Consider a scenario where the property is reused as residential and trees are planted, with the tree pits dug below 2 ft bgs. Subsurface soil could then sit at the surface and be consumed by a child.

Response: The U.S. Army's understanding of USEPA's position is that soil below 2 ft bgs only needs to satisfy target risk levels for excavation workers and not residents since residents would be unlikely to be exposed to subsurface soils. In addition, the concentrations of contaminants currently present in subsurface soil would not be representative of the concentrations that might be present if landscaping activities were to occur which would involve mixing of subsurface soils with surface soil, clean topsoil, and other soil amendments. Therefore, it would not be appropriate to evaluate risks to residents using available subsurface soil data.

Comment 26, Page 5, AREE 7 description, 1st paragraph, last sentence

Comment: AREE 7 will need to be closed under RCRA by VDEQ before FOST/transfer.

Response: The U.S. Army understands the requirement for clean closure of AREE 7 by VDEQ before a final No Action decision can be made. A closure report has been submitted to VDEQ, and approval is pending.

Comment 27, Page 5, AREE 10 description, 1st paragraph, 4th sentence

Comment: How was the overflow from the lagoon discharged? Via earthen trench? Pipe?

Response: The lagoon and WSRT were connected naturally. The lagoon overflowed directly into WSRT.

Comment 28, Page 6, AREE 10 description, 2nd paragraph

Comment: What about sampling of the surface soil around the lagoon?

Response: The lagoon was dredged and backfilled such that any residual contamination would be present at the base of the former lagoon (i.e., 4 – 4.5 ft bgs) and not at the soil surface.

Comment 29, Page 7, AREE 16-2 description, title

Comment: Why is it the "Possible" Firefighter Training Pit?

Response: See response to Comment 6.

Comment 30, Page 7, AREE 16-2 description, 2nd paragraph, 2nd sentence, "Surface and subsurface soil..."

Comment: AREE 16-1 only discusses surface soils. Was the sampling different for the two AREEs?

Response: Soil samples at AREE 16-1 could not be collected at depths below 2 ft bgs because bedrock was encountered.

Comment 31, Page 7, AREE 16-2 description, 2nd paragraph, "maximum background concentration (4.89 ppm to 5.4 ppm)"

Comment: The AREE 16-1 text doesn't give this range.

Response: A range of maximum background arsenic concentrations is given for AREE 16-2 and not AREE 16-1 because both surface soil and subsurface soil samples were collected at AREE 16-2, while only surface soil samples were collected at AREE 16-1 (see response to Comment 30).

Comment 32, Page 7, AREE 16-2 description, 2nd paragraph, last sentence

Comment: Explain how analytical results indicate that soils have not been adversely impacted? Is it because only arsenic was found and not dioxins/furans? Then where does the arsenic come from?

Response: Soils have not been impacted because arsenic was the only contaminant that exceeded screening levels at AREE 16-2, and the arsenic concentrations at AREE 16-2 were determined to be statistically within background levels.

Comment 33, Page 7, AREE 17 description, 1st paragraph

Comment: How deep is the dump? Is it unlined?

Response: Based on observations made during test pit excavation, the dump extends to depths up to 7 ft in some areas. The dump is unlined.

Comment 34, Page 7, AREE 17 description, 1st paragraph, "... and small amounts of sandblasting waste containing lead paint..."

Comment: Are there any elevated lead levels?

Response: No.

Comment 35, Page 7, AREE 17 description, 3rd paragraph

Comment: Is groundwater contamination a concern?

Response: No.

Comment 36, Page 9, AREE 29-1 description

Comment: Were hazardous materials stored in the "Salvage Yard"?

Response: To the U.S. Army's best knowledge, no.

Comment 37, Page 9, AREE 29-2 description

Comment: What about the sludge piles themselves?

Response: Based on review of aerial photography, there was a possibility that AREE 29-2 may have been used as a sludge disposal area. However, during sampling, there was no sludge present.

Comment 38, Page 9, AREE 29-3 description

Comment: Were hazardous materials stored at the "Possible Disposal Area"?

Response: To the U.S. Army's best knowledge, no.

Comment 39, Page 9, AREE 30 description, 1st paragraph

Comment: "a petroleum odor was detected" instead of "a petroleum odor was observed".

Response: The U.S. Army agrees with this suggested wording change.

Comment 40, Page 9, AREE 30 description, 2nd paragraph, last sentence

Comment: "No contamination above screening levels..." What were the screening levels?

Response: USEPA Region III risk-based concentrations (RBCs), the USEPA screening level for lead in residential soil, Virginia's TPH soil action level, and maximum background concentrations.

Comment 41, Page 9, AREE 33 description, 2nd paragraph

Comment: Industrial soil RBCs were used as the screening levels. Why not residential (subsurface) RBCs?

Response: Industrial soil RBCs were used to screen soil results at AREE 33 because the soil sample was collected from greater than 2 ft bgs (i.e., excavation workers are the most likely human receptor). Also, see response to Comment 25.

Comment 42, Page 9, Site-wide Groundwater description, 1st sentence

Comment: "...composition of the aquifer..." Is there only one aquifer?

Response: The groundwater "aquifer" of concern at VHFS consists of groundwater in the overburden and in fractured bedrock which are interconnected (i.e., there is no defined confining unit). Therefore, it is evaluated as a single aquifer.

Comment 43, Page 11, Other Site Drainage, 3rd paragraph, 2nd sentence

Comment: "Metals, PAHs, and pesticides were detected at concentrations above screening levels." What are the screening levels?

Response: The more stringent of the Effects Range – Lows and the No Effects Levels or Lowest Effects Levels for sediment which are protective of benthic organisms, and maximum background concentrations.

Comment 44, Page 12, 1st paragraph, 1st full sentence

Comment: "In addition, the HHRA evaluated potential risks to hypothetical future adult residents who could be exposed contaminants in groundwater and surface soil and to hypothetical future child residents who could be exposed to contaminants in groundwater, surface soil, surface water, and sediment." What about subsurface soil?

Response: For subsurface soil, the HHRA evaluated risks to excavation workers, the human receptor most likely to be exposed to subsurface soil. Also, see response to Comment 25.

Comment 45, Page 12, AREE 3 description, 1st sentence

Comment: Current and future land-use conditions ... What are these? Maybe say "current industrial/commercial use or potential future residential use conditions", or unrestricted future land use conditions.

Response: See response to Comment 10.

Comment 46, Page 12, AREE 3 description

Comment: With regard to the excavation workers, there is no mention of subsurface soil exceedance of industrial RBCs. What about residential RBCs?

Response: Although industrial soil RBCs were exceeded by contaminants in subsurface soil as indicated on page 4, the concentrations of contaminants yielded risks lower than those for residents exposed to surface soil; therefore, only the risks for residents are presented. Also, see response to Comment 25.

Comment 47, Page 13, AREE 5 description

Comment: Is there any reason to collect surface soil samples?

Response: Only subsurface soil samples were collected because the industrial sewerline is buried at least 5 ft bgs.

Comment 48, Page 13, AREE 5 description

Comment: Risks to excavation workers are presented. What about residential exposure risks?

Response: See response to Comment 25.

Comment 49, Page 13, AREE 7 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 50, Page 13, AREE 10 description

Comment: Why were surface soil samples not collected?

Response: See response to Comment 28.

Comment 51, Page 13, AREE 10 description, 1st sentence

Comment: "... so the HHRA only evaluated risks to future excavation workers."...Then can we say that property is okay for unrestricted future use?

Response: See response to Comment 25.

Comment 52, Page 13, AREE 10 description

Comment: "No ERA was conducted at AREE 10 because all samples were collected at depths of greater than 6 inches." Depths from 0 inches to 2 feet are defined as "surface soil". Internal inconsistency created.

Response: The USEPA protocols for HHRAs and ERAs differ with respect to the definition of "surface soils" to which receptors are exposed. ERAs only use data for surface soil samples collected from the 0-6 inch depth interval, while HHRAs use data for surface soil samples collected from the 0-2 ft depth interval. The U.S. Army followed USEPA's protocols.

Comment 53, Page 13, AREE 16-2 description, Title

Comment: Why is it the "Possible" Firefighter Training Pit?

Response: See response to Comment 6.

Comment 54, Page 13, AREE 16-2 description

Comment: Current or potential future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 55, Page 13, AREE 16-2 description

Comment: What about residential risks to subsurface soil?

Response: See response to Comment 25.

Comment 56, Page 13, AREE 17 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 57, Page 13, AREE 17 description

Comment: What about residential risks to subsurface soil?

Response: See response to Comment 25.

Comment 58, Page 14, AREE 18 description

Comment: Current and potential future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 59, Page 14, AREE 18 description

Comment: Did the HHRA consider residential exposure to subsurface soil?

Response: See response to Comment 25.

Comment 60, Page 14, AREE 20 description

Comment: Current and future land uses ...: What are these?

Response: See response to Comment 10.

Comment 61, Page 14, AREE 24 description, 1st sentence

Comment: Current and future land-use conditions ... What are these?

"... risk to workers, trespassers, and ..." should be "... risks to workers, trespassers, and ..."

Response: See response to Comment 10.

The U.S. Army agrees with this suggested wording change.

Comment 62, Page 14, AREE 24 description, 2nd sentence

Comment: "...for child residents exposed to contaminants in surface soil ..." What are these contaminants? PCBs? Metals?

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. Aluminum is the only contaminant that meet these criteria. PCBs were not detected in surface soil at AREE 24.

Comment 63, Page 14, AREE 25 description

Comment: Are toxicologists satisfied that this area is okay for residential use?

Response: Based on discussions with USEPA, it is the U.S. Army's understanding that this area is okay for residential use based on the BRA findings.

Comment 64, Page 14, AREE 26 description

Comment: Current and future land uses ... What are these?

Response: See response to Comment 10.

Comment 65, Page 15, AREE 29-2 description

Comment: Current and potential future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 66, Page 15, AREE 29-2 description, 2nd sentence

Comment: "...for child residents exposed to contaminants in surface soil ..." What are these contaminants?

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. Aluminum is the only contaminant that meet these criteria.

Comment 67, Page 15, AREE 29-2 description

Comment: What about the materials which were piled there?

Response: See response to Comment 37.

Comment 68, Page 15, AREE 29-3 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 69, Page 15, AREE 29-3 description, 2nd sentence

Comment: "... for child residents exposed to contaminants in surface soil ..." What are these contaminants? Page 9 doesn't mention surface soil, just subsurface soil.

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. For AREE 29-3 surface soil, no contaminants meet these criteria. The risks presented for child residents exposed to contaminants in surface soil by dermal absorption is actually the risk associated with exposure to background metals (i.e., aluminum, arsenic, beryllium, iron, and manganese) which were only discounted if risks were found to exceed USEPA's target risk criteria.

Page 9 does not mention contamination in surface soil because none of the detected compounds exceeded screening levels (i.e., residential soil RBCs and maximum background concentrations).

Comment 70, Page 15, AREE 29-3 description

Comment: "An ERA was not conducted because all soil samples were collected at depths greater than 6 inches." Are depths greater than 6 inches defined as surface or subsurface soil?

Response: See response to Comment 52.

Comment 71, Page 15, AREE 30 description

Comment: "... human health risks were only evaluated for future excavation workers." Why?

Response: See response to Comment 25.

Comment 72, Page 15, AREE 30 description

Comment: "All analytes were detected below their screening levels ..." What are the screening levels?

Response: USEPA Region III industrial soil RBCs, the USEPA screening level for lead in residential soil, and maximum background concentrations.

Comment 73, Page 15, AREE 30 description

Comment: Can't determine that AREE 30 is safe for unrestricted future use based only on human health risks for future excavation workers.

Response: See response to Comment 25. Based on this response and the findings of the BRA, it is the U.S. Army's understanding that unrestricted use of AREE 30 is okay.

Comment 74, Page 15, AREE 33 description

Comment: Why were only subsurface soil samples collected at AREE 33?

Response: The purpose of the RI at AREE 33 was to determine if the household debris present had impacted the native soils which were encountered at greater than 2 ft bgs.

Comment 75, Page 15, AREE 3 description

Comment: Why is there no information regarding residential reuse risks?

Response: See response to Comment 25.

Comment 76, Page 15, Site-wide Groundwater description, 3rd sentence

Comment: "naturally- occurring" should be "naturally-occurring"

Response: The U.S. Army agrees with this suggested wording change.

Comment 77, Page 15, Site-wide Groundwater description

Comment: Excluding bis(2-ethylhexyl)phthalate, what are the risk and HI? What is the contaminant with the next highest risk?

Response: Excluding bis(2-ethylhexyl)phthalate along with naturally-occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk ($9x10^{-6}$) is for adult residents exposed to contaminants in site-wide groundwater by ingestion, and the highest noncarcinogenic risk (HI=0.5) is for child residents exposed to contaminants in site-wide groundwater by ingestion. The site-related contaminants with the greatest impact on cancer risks and noncarcinogenic hazards are beryllium and barium, respectively.

Comment 78, Page 15, South Run at AREEs 1 and 2 description

Comment: Current or future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 79, Page 16, South Run at AREEs 1 and 2 description, 1st paragraph

Comment: "Although the HI associated with incidental ingestion exposures to sediment in South Run at AREEs 1 and 2 by child residents exceeded 1, the exceedance was driven by metals believed to be naturally occurring." ... Why weren't the metals discounted before running the calculations?

Response: Statistical background comparisons could not be conducted for sediment sample results because of the limited number of available background samples. Therefore, all metal results were included in the calculations.

Comment 80, Page 16, South Run at AREEs 1 and 2 description, 2nd paragraph

Comment: Based on the potential for adverse effects to benthic organisms in the tributaries to South Run at AREEs 1 and 2 identified in the ERA, shouldn't an action alternative be evaluated?

Response: The ERA estimated the potential for adverse effects to benthic organisms based on the assumption that a viable habitat for benthic organisms existed. However, the habitat for benthic organisms in the tributaries to South Run at AREEs 1 and 2 is limited and, therefore, the adverse effects are over-estimated by the ERA and are actually limited. No action is warranted based on the existing conditions.

Comment 81, Page 16, Other Site Drainages description

Comment: Current or potential future land-use conditions ... What are these?

Response: See response to Comment 10.

AREE 20

Comment 82. Page 1, Introduction, 1st sentence

Comment: Delete "contaminated materials at".

Response: The U.S. Army agrees with this suggested wording change.

Comment 83. Page 1, Introduction, 2nd sentence

Comment: "major characteristic" should be replaced with "major component".

Response: The U.S. Army agrees with this suggested wording change.

Comment 84. Page 5, AREE 20 description, 2nd paragraph, 2nd sentence

Comment: Should read "... the structure , and the Army shut down the incinerator permanently ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 85. Page 5, AREE 20 description, 2nd paragraph, 3rd sentence

Comment: Replace "... (i.e., boxes ..." with "... (e.g., boxes ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 86. Page 5, AREE 20 description, 4th paragraph, 3rd sentence, "should be sufficiently low."

Comment: What if it isn't?

Response: The text in the Decision Document will be revised to say "is sufficiently low" instead of "should be sufficiently low".

Comment 87. Page 5, AREE 20 description, 4th paragraph, 4th sentence

Comment: Delete "further" in "no further action".

Response: The U.S. Army agrees with this suggested wording change.

Comment 88. Page 5, AREE 20 description, 5th paragraph, 1st sentence, "the length of the incinerator"

Comment: How big is the incinerator?

Response: Approximately 45 ft long.

Comment 89. Page 5, AREE 20 description, 5th paragraph, end of second sentence, "... will require stabilization prior to disposal ..."

Comment: Under which regulatory program?

Response: Stabilization to eliminate free liquids from waste materials is required by Department of Transportation (DOT) regulations and disposal facility permits.

Comment 90. Page 5, AREE 20 description, 5th paragraph, last sentence, "... since the ash requires special management ..."

Comment: Under which regulatory program?

Response: Solid waste landfills in Virginia are not permitted to accept elevated dioxin/furan concentrations. Although the waste will still be managed under the Solid Waste Management Regulations, it will require special management because it will have to be disposed in a landfill that is permitted to accept elevated dioxin/furan concentrations.

Comment 91: Page 5, AREE 20 description, 5th paragraph, last sentence

Comment: Replace "e.g." with "i.e."

Response: The U.S. Army agrees with this suggested wording change.

Comment 92: Page 7, Remedial Action Objective

Comment: There doesn't appear to be a risk driver; no CERCLA trigger for an action. Write this as a No Action Proposed Plan for this AREE.

Response: Per USEPA's comment, a No Action Decision Document will be written for AREE 20. The U.S. Army will remove and dispose of the ash and oil as a BRAC action rather than a CERCLA-driven action.

Comment 93: Page 7, Summary of Remedial Alternatives, Alternative 2 - Ash and Oil Removal

Comment: This doesn't appear to be warranted under CERCLA. As a CERCLA ROD, no action would seem to be appropriate. The ash and oil removal seems like a separate BRAC issue.

Response: See response to Comment 92.

AREE 1

Comment 94: Page 1, Introduction, 1st sentence

Comment: Delete "contaminated soil".

Response: The U.S. Army agrees with this suggested wording change.

Comment 95: Page 1, Introduction, 2nd sentence

Comment: Replace "characteristics" with "components".

Response: The U.S. Army agrees with this suggested wording change.

Comment 96: Page 2, Site Background, 3rd paragraph, last sentence

Comment: Delete "... and is currently undergoing regulatory review."

Response: The U.S. Army agrees with this suggested wording change.

Comment 97: Page 5, partial sentence at top of page, "contaminants in these media were not found to pose unacceptable risk."

Comment: Under all scenarios?

Response: Yes, under all scenarios evaluated.

Comment 98: Page 5, Human Health and Ecological Risk Assessment, 1st paragraph, 1st sentence

Comment: Spell out RI.

Response: This is not necessary since RI was spelled out on page 2.

Comment 99, Page 7, AREE 1 description, last two sentences

Comment: What are the risk numbers for workers, trespassers, and excavation workers?

Response: The risk numbers for workers, trespassers, and excavation workers are too numerous to present individually in the Proposed Plan. However, discounting naturally-occurring metals that were statistically determined to be within background levels, the cancer risks and noncarcinogenic hazards for workers, trespassers, and excavation workers by incidental ingestion, dermal absorption, and inhalation are below USEPA's target risks of $1x10^{-4}$ and HI=1, respectively.

Comment 100, Page 8, 2nd full paragraph

Comment: "2,3,7,8-TCDF" ... spell out TCDF.

Response: Tetrachlorodibenzofuran.

Comment 101, Page 9, 1st paragraph, 2nd sentence

Comment: Delete "draft".

Response: The U.S. Army agrees with this suggested wording change.

Comment 102, Page 9, Alternative 3 – Clay Cap, 1st sentence

Comment: Insert "of" after construction.

Response: The U.S. Army agrees with this suggested wording change.

Comment 103, Page 9, Alternative 3 – Clay Cap, 1st sentence, "land use restrictions"

Comment: Have the type/costs and O&M been considered for land use restrictions?

Response: The type of land use restrictions considered are deed restrictions. These deed restrictions would be imposed after the cap is constructed and would limit uses of the property to activities that would not impact the integrity of the cap. For example, activities requiring excavation of the property would be prohibited. Further definition of the land use restrictions will be made once a final remedial alternative is selected, and will be included in the Decision Document for AREE 1.

The capital costs for implementing land use restrictions have been included as a line item in the FS cost estimate. The O&M cost contingency included in the FS cost estimate would cover any long-term O&M requirements for the land use restrictions.

Comment 104, Page 9, Alternative 3 – Clay Cap, 2nd paragraph concerning land use restrictions

Comment: Have these been thought out? Will the county accept zoning ordinances and permitting restrictions? What about monitoring of institutional controls? What are the permitting restrictions? What will happen during the window of the landfill cap installation and the time of transfer?

Response: Further definition of the land use restrictions will be made once a final remedial alternative is selected, and will be included in the Decision Document for AREE 1. The Decision Document text will address the issues raised by USEPA (i.e., county acceptance of zoning ordinances, permitting restrictions, and monitoring of institutional controls), as appropriate.

The landfill will not be transferred until cap construction is complete. Since the U.S. Army will maintain control over the use of the landfill property until such time as the property is transferred, land use restrictions will not be required during this time period. Since the risks associated with current industrial/commercial use were found to be acceptable,

access restrictions will not be required prior to cap construction. Access restrictions (e.g., safety fencing), however, will be maintained during cap construction to protect the public from construction hazards.

Comment 105, Page 10, Alternative 4 – Liner Cap, 2nd paragraph concerning land use restrictions

Comment: Have these been thought out? Will the county accept zoning ordinances and permitting restrictions? What about monitoring of institutional controls? What are the permitting restrictions? What will happen during the window of the landfill cap installation and the time of transfer?

Response: See response to Comment 104.

Comment 106, Page 11, Overall Protection of Human Health and the Environment

Comment: Replace "because it removes" with "because it would remove".

Response: The U.S. Army agrees with this suggested wording change.

Comment 107, Page 11, Compliance with ARARs

Comment: Replace "will be implemented" with "would be implemented".

Response: The U.S. Army agrees with this suggested wording change.

Comment 108, Page 11, Compliance with ARARs

Comment: DOT and OSHA regulations are not ARARs.

Response: The U.S. Army acknowledges this comment.

Comment 109, Page 11, Compliance with ARARs, "ARARs such as solid and hazardous, if applicable, waste regulations"

Comment: Hasn't this been evaluated/determined? What about landfill design standards in the waste regulations?

Response: Based on available data, the landfill contains non-hazardous waste and, therefore, would be governed by the Solid Waste Management Regulations. The landfill capping alternatives considered were identified based on this conclusion. However, if Alternative 2 were to be selected, waste characterization samples would be required by the disposal facility. Although not anticipated, if any portion of the excavated waste was found to be hazardous, Hazardous Waste Management Regulations would apply to the affected waste.

Comment 110, Page 12, 1st partial sentence

Comment: Change "form" to "from".

Response: The U.S. Army agrees with this suggested wording change.

Comment 111, Page 12, 1st partial sentence, "and appropriate land use restrictions"

Comment: No basis given for this since no details regarding the institutional controls have been provided. What are the reuse plans in and around this area?

Response: See response to Comment 104. The reuse plans in and around this area have not yet been finalized.

Comment 112, Page 12, Implementability

Comment: No basis to evaluate implementability of institutional controls.

Response: See response to Comment 104.

Comment 113, Page 12, Cost

Comment: What about the cost of institutional control implementation and future monitoring?

Response: See response to Comment 103.

Comment 114, Page 12-3, Preferred Alternative

Comment: What about institutional controls?

Response: The preferred alternative will include land use restrictions (a.k.a., institutional controls).

Response to Comments on the Proposed Plans for Vint Hill Farms Station from VDEQ

AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33, and Site-wide Groundwater, South Run at AREEs 1 & 2, and Other Site Drainages

Comment 115, AREE 7

Comment: Since AREE 7 is to be closed under RCRA, clean closure must be approved by the Department's Office of Waste Permitting before a no further action alternative can be selected for this AREE.

Response: See response to Comment 26.

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