FINAL

IMA

CORRECTIVE ACTION PLAN

PART B
ADDENDUM #1

3d Inf Div (Mech)

Bulk Fuel Facility (HAA-09)
Building 7009
Hunter Army Airfield, Georgia
Facility ID #9-025113*2

Prepared for

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract No. W91278-10-D-0089
Delivery Order No. CVO1

April 2011

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From Science to Solutions

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FINAL

CORRECTIVE ACTION PLAN
PART B
ADDENDUM #1
FOR THE
BULK FUEL FACILITY (HAA-09)
BUILDING 7009
HUNTER ARMY AIRFIELD, GEORGIA
FACILITY ID #9-025113*2

Prepared for

U. S. Army Corps of Engineers, Savannah District
and
Fort Stewart Directorate of Public Works
under Contract Number W91278-10-D-0089
Delivery Order Number CV01

Prepared by

Science Applications International Corporation
151 Lafayette Drive
Oak Ridge, TN 37830

April 2011

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

CONTENTS

ACRONYMS

ACL	alternate concentration limit
AST	aboveground storage tank
ATL	alternate threshold level
BFF	Bulk Fuel Facility
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
COPC	chemical of potential concern
DRO	diesel-range organics
EFR®	Enhanced Fluid Recovery®
EPA	U. S. Environmental Protection Agency
GA EPD	Georgia Environmental Protection Division
GRO	gasoline-range organics
GUST	Georgia Underground Storage Tank
IWQS	In-Stream Water Quality Standard
JP	jet propellant
MDC	maximum detected concentration
NFA	no further action
PAH	polycyclic aromatic hydrocarbon
SAIC	Science Applications International Corporation
STL	soil threshold level
TPH	total petroleum hydrocarbon
UST	underground storage tank
USTMP	Underground Storage Tank Management Program
VOC	volatile organic compound

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CORRECTIVE ACTION PLAN
PART B

Facility Name: Bulk Fuel Facility (HAA-09) Street Address: Perimeter Road

Facility ID: 9-025113*2 City: Hunter Army Airfield County: Chatham Zip Code: 31409

Submitted by UST Owner/Operator:		Prepared by Consultant/Contractor:	
Name:	Thomas C. Fry/Environmental Branch	Name:	Patricia A. Stoll
Company:	U.S. Army, HQ 3d (Mech)	Company:	SAIC
Address:	DPW ENRD ENV. Br. (Rutland)	Address:	P.O. Box 2501
	1550 Frank Cochran Drive		
City:	Fort Stewart State: GA	City:	Oak Ridge State: TN
Zip Code:	31314-4927	Zip Code:	37831
Telephone:	(912) 767-2010	Telephone:	(865) 481-8792

I. PLAN CERTIFICATION

A. UST Owner/Operator

I hereby certify that the information contained in this plan and in all the attachments is true, accurate, and complete, and the plan satisfies all criteria and requirements of Rule 391-3-15-.09 of the Georgia Rules for Underground Storage Tank Management.

Name: Thomas C. Fry

Signature: _____ Date: _____

B. Professional Engineer or Professional Geologist

Name: Patricia Stoll

Signature: Patricia Stoll

Date: 4/11/11

GEORGIA REGISTERED 22851 PROFESSIONAL ENGINEER P. A. STOLL

Georgia Stamp Of Use

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Check all boxes below that apply. Attach supporting documentation, i.e., narrative, figures, tables, maps, boring/well logs, etc., for all items checked. Supporting documentation should be three-hole punched and prepared in conformity with the guidance document "Underground Storage Tank (UST) Release: Corrective Action Plan – Part B (CAP-B) Content," GUST-7B.

II. SITE INVESTIGATION REPORT

A. Local and Site Hydrology

☐ Documentation of Local Groundwater Conditions

☐ Stratigraphic Boring Logs

☐ Stratigraphic Cross Sections

☐ Referenced or Documented Calculations of Relevant Aquifer Parameters

☐ Direction of Groundwater Flow

☐ Table of Monitoring Well Data

☐ Potentiometric Map

☐ Flow Net Superimposed on a Base Map

☒ Not Applicable: The extent of contamination and the local and site hydrogeologic requirements have been fulfilled under the Corrective Action Plan (CAP)–Part B and subsequent Progress Reports; therefore, additional site investigation reporting is not necessary.

B. Extent of Contamination

☐ Soil ☐ Groundwater ☒ Free Product ☐ Surface Water

III. REMEDIAL ACTION PLAN

A. Corrective Action Completed or In-Progress

☒ Recovery/Removal of Free Product (Non-aqueous Phase Hydrocarbons)

☐ Remediation/Treatment of Contaminated Backfill Material & Native Soils

☐ Other (specify)

B. Objective of Corrective Action

☒ Remove Free Product that Exceeds One-Eighth Inch

☐ Remediate Groundwater Contamination That Exceeds:

☐ Maximum Contaminant Levels (MCLs)

☐ In-stream Water Quality Standards

☐ Remediate Soil Contamination That Exceeds:

☐ Threshold Values Listed In Table A
OR
☐ Threshold Values Listed In Table B
OR
☐ Alternate Threshold Levels (ATLs)

☐ Provide Risk-Based Corrective Action

☐ Remediate Soil and/or Groundwater Contamination That Exceeds Alternate Concentration Limits (ACLs) and Monitor Residual Contaminants
OR
☐ Monitor Soil and/or Groundwater Contamination That Exceeds Levels In Rule -.09(3) But Is Less Than ACLs

C. Design Operation of Corrective Action Systems

☐ Soil ☐ Groundwater ☒ Free Product ☐ Surface Water

D. Implementation (MUST INCLUDE THE FOLLOWING)

NOTE: If No Further Action is proposed and none of the following apply, a brief explanation must be provided with the signed Certificate of Completion.

- Milestone schedule for proposed site activities
- Inspection and preventive maintenance schedule for all specialized remediation equipment
- Monitoring/sampling and reporting plan for measuring interim progress and project completion
- Plan to decommission equipment/wells and close site

IV. PUBLIC NOTICE

☒ Not Applicable: The corrective action objectives submitted and approved under the CAP-Part B have not changed.

☐ Certified Letters to Adjacent, and Potentially Affected Property Owners and Local Officials

☐ Legal Notice in Newspaper, as approved by EPD

☐ Other EPD-approved Method (specify) _____

V. CLAIM FOR REIMBURSEMENT (For GUST Trust Fund sites only)

☒ Not Applicable

☐ GUST Trust Fund Application (GUST-36), must be attached if applicable

☐ Cost Proposal

- ☐ Non-Reimbursable Costs
  OR
- ☐ Reimbursable Costs
  - ☐ Total Project Costs
    - ☐ Costs incurred to date, per GUST-92
    - ☐ Estimated costs to complete corrective action, per GUST-92
  - ☐ Invoices and Proofs-of-Payment for Costs Incurred to Date

☐ Proposed Schedule for Reimbursement

- ☐ Lump Sum Payment upon Completion of Corrective Action
  OR
- ☐ Interim Payments with Final Payment upon Completion

☐ Cost Proposal

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II. SITE INVESTIGATION

The Bulk Fuel Facility (BFF) is approximately 600 x 1,200 ft and covers an area of approximately 16.5 acres (Figure 1). Currently, the facility contains two active aboveground storage tanks (ASTs) (AST 7007 and AST 7009) for the storage of jet propellant (JP)-8 with capacities of approximately 500,000 gal each, above- and underground piping, and off-loader and pump stations for the distribution of fuel to and from the tanks. In 2011, an AST was constructed at the location of former AST 7005. The capacity of this AST is 30,000 barrels or 1,260,000 gal. Previously, Underground Storage Tank (UST) 117, a 550-gal JP-4 fuel tank, and three 500,000-gal ASTs (AST 7001, AST 7003, and AST 7005) were located at the BFF. Since the closure of UST 117 in 1996, three separate releases have been identified at the BFF under the Georgia Environmental Protection Division (GA EPD) Underground Storage Tank Management Program (USTMP) regulations.

Science Applications International Corporation (SAIC) performed a soil gas survey of the BFF in January 1999 to identify areas of significant contaminant concentrations (SAIC 1999). SAIC conducted a Corrective Action Plan (CAP)-Part A investigation in December 1999 and January 2000 and a CAP-Part B investigation from November 2000 to March 2001 to determine the extent of petroleum contamination at the BFF, including the areas around UST 117, AST 7001, AST 7003, AST 7005, AST 7007, and AST 7009. Thirty-four monitoring wells, seven soil borings, and six vertical-profile borings were installed during these investigations, and surface water and sediment samples were collected from Lamar Canal. The CAP-Part B Report (SAIC 2001) was submitted to GA EPD USTMP in July 2001.

Release #1: UST 117, Building 7002. UST 117 was a 500-gal UST located near Building 7002 at the BFF. This tank was removed and the piping abandoned in place on September 30, 1996. A CAP-Part A investigation was conducted by SAIC between December 1999 and January 2000 to identify areas of significant contamination concentrations (SAIC 2000). A CAP-Part B investigation was conducted by SAIC from November 2000 to March 2001 to determine the extent of petroleum contamination at the site (SAIC 2001). As part of these investigations, a groundwater plume was identified in the vicinity of AST 7003, which is located 100 to 150 ft south of UST 117. Semiannual monitoring of Release #1 was initiated in July 2002 and discontinued in January 2003. GA EPD USTMP granted no further action (NFA) status for Release #1 in correspondence dated October 6, 2003 (Lewis 2003).

Release #3: AST 7003. In May 2006, the concrete foundation and berm for AST 7003 were removed by CAPE Environmental and free product was discovered at a depth of 3 to 4 ft below ground surface. In August 2006, CAPE Environmental installed four, 2-ft-diameter sumps in the bermed area of former AST 7003. In November 2006, monitoring points were installed on 50-ft centers in the bermed area of the former AST. No water or free product was measured in any of the points; however, soil contamination was identified in the soil headspace readings. Griffin Services was contracted to remove the free product on a routine basis. In November 2009, Arcadis initiated remedial action in the vicinity of former AST 7003. Impacted soil exceeding alternate threshold levels (ATLs) was excavated, and an oxygen-releasing substance was placed in the excavated area to enhance bioremediation of contaminated groundwater. Quarterly groundwater monitoring events through October 2010 demonstrated that dissolved benzene in groundwater near former AST 7003 continues to exceed the alternate concentration limit (ACL) but that attenuation is occurring. Semi-annual monitoring of groundwater in this area has been recommended.

Release #2: AST 7009. In December 1999 and January 2000, the CAP-Part A investigation associated with Release #1 to identify areas of significant contamination concentrations involved collecting samples

from the vicinity of AST 7009. A CAP-Part B investigation, which included the vicinity of AST 7009, was conducted by SAIC from November 2000 to March 2001 to determine the extent of petroleum contamination at the site (SAIC 2001). The nature and extent of contamination was determined during the CAP-Part B investigation. In July 2002, as part of the groundwater monitoring for Release #1, free product was observed in well BF-MW-E5, which is located within the bermed area of AST 7009. This tank is approximately 500 ft northeast of AST 7003 and is hydraulically sidegradient to AST 7003. Semiannual monitoring of Release #2 was initiated in July 2004 and discontinued in January 2005 because detected benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbon (PAH) constituents were below the In-Stream Water Quality Standards (IWQSs). Free product removal activities were implemented in July 2004 consisting of absorbent socks in well BF-MW-E5 and bimonthly or quarterly pumping of the same well. In July 2007, an 8-hr Enhanced Fluid Recovery® (EFR®) event was initiated to vacuum extract the free product from well BF-MW-E5 on a quarterly basis. Free product has not been observed in the other wells located within the berm or those located around the perimeter of the berm for AST 7009. EFR® events were conducted on a quarterly basis through the spring of 2010 with biannual groundwater monitoring of sentinel well BF-MW-38.

Soil Contamination in the Vicinity of AST 7009

Three soil samples were collected from borings in the vicinity of AST 7009 during the CAP-Part A investigation prior to well installation (SB-25, SB-26, and SB-27). Twelve soil samples were collected from an additional six borings during the CAP-Part B investigation prior to installation of wells BF-MW-E1 through BF-MW-E6. Results for these 15 soil samples are shown in Tables 1 and 2. Maximum detected concentrations (MDCs) were 0.002 mg/kg of benzene, 0.0025 mg/kg of toluene, 4.5 mg/kg of ethylbenzene, and 17 mg/kg of xylenes. The Georgia UST (GUST) soil threshold level (STL) (i.e., Table A, Column 1) for ethylbenzene of 0.37 mg/kg was exceeded in one sample collected during installation of BF-MW-E3. No other BTEX constituents exceeded the applicable GUST STLs (i.e., Table A, Column 1). Thirteen PAHs were detected, all at levels below the applicable GUST STLs (i.e., Table A, Column 1).

Groundwater Contamination in the Vicinity of AST 7009

Groundwater samples were collected from monitoring wells BF-MW-25, BF-MW-26, and BF-MW-27 during the CAP-Part A investigation. Additional groundwater samples were collected from these same three wells and wells BF-MW-E1 through BF-MW-E6 during the CAP-Part B investigation. Results for all 12 groundwater samples are shown in Tables 3 and 4. MDCs were 3.6 µg/L of benzene, 1.0 µg/L of toluene, 17.2 µg/L of ethylbenzene, and 19 µg/L of xylenes. All four MDCs were detected in well BF-MW-E5. Three PAHs were detected. All detected concentrations of BTEX constituents and PAHs fell below applicable GA EPD IWQSs.

As recommended in the *First Annual Monitoring Only Report for Former Underground Storage Tank 117, Building 7002, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia* (SAIC 2003), three additional wells (MW-35, MW-36, and MW-37) were installed around the perimeter of the bermed area in the vicinity of AST 7009 to confirm that free product in BF-MW-E5 was not from an upgradient source or migrating downgradient of the AST containment area. The results of semiannual well gauging from 2002 to 2009 with an oil/water interface probe have indicated that the free product is limited to well BF-MW-E5 and does not extend beyond the bermed area.

Following the CAP-B Report, semiannual monitoring was commenced at the BFF. A monitoring only plan for the groundwater plume in the vicinity of AST 7009 began with the third semiannual event at the BFF in accordance with the technical approach provided in the First Annual Monitoring Only Report (SAIC 2003). In July 2004 and January 2005, BTEX and PAH concentrations from wells within the

vicinity of AST 7009 remained well below applicable regulatory criteria (Tables 3 and 4). GA EPD concurred with the recommendation of suspending the semiannual groundwater sampling until free product removal in BF-MW-E5 is complete (Logan 2006).

Sentinel well BF-MW-38 was installed and sampled for BTEX in December 2007. The results are shown in Table 3 No BTEX constituents were detected.

Following submittal of the *Third Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia* (SAIC 2007), GA EPD USTMP recommended that the site be transferred to the GA EPD Solid Waste Program in correspondence dated February 28, 2008 (Logan 2008).

In October 2009, wells BF-MW-E5 and BF-MW-38 were sampled for BTEX and PAHs. All BTEX and PAH concentrations remained well below applicable regulatory criteria (see Tables 3 and 4).

This CAP-Part B Addendum presents information relating to a pilot-scale product recovery system for corrective action of Release #2 at the BFF (HAA-09) in the vicinity of AST 7009. Nature and extent of groundwater and soil contamination was fully delineated in the CAP-Part B investigation and subsequent monitoring reports. Free product was not identified in the area of AST 7009 during the CAP-Part B investigation but has been consistently encountered in BF-MW-E5 since 2002.

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III. REMEDIAL ACTION

III.A CORRECTIVE ACTION COMPLETED OR IN PROGRESS

III.A.1 Recovery/Removal of Free Product

Since the discovery of free product in BF-MW-E5 in July 2002, product removal has been conducted via pumping, use of passive socks, and EFR® events. Historical free product removal activities at BF-EW-05 are summarized in Table 5.

III.A.2 Remediation/Treatment of Contaminated Backfill Material and Native Soil

AST 7009 is a currently active 500,000-gal AST. Subsurface soil samples were collected during the installation of wells BF-MW-E1 through BF-MW-E6 in 2000. The results of the subsurface soil samples were documented in the CAP-Part B Report (SAIC 2001). BTEX and PAH concentrations for all constituents except ethylbenzene in those samples were below GUST STLs (i.e., Table A, Column 1). Ethylbenzene exceeded the GUST STL (i.e., Table A, Column 1) of 0.370 mg/kg in one sample collected from BF-MW-E3. The detected concentration of 4.5 mg/kg falls below the ATL of 61.85 mg/kg. No further excavation of potentially contaminated backfill or native soil has occurred at AST 7009.

III.B OBJECTIVE OF CORRECTIVE ACTION

III.B.1 Removal of Free Product That Exceeds One-Eighth Inch

Free product is present in well BF-MW-E5 at AST 7009 in excess of 1/8 of an inch. On March 5, 2010, 1.28 ft of free product was observed in well BF-MW-E5, which is the last time the well was gauged. The free product is most likely trapped within the fine-grained sand that comprises the foundation material of the AST. The objective of the corrective action is to utilize surfactant flooding to flush the free product from the pore space of the fine-grained sand beneath the AST.

III.B.2 Remediate Groundwater Contamination

Based upon the results of the CAP-Part B investigation, natural attenuation of groundwater was recommended as the corrective action for the BFF. BTEX and PAH constituents detected in the wells associated with AST 7009 have not exceeded regulatory criteria (see Tables 3 and 4 for results from 1999 through 2009). The maximum benzene concentration was 3.6 µg/L observed in BF-MW-E5 during the CAP-Part B investigation in December 2000. The maximum naphthalene concentration was 32.9 µg/L observed in BF-MW-E5 during the fourth semiannual sampling event in January 2005. Therefore, groundwater remediation is not warranted.

III.B.3 Remediate Soil Contamination

AST 7009 is currently an active 500,000-gal AST. Based upon the results of the CAP-Part B investigation, active remediation/removal of soil was not recommended.

III.B.4 Provide Risk-based Corrective Action

III.B.4.a Potential receptor survey

An exposure assessment was conducted as part of the CAP-Part B Report to identify any potentially complete pathways between the contaminant source and potential receptors. This involved identifying potential current and future receptors, release mechanisms through which contamination might come into contact with the receptors, and routes of exposure through which receptors might be exposed.

The BFF site is located within an active military installation and within an access-controlled fence. Lamar Canal is located approximately 180 ft south-southeast (downgradient) of the BFF site. A series of storm drains and catch basins are located along the southern border of the BFF and are used to drain the bermed areas around each of the ASTs.

A potential receptor survey was included in the CAP-Part B Report and is summarized as follows. Current and potential future on-site receptors include industrial workers and military residents. No connection between site contamination and current off-site receptors was identified. Potential future on-site industrial receptors may come into contact with site soil contamination during construction or excavation activities. No near-term on-site receptors are likely to come into contact with groundwater unless the surficial aquifer discharges into the catch basin or Lamar Canal.

III.B.4.b Screening for chemicals of potential concern

The first step in the risk process uses screening levels that are readily obtainable and that, due to their conservative nature, can be used with a high degree of certainty to indicate sites for which NFA is required. The CAP-Part B Report described the screening method used to determine chemicals of potential concern (COPCs) for the BFF site; namely, comparison of detected concentrations with the following:

- Georgia IWQSs,
- GUST STLs (i.e., Table A, Column 1),
- soil screening levels developed by the U.S. Environmental Protection Agency (EPA), and
- soil and groundwater risk-based concentrations developed by EPA Region 3.

BTEX compounds were identified as COPCs for soil at the BFF in the CAP-Part B Report. However, ethylbenzene was the only constituent to exceed the GUST STL in the vicinity of AST 7009 (Release #2). This exceedance occurred in a single sample.

Benzene and naphthalene were identified as COPCs for groundwater at the site. However, benzene and naphthalene did not exceed their respective IWQS or risk-based screening level, respectively, in the vicinity of AST 7009 (Release #2).

III.B.4.c Site-specific Levels

III.B.4.c.1 Alternate threshold levels

ATLs were calculated for BTEX constituents identified as COPCs in the CAP-Part B Report as follows:

- 0.387 mg/kg for benzene,
- 12.21 mg/kg for toluene,

- 61.85 mg/kg for ethylbenzene, and
- 74.6 mg/kg for xylenes.

III.B.4.c.2 Alternate concentration levels

ACLs were calculated for constituents identified as COPCs in the CAP-Part B Report as follows:

- 634.4 µg/L for benzene, and
- 820.9 µg/L for naphthalene.

III.B.4.c.3 Fate and transport model

Fate and transport modeling was conducted during the CAP-Part B investigation to develop ATLs and ACLs that would be utilized as site-specific remedial levels for the corrective action. Because no groundwater concentrations related to Release #2 have exceeded regulatory criteria (i.e., IWQSs) and no soil samples have been collected since the CAP-B investigation, no additional modeling has been performed.

III.B.4.d Conclusions and Recommendations

The conclusions below are based on a review of the CAP-Part A Report, CAP-Part B Report, and Annual Monitoring Only and Free Product Removal Reports.

- Free product continues to be measured in BF-MW-E5 at a thickness ranging from 0.46 to 1.95 ft during the four vacuum extraction events in 2009. Historically, the level of the free product and water has been periodically observed above the screened interval. Free product has not been observed in any of the wells around the berm perimeter.

- The vertical and horizontal extents of soil contamination in the vicinity of AST 7009 were delineated during the CAP-Part A and CAP-Part B investigations.

- The vertical and horizontal extents of groundwater contamination in the vicinity of AST 7009 are below federal maximum contaminant levels and Georgia IWQSs and were delineated during the CAP-Part A and CAP-Part B investigations. No active remediation of groundwater was recommended.

- The one soil sample that exceeded the STL during the CAP-Part B investigation was determined to fall below the calculated ATL. No remediation of soil was recommended.

- The environmental site ranking score is 65,250 (Appendix III).

The BFF is located within the confines of the Hunter Army Airfield, and the October 2009 benzene concentrations in groundwater are below the IWQS; however, free product in excess of 1/8 of an inch in thickness continues to persist at the site. Therefore, corrective action to address the free product is recommended.

III.C DESIGN AND OPERATION OF CORRECTIVE ACTION SYSTEMS

III.C.1 Theory/Selection of Corrective Action System

Surfactant flushing is a free product removal technology involving the injection and subsequent extraction of chemicals to solubilize and/or mobilize free product. The surfactant is injected into a system of wells positioned to sweep the source zone. The chemical flood and the solubilized or mobilized free product are removed through extraction wells, and the produced liquids are then either disposed (usually off-site treatment) or treated on-site to remove contaminants.

Based upon information gathered during prior facility upgrades and removals, a 4- to 5-ft-thick sand foundation was installed underneath the concrete pad of each AST at the BFF. This sand foundation was installed to stabilize ground movement of the native silty clays. The concrete pad underlying AST 7009 is approximately 50 ft in diameter. Based upon soil borings around removed ASTs at the BFF, the sand pad underlying the concrete is likely a bit larger than 50 ft in diameter. Prior activities have resulted in a release of fuel into this sand foundation. The fuel remains trapped in the sand due to the surrounding silty clay. AST 7009 is an active 500,000-gal AST. A surfactant flood of the fine-grained sand is proposed to flush the free product from the pore space without disruption of facility operations.

A pilot-scale product recovery system will be installed around AST 7009 consisting of a combination surfactant injection/multi-phase extraction system to recover trapped free phase product from under the AST. The system will include a surfactant injection system, a multi-phase extraction system, and a groundwater treatment system. The system will be operated for a period of 6 months. Wells will be gauged for free product on a quarterly basis for 1 year following the pilot study.

III.D IMPLEMENTATION

III.D.1 Milestone Schedule

A schedule for the product recovery system pilot study is provided in Figure 2. Fort Stewart will notify GA EPD of any significant changes to the proposed treatment time and will provide GA EPD an updated Gantt chart, as necessary.

III.D.2 Progress Reporting

A Progress Report will document the installation and startup of the system. A second Progress Report will follow the pilot study documenting the operation of the system for the 6-month period, and a third Progress Report will be prepared following the fourth quarterly monitoring event.

III.D.3 Certificate of Completion Report

Petition for permanent closure will be submitted with the final Progress Report. GA EPD will provide final approval for decommissioning the monitoring wells, which will be requested in the final Progress Report. Decommissioning of monitoring wells will be completed according to the U.S. Army Corps of Engineers design manual for monitoring wells. Decommissioning will comply with all applicable state and federal standards.

The following certification will be submitted to GA EPD within 30 days of submitting the final Progress Report.

I hereby certify that the Corrective Action Plan-Part B, dated July 2001, for Hunter Army Airfield, Bulk Fuel Facility (HAA-09), Facility ID 9-025113*2, including any and all certified amendments thereto, has been implemented in accordance with the schedules, specifications, sampling programs, and conditions contained therein, and that the plan's stated objectives have been met.

Signature (Owner/Operator)

III.D.4 Inspection Schedule and Preventative Maintenance Program

Preventative maintenance for the injection/extraction system will be performed on a weekly basis. Initial startup tests and system calibrations will be conducted upon installation of the system. Site visits will be conducted biweekly throughout system operation.

The system will be operated in accordance with manufacture's specifications. System adjustments/servicing include the following:

- checking system voltages for proper operation, and
- inspecting all piping for evidence of any leaks.

III.D.5 Periodic Monitoring

Air, groundwater, and effluent samples will be collected during the pilot study.

- Groundwater samples from the extraction wells will be collected biweekly and visually monitored for surfactant (which is colored to easily identify) to track the effectiveness of the product recovery and determine when the system can be removed from service.

- Air samples will be collected monthly from the air stripper and analyzed for volatile organic compounds (VOCs) to monitor discharge to the atmosphere.

- Effluent samples will be collected from the treatment system and analyzed for VOCs, total petroleum hydrocarbon (TPH)-gasoline-range organics (GRO), TPH-diesel-range organics (DRO), oil and grease, chemical oxygen demand, total dissolved solids, total suspended solids, total iron, hardness, phenols, and pH initially prior to any discharge to the Hunter wastewater treatment plant. Effluent water samples will then be collected biweekly during operation of the system and analyzed for these same parameters to ensure continued compliance with the acceptance criteria of the treatment plant.

- Effluent samples will be collected biweekly from between each pair of filter media (e.g., between the two liquid-phase carbon filters) and analyzed for TPH-DRO and TPH-GRO to identify when filter breakthrough occurs so the filter material can be replaced.

Groundwater monitoring will continue on a biannual basis with the next event scheduled for Fall 2011. Samples will be analyzed from BF-MW-E5 and BF-MW-38 for BTEX.

Wells will be gauged for free product on a quarterly basis for 1 year following the pilot study.

III.D.6 Effectiveness of Corrective Action

The corrective action will be discontinued once the objectives of the corrective action have been achieved; that is, the removal of free product greater than 1/8 inch of an inch in thickness.

III.D.7 Confirmatory Soil Sampling Plan

No excavation of soil is planned; therefore, confirmatory sampling will not be conducted.

III.D.8 Stockpiled Bulk Soil Sampling

No stockpiled soil will be generated with this corrective action; therefore, no soil sampling will be conducted.

III.D.9 Termination Conditions

The corrective action will be considered complete when free product no longer exceeds 1/8 inch in thickness in the vicinity of AST 7009. Once the corrective action objective is achieved, the corrective action will be terminated regardless of the site ranking score.

III.D.10 Post-completion Site Restoration Activities

After termination has been granted, equipment and debris related to the remediation activities and/or monitoring program will be removed from the site.

III.E PUBLIC NOTIFICATION

Public notice requirements were fulfilled in conjunction with the CAP-Part B Report in 2000. No further public notification is required at this time.

IV. CLAIM FOR REIMBURSEMENT

Fort Stewart is a federally owned facility and has funded the investigation for the BFF, Facility ID #9-025113*2, using U.S. Department of Defense Environmental Restoration Account Funds. Application for Georgia Underground Storage Tank Trust Fund reimbursement is not being pursed at this time.

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V. REFERENCES

Lewis, Lisa L. 2003. Letter to Thomas C. Fry (Fort Stewart Directorate of Public Works Environmental Branch) regarding approval of no further action for Release #1 and proceed with corrective action on Release #2, October 6.

Logan, William 2006. Letter to Algeana Stevenson (Fort Stewart Directorate of Public Works Environmental Branch) regarding approval of technical proposal contained in the Second Annual Monitoring and Free Product Removal Report, May 16.

Logan, William 2008. Letter to Algeana Stevenson (Fort Stewart Directorate of Public Works Environmental Branch) regarding review comments on the Third Annual Monitoring and Free Product Removal Report, February 28.

SAIC (Science Applications International Corporation) 1999. *Soil Gas Survey Report for the Bulk Fuel Facility (HAA-09) at Hunter Army Airfield, Georgia*, November.

SAIC 2000. *Corrective Action Plan-Part A Report for the Former Underground Storage Tank 117, Building 7002 Site, Bulk Fuel Facility at Hunter Army Airfield, Georgia.* Oak Ridge, Tennessee. June.

SAIC 2001. *Corrective Action Plan-Part B Report for the Former Underground Storage Tank 117, Building 7002 Site, Bulk Fuel Facility at Hunter Army Airfield, Georgia.* Oak Ridge, Tennessee. July.

SAIC 2003. *First Annual Monitoring Only Report for Former Underground Storage Tank 117, Building 7002, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia,* July.

SAIC 2007. *Third Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia,* September.

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APPENDIX I

FIGURES

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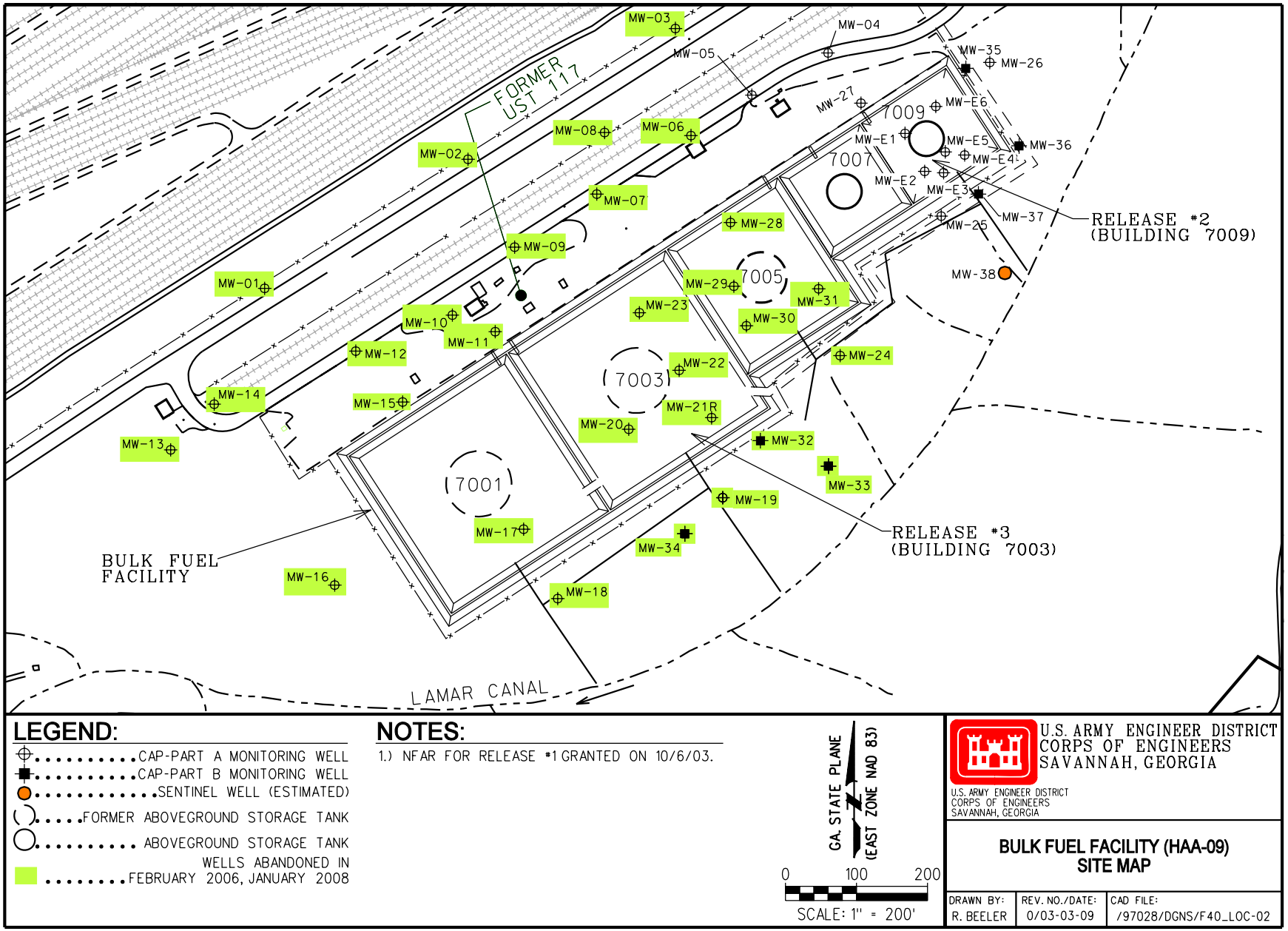

Figure 1. Site Location Map for the Bulk Fuel Facility, Hunter Army Airfield, Georgia

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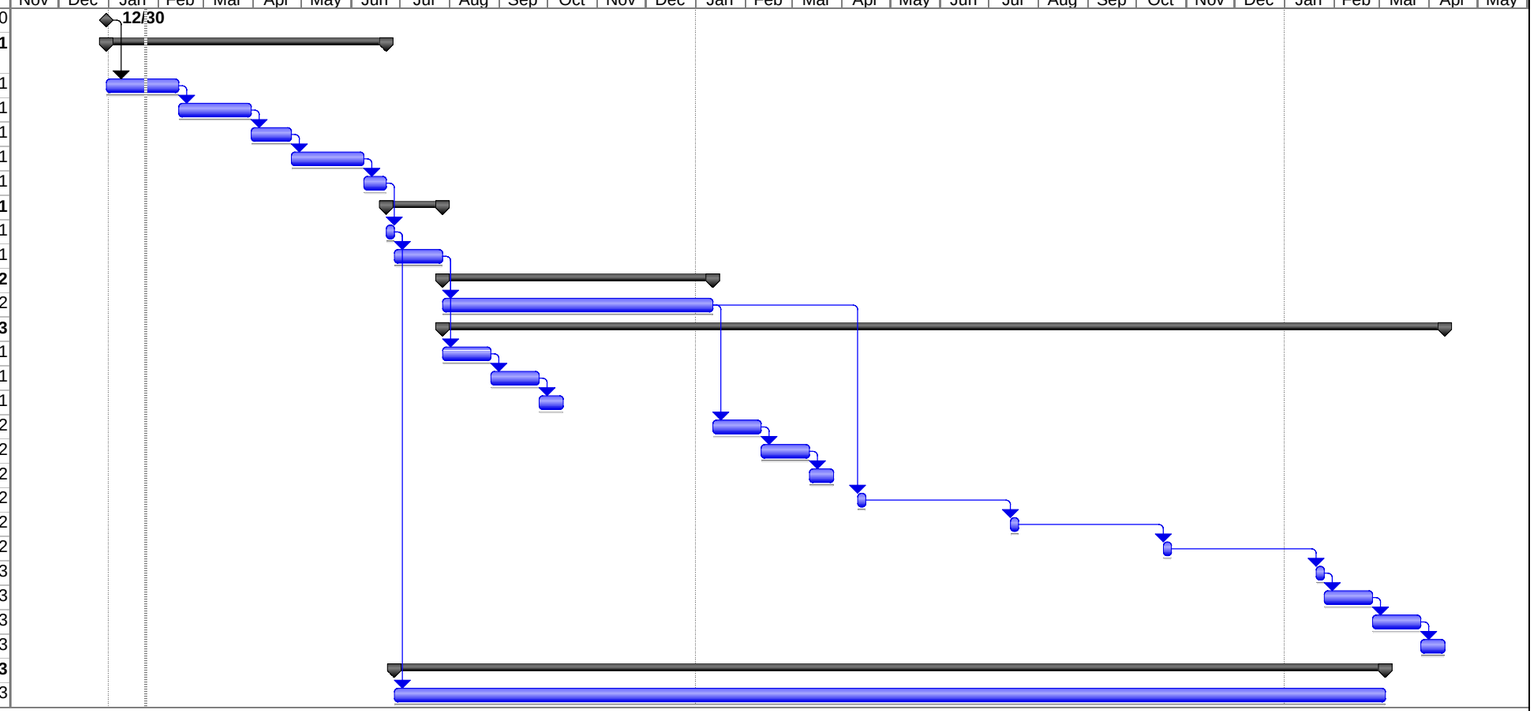
ID	Task Name	Duration	Start	Finish
1	Notice to Proceed	1 day	Thu 12/30/10	Thu 12/30/10
2	**Task 1 - CAP Part B Addendum/WorkPlan/UIC Permit/SSHP/APP**	**124 days**	**Thu 12/30/10**	**Wed 6/22/11**
3	Draft Plans	45 edays	Thu 12/30/10	Sun 2/13/11
4	Review	45 edays	Sun 2/13/11	Wed 3/30/11
5	Final Plans	25 edays	Wed 3/30/11	Sun 4/24/11
6	Final Plan Review	45 edays	Sun 4/24/11	Wed 6/8/11
7	Revised Final Plans	14 edays	Wed 6/8/11	Wed 6/22/11
8	**Task 2 - Install Pilot Scale Product Recovery System**	**25 days**	**Wed 6/22/11**	**Wed 7/27/11**
9	Injection well install	5 edays	Wed 6/22/11	Mon 6/27/11
10	System Delivery and install	30 edays	Mon 6/27/11	Wed 7/27/11
11	**Task 3 - Operantion and Maintenance**	**120 days**	**Thu 7/28/11**	**Wed 1/11/12**
12	Six months of operation	6 mons	Thu 7/28/11	Wed 1/11/12
13	**Task 4 - Reporting/Monitoring**	**445 days**	**Wed 7/27/11**	**Wed 4/10/13**
14	CAP Part B Progress Report draft	30 edays	Wed 7/27/11	Fri 8/26/11
15	Review	30 edays	Fri 8/26/11	Sun 9/25/11
16	Cap Part B Progress Report Final	15 edays	Sun 9/25/11	Mon 10/10/11
17	CAP Part B Semi Annual Progress Report draft	30 edays	Wed 1/11/12	Fri 2/10/12
18	Review	30 edays	Fri 2/10/12	Sun 3/11/12
19	CAP Part B Semi Annual Progress Report final	15 edays	Sun 3/11/12	Mon 3/26/12
20	First Quarterly Monitoring	5 edays	Tue 4/10/12	Sun 4/15/12
21	Second Quarterly Moniroting	5 edays	Sat 7/14/12	Thu 7/19/12
22	Third Quarterly Monitoring	5 edays	Wed 10/17/12	Mon 10/22/12
23	Fourth Quarterly Monitoring	5 edays	Sun 1/20/13	Fri 1/25/13
24	CAP Part B Semi Annual Progress Report draft	30 edays	Fri 1/25/13	Sun 2/24/13
25	Review	30 edays	Sun 2/24/13	Tue 3/26/13
26	CAP Part B Semi Annual Progress Report final	15 edays	Tue 3/26/13	Wed 4/10/13
27	**Task 5 - IDW**	**440 days**	**Tue 6/28/11**	**Mon 3/4/13**
28	IDW disposal thoughout the project	22 mons	Tue 6/28/11	Mon 3/4/13



Project: BFF Product Recovery Pilot S
Date: Mon 1/24/11

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Page 1

Figure 2. Project Schedule

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APPENDIX II

TABLES

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Table 1. Soil Analytical Results for BTEX

Sample Location	Sample ID	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)
CAP-Part A Investigation – December 1999 and January 2000							
SB-25	BF2511	12/02/99	0.0009 J	0.0025 =	0.0012 U	0.0035 U	0.0034
SB-26	BF2611	12/02/99	0.0012 U	0.0012 U	0.0012 U	0.0035 U	ND
SB-27	BF2711	01/11/00	0.0012 U	0.0011 U	0.0012 U	0.0037 U	ND
CAP-Part B Investigation – December 2000							
BF-MW-E1	MW-01-01	01/11/00	0.003 U	0.003 U	0.009 =	0.003 U	ND
BF-MW-E1	MW-01-02	01/11/00	0.003 U	0.003 U	0.003 U	0.003 U	ND
BF-MW-E2	MW-02-01	01/11/00	0.003 U	0.003 U	0.016 =	0.008 =	0.024
BF-MW-E2	MW-02-02	01/11/00	0.003 U	0.003 U	0.003 U	0.003 U	ND
BF-MW-E3	MW-03-01	01/11/00	0.002 J	0.002 U	**4.5 =**	17 =	21.502
BF-MW-E3	MW-03-02	01/11/00	0.002 J	0.003 U	0.18 =	3.5 =	3.682
BF-MW-E4	MW-04-01	01/11/00	0.003 U	0.003 U	0.003 U	0.001 J	0.001
BF-MW-E4	MW-04-02	01/11/00	0.004 U	0.004 U	0.004 U	0.004 U	ND
BF-MW-E5	MW-05-01	01/11/00	0.004 U	0.004 U	0.004 U	0.002 J	0.002
BF-MW-E5	MW-05-02	01/11/00	0.004 U	0.001 U	0.004 U	0.004 U	ND
BF-MW-E6	MW-06-01	01/11/00	0.003 U	0.003 U	0.003 U	0.003 U	ND
BF-MW-E6	MW-06-02	01/11/00	0.003 U	0.003 U	0.003 U	0.003 U	ND
Soil Threshold Levels (Table A, Column 1)			0.005	0.400	0.370	20.0	NRC
Alternate Threshold Limits			0.387	12.210	61.850	74.6	NRC

NOTES:

Bold indicates the detected concentration exceeds the applicable soil threshold level.

BTEX Benzene, toluene, ethylbenzene, and xylenes.

CAP Corrective Action Plan.

ND Not detected.

NRC No regulatory criterion.

Laboratory Qualifiers:

J Indicates the value of the compound is an estimated value.

U Indicates the compound was not detected at the concentration reported.

= Indicates the compound was detected at the concentration reported.

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Table 2. Soil Analytical Results for PAHs

Sample Location	Sample ID	Date Sampled	Acenaphthene (mg/kg)	Anthracene (mg/kg)	Benzo(*a*)anthracene (mg/kg)	Benzo(*a*)pyrene (mg/kg)	Benzo(*b*)fluoranthene (mg/kg)	Benzo(*g,h,i*)perylene (mg/kg)	Benzo(*k*)fluoranthene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(1,2,3-*cd*) pyrene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
CAP-Part A Investigation – December 1999 and January 2000															
SB-25	BF2511	12/02/99	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U	0.0426 U
SB-26	BF2611	12/02/99	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U	0.0436 U
SB-27	BF2711	01/11/00	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U	0.0424 U
CAP-Part B Investigation – December 2000															
BF-MW-E1	MW-01-01	01/11/00	0.076 U	0.086 J	0.74 J	0.0076 U	0.015 U	0.015 U	0.0076 U	0.97 J	0.18 J	0.0076 U	0.076 U	0.49 J	0.55 J
BF-MW-E1	MW-01-02	01/11/00	0.082 U	0.29 J	2 J	0.0082 U	0.04 U	0.016 U	0.052 U	3 J	0.62 J	0.0082 U	0.3 J	0.49 J	0.55 J
BF-MW-E2	MW-02-01	01/11/00	0.079 U	0.0079 U	0.0079 U	0.0079 U	0.015 U	0.017 =	0.0079 U	0.015 U	0.079 U	0.0082 =	0.079 U	0.0079 U	0.0079 U
BF-MW-E2	MW-02-02	01/11/00	0.083 J	0.0083 U	0.0083 U	0.0083 U	0.016 U	0.016 U	0.0083 U	0.016 U	0.0083 U	0.0083 U	0.083 U	0.0083 U	0.0083 U
BF-MW-E3	MW-03-01	01/11/00	0.083 U	0.0083 U	0.0083 U	0.02 J	0.016 U	0.016 U	0.0083 U	0.016 U	0.0083 U	0.03 =	0.083 U	0.0089 =	0.0083 U
BF-MW-E3	MW-03-02	01/11/00	0.083 U	0.0083 U	0.0083 U	0.0083 U	0.016 U	0.016 U	0.0083 U	0.016 U	0.0083 U	0.0083 U	0.083 U	0.0083 U	0.0083 U
BF-MW-E4	MW-04-01	01/11/00	0.084 U	0.0084 U	0.0084 U	0.0084 U	0.025 =	0.016 U	0.026 J	0.016 U	0.0084 U	0.0084 U	0.084 U	0.0084 U	0.0084 U
BF-MW-E4	MW-04-02	01/11/00	0.087 U	0.0087 U	0.0087 U	0.0087 U	0.024 =	0.017 U	0.0087 U	0.017 U	0.0087 U	0.0087 U	0.087 U	0.0087 U	0.0087 U
BF-MW-E5	MW-05-01	01/11/00	0.078 U	0.0078 U	0.0078 U	0.0078 U	0.015 U	0.023 J	0.0078 U	0.04 =	0.0078 U	0.0078 U	0.078 U	0.0078 U	0.092 J
BF-MW-E5	MW-05-02	01/11/00	0.085 U	0.0085 U	0.0085 U	0.0085 U	0.016 U	0.016 U	0.024 =	0.016 U	0.0085 U	0.0085 U	0.085 U	0.0085 U	0.0085 U
BF-MW-E6	MW-06-01	01/11/00	0.08 U	0.008 U	0.008 U	0.008 U	0.015 U	0.015 U	0.008 U	0.015 U	0.008 U	0.008 U	0.08 U	0.008 U	0.008 U
BF-MW-E6	MW-06-02	01/11/00	0.085 U	0.0085 U	0.0085 U	0.0085 U	0.016 U	0.016 U	0.0085 U	0.016 U	0.0085 U	0.0085 U	0.085 U	0.0085 U	0.0085 U
Soil Threshold Levels (Table A, Column 1)			NA	NA	NA	0.66	0.82	NA	1.6	NA	NA	0.660	NA	NA	NA

NOTES:

CAP Corrective Action Plan.
NA Not applicable. The health-based threshold level exceeds the expected soil concentration under free product conditions.
PAH Polycyclic aromatic hydrocarbon.

Laboratory Qualifiers:

J Indicates the value of the compound is an estimated value.
U Indicates the compound was not detected at the concentration reported.
= Indicates the compound was detected at the concentration reported.

Table 3. Groundwater Analytical Results for BTEX

Sample Location	Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)
CAP-Part A Investigation – December 1999 and January 2000							
BF-MW-25	BF2512	12/02/99	1 U	1 U	1 U	3 U	ND
BF-MW-26	BF2612	12/02/99	1 U	1 U	1 U	3 U	ND
BF-MW-27	BF2712	01/11/00	1 UJ	1 UJ	1 UJ	3 UJ	ND
CAP-Part B Investigation – December 2000							
BF-MW-25	BF2522	12/02/00	1 U	1 U	1 U	3 U	ND
BF-MW-26	BF2622	12/02/00	1 U	1 U	1 U	3 U	ND
BF-MW-27	BF2722	12/03/00	1 U	1 U	1 U	3 U	ND
BF-MW-E1	BFE122	12/01/00	1 U	1 U	0.99 J	0.45 J	1.44
BF-MW-E2	BFE222	12/02/00	1 U	0.3 J	1 U	3 U	0.3
BF-MW-E3	BFE322	12/02/00	1 U	0.48 J	1 U	0.3 J	0.78
BF-MW-E4	BFE422	12/02/00	0.29 J	0.27 J	0.28 J	0.36 J	1.2
BF-MW-E5	BFE522	12/02/00	3.6 =	1 =	17.2 =	19 =	40.8
BF-MW-E6	BFE622	12/01/00	1 U	1 U	1 U	3 U	ND
Third Semiannual Sampling Event – July 2004							
BF-MW-25	BF2552	07/16/04	1 U	1 U	1 U	1 U	ND
BF-MW-26	BF2652	07/16/04	1 U	1 U	1 U	1 U	ND
BF-MW-27	BF2752	07/16/04	1 U	1 U	1 U	1 U	ND
BF-MW-35	BF3552	07/17/04	1 U	1 U	1 U	1 U	ND
BF-MW-36	BF3652	07/17/04	1 U	1 U	1 U	1 U	ND
BF-MW-37	BF3752	07/17/04	1 U	1 U	1 U	1 U	ND
BF-MW-E1	BFE152	07/16/04	1 U	1 U	1 U	1 U	ND
BF-MW-E2	BFE252	07/16/04	1 U	1 U	1 U	1 U	ND
BF-MW-E3	BFE352	07/16/04	1 U	1 U	1 U	1 U	ND
BF-MW-E4	BFE452	07/16/04	1 U	1 U	1 U	1 U	ND
BF-MW-E5	BFE552	07/16/04	2 =	1 U	17.3 =	42.7 =	62.0
BF-MW-E6	BFE652	07/16/04	1 U	1 U	1 U	1 U	ND
In-Stream Water Quality Standards (Georgia Rule 391-3-6.03)			51	200,000	28,718	NRC	NRC
Alternate Concentration Limits			634	—	—	—	—

Table 3. Groundwater Analytical Results for BTEX (continued)

Sample Location	Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)
Fourth Semiannual Sampling Event (Release #2) – January 2005							
BF-MW-25	BF2562	01/12/05	1 U	1 U	1 U	1 U	ND
BF-MW-26	BF2662	01/13/05	1 U	1 U	1 U	1 U	ND
BF-MW-27	BF2762	01/13/05	1 U	1 U	1 U	1 U	ND
BF-MW-35	BF3562	01/14/05	1 U	1 U	1 U	1 U	ND
BF-MW-36	BF3662	01/14/05	1 U	1 U	1 U	1 U	ND
BF-MW-37	BF3762	01/14/05	1 U	1 U	1 U	1 U	ND
BF-MW-E1	BFE162	01/13/05	1 U	1 U	1 U	1 U	ND
BF-MW-E2	BFE262	01/13/05	1 U	1 U	1 U	1 U	ND
BF-MW-E3	BFE362	01/13/05	1 U	1 U	1 U	1 U	ND
BF-MW-E4	BFE462	01/13/05	1 U	1 U	1 U	0.9 J	0.9
BF-MW-E5	BFE562	01/13/05	1 U	0.43 J	10.4 =	34.9 =	45.73
BF-MW-E6	BFE662	01/13/05	1 U	0.47 J	1 U	1 U	ND
Sentinel Well Sampling – December 2007							
BF-MW-38	BF3872	12/10/07	1 U	1 U	1 U	1 U	ND
First Biannual Sampling Event – October 2009							
BF-MW-E5	BFE592	10/08/09	3.82 =	0.360 J	34.7 =	69.4 =	108.28
BF-MW-38	BF3892	10/08/09	1 U	1 U	1 U	1 U	ND
In-Stream Water Quality Standards (Georgia Rule 391-3-6.03)			51	200,000	28,718	NRC	NRC
Alternate Concentration Limits			634	—	—	—	—

NOTES:
BTEX Benzene, toluene, ethylbenzene, and xylenes.
CAP Corrective Action Plan.
ND Not detected.
NRC No regulatory criterion.

Laboratory Qualifiers:
J Indicates the value of the compound is an estimated value.
U Indicates the compound was not detected at the concentration reported.
UJ Indicates the compound was not detected at the estimated concentration reported.
= Indicates the compound was detected at the concentration reported.

Table 4. Groundwater Analytical Results for PAHs

Sample Location	Sample ID	Date Sampled	Detected Compounds				
			2-Methylnaphthalene (µg/L)	Acenaphthene (µg/L)	Fluorene (µg/L)	Naphthalene (µg/L)	Phenanthrene (µg/L)
CAP-Part B Investigation – December 2000							
BF-MW-04	BF0422	12/02/00	0.99 U	0.99 U	0.99 U	0.99 U	0.99 U
BF-MW-25	BF2522	12/02/00	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
BF-MW-26	BF2622	12/02/00	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
BF-MW-27	BF2722	12/03/00	1 U	1 U	1 U	1 U	1 U
BF-MW-E1	BFE122	12/01/00	1 U	2.2 =	4 =	9.1 =	1 U
BF-MW-E2	BFE222	12/02/00	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
BF-MW-E3	BFE322	12/02/00	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
BF-MW-E4	BFE422	12/02/00	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
BF-MW-E5	BFE522	12/02/00	NA	0.55 J	1 =	16.6 =	0.73 J
BF-MW-E6	BFE622	12/01/00	1 U	1 U	1 U	1 U	1 U
Third Semiannual Sampling Event – July 2004							
BF-MW-04	BF0452	07/16/04	1 U	1 U	1 U	1 U	1 U
BF-MW-25	BF2552	07/16/04	0.6 J	0.99 U	0.99 U	0.56 J	0.99 U
BF-MW-26	BF2652	07/16/04	0.66 J	1.1 U	1.1 U	0.65 J	1.1 U
BF-MW-27	BF2752	07/16/04	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
BF-MW-35	BF3552	07/17/04	1 U	1 U	1 U	1 U	1 U
BF-MW-36	BF3652	07/17/04	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
BF-MW-37	BF3752	07/17/04	1 U	1 U	1 U	1 U	1 U
BF-MW-E1	BFE152	07/16/04	1 U	2.8 =	5.7 =	1 U	5.8 =
BF-MW-E2	BFE252	07/16/04	1 U	1 U	1 U	1 U	1 U
BF-MW-E3	BFE352	07/16/04	1 U	1 U	1 U	1 U	1 U
BF-MW-E4	BFE452	07/16/04	0.64 J	0.97 U	0.97 U	0.49 J	0.97 U
BF-MW-E5	BFE552	07/16/04	8.4 =	1.6 =	2.6 =	17.3 =	0.57 J
BF-MW-E6	BFE652	07/16/04	1 U	1 U	1 U	1 U	1 U
In-Stream Water Quality Standards (Georgia Rule 391-3-6)			NRC	NRC	14,000	NRC	NRC
Alternate Concentration Limits			—	—	—	820	—

Table 4. Groundwater Analytical Results for PAHs (continued)

Sample Location	Sample ID	Date Sampled	Detected Compounds					
			2-Methylnaphthalene (µg/L)	Acenaphthene (µg/L)	Fluorene (µg/L)	Naphthalene (µg/L)	Phenanthrene (µg/L)	Pyrene (µg/L)
Fourth Semiannual Sampling Event (Release #2) – January 2005								
BF-MW-04	BF0462	01/12/05	1 U	1 U	1 U	1 U	1 U	1 U
BF-MW-25	BF2562	01/12/05	1 U	1 U	1 U	1 U	1 U	1 U
BF-MW-26	BF2662	01/13/05	1 U	1 U	1 U	1 U	1 U	1 U
BF-MW-27	BF2762	01/13/05	1 U	1 U	1 U	1 U	1 U	1 U
BF-MW-35	BF3562	01/14/05	1 U	1 U	1 U	1 U	1 U	1 U
BF-MW-36	BF3662	01/14/05	1 U	1 U	1 U	1 U	1 U	1 U
BF-MW-37	BF3762	01/14/05	1 U	1 U	1 U	1 U	1 U	1 U
BF-MW-E1	BFE162	01/13/05	1 U	1.6 =	3.1 =	1 U	1.2 =	1 U
BF-MW-E2	BFE262	01/13/05	0.99 U	0.99 U	0.99 U	0.99 U	0.99 U	0.99 U
BF-MW-E3	BFE362	01/13/05	1.4 =	1 U	1 U	0.31 J	1 U	1 U
BF-MW-E4	BFE462	01/13/05	1.5 J	1 U	1 U	0.61 J	1 U	1 U
BF-MW-E5	BFE562	01/13/05	43.2 =	5.4 =	10.3 =	32.9 =	10.7 =	2.4 =
BF-MW-E6	BFE662	01/13/05	1 U	1 U	1 U	1 U	1 U	1 U
In-Stream Water Quality Standards (Georgia Rule 391-3-6)			NRC	NRC	14,000	NRC	NRC	11,000
Alternate Concentration Limits			—	—	—	820	—	—

NOTES:
CAP Corrective Action Plan.
NA Not applicable.
NRC No regulatory criterion.
PAH Polycyclic aromatic hydrocarbon.

Laboratory Qualifiers:
J Indicates the value of the compound is an estimated value.
U Indicates the compound was not detected at the concentration reported.
= Indicates the compound was detected at the concentration reported.

Table 5. Summary of Free Product Removal Activities at BF-MW-E5

Date	Depth of Screened Interval (ft BTOC)	Depth to Free Product (ft BTOC)	Depth to Water (ft BTOC)	Product Thickness (ft)	Description
06/18/04	4.7 – 14.7	4.51	7.65	3.14	~40 gal of water/product mixture pumped from well. An absorbent sock was placed in the well upon completion of pumping
07/16/04	4.7 – 14.7	4.48	5.71	1.23	2 gal of water/product mixture pumped from well prior to sampling. Absorbent socks were not placed in the well because the free product was removed during well purging
08/23/04	4.7 – 14.7	4.57	**4.64**	0.07	~40 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because the free product was removed during pumping
09/20/04	4.7 – 14.7	—	**4.09**	0	No pumping of the well was conducted. Absorbent socks were not placed in the well because free product was not present
10/18/04	4.7 – 14.7	—	**4.07**	0	~50 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was not present
11/19/04	4.7 – 14.7	sheen	5.08	sheen	No pumping of the well was conducted. Absorbent socks were not placed in the well because only a sheen of free product was present
12/16/04	4.7 – 14.7	sheen	5.11	sheen	~40 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because only a sheen of free product was present
01/13/05	4.7 – 14.7	—	4.81	0	1 gal of water/product mixture pumped from well prior to sampling. Absorbent socks were not placed in the well because free product was not present
02/16/05	4.7 – 14.7	4.54	**4.55**	0.01	~40 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was removed during pumping
03/16/05	4.7 – 14.7	sheen	**3.92**	sheen	No pumping of the well was conducted. Absorbent socks were not placed in the well because only a sheen of free product was present
04/28/05	4.7 – 14.7	4.06	**4.13**	0.07	~35 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was removed during pumping
05/16/05	4.7 – 14.7	—	**3.95**	0	No pumping of the well was conducted. Absorbent socks were not placed in the well because free product was not present

NOTES:
Bold indicates the water table is above the screened interval.
BTOC Below top of casing.
EFR® Enhanced Fluid Recovery®.

Table 5. Summary of Free Product Removal Activities at BF-MW-E5 (continued)

Date	Depth of Screened Interval (ft BTOC)	Depth to Free Product (ft BTOC)	Depth to Water (ft BTOC)	Product Thickness (ft)	Description
06/16/05	4.7 – 14.7	3.68	**3.70**	0.02	~45 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was removed during pumping
07/19/05	4.7 – 14.7	—	**4.09**	0	No pumping of the well was conducted. Absorbent socks were not placed in the well because free product was not present
09/20/05	4.7 – 14.7	—	4.98	0	No pumping of the well was conducted. Absorbent socks were not placed in the well because free product was not present
10/13/05	4.7 – 14.7	—	3.71	0	30 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was removed during pumping
11/17/05	4.7 – 14.7	—	5.22	0	No pumping of the well was conducted. Absorbent socks were not placed in the well because free product was not present
01/14/06	4.7 – 14.7	—	**4.27**	0	40 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was not present
02/15/06	4.7 – 14.7	—	**3.71**	0	No pumping of the well was conducted. Absorbent socks were not placed in the well because free product was not present
04/20/06	4.7 – 14.7	—	**4.30**	0	40 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was not present
06/20/06	4.7 – 14.7	4.91	4.93	0.02	No pumping of the well was conducted. Absorbent socks were not placed in the well because free product will be addressed during the next pumping event
07/19/06	4.7 – 14.7	5.34	5.36	0.02	65 gal of water/product mixture was pumped from well. Absorbent socks were not placed in the well because free product was removed during pumping
10/20/06	4.7 – 14.7	—	5.57	0	40 gal of water/product mixture pumped from well. Absorbent socks were not placed in the well because free product was not present
11/14/06	4.7 – 14.7	5.60	8.17	2.57	50 gal of water/product mixture pumped from well. Two absorbent socks were placed in the well
12/18/06	4.7 – 14.7	5.27	9.59	4.32	Both absorbent socks were saturated. Two new absorbent socks were placed in the well

NOTES:

Bold indicates the water table is above the screened interval.

BTOC Below top of casing.

EFR® Enhanced Fluid Recovery®.

Table 5. Summary of Free Product Removal Activities at BF-MW-E5 (continued)

Date	Depth of Screened Interval (ft BTOC)	Depth to Free Product (ft BTOC)	Depth to Water (ft BTOC)	Product Thickness (ft)	Description
01/07	4.7 – 14.7	4.32	4.80	0.48	40 gal of water/product mixture pumped from well. Absorbent socks were placed in the well
04/20/07	4.7 – 14.7	4.97	6.65	1.68	50 gal of water/product mixture pumped from well. Absorbent socks were placed in the well
07/11/07	4.7 – 14.7	4.50	4.76	0.26	1,536 gal of liquid removed during 8-hr EFR® event
01/25/08	4.7 – 14.7	3.25	**3.39**	0.14	1,592 gal of liquid removed during 9-hr EFR® event
05/01/08	4.7 – 14.7	4.56	5.53	0.97	1,420 gal of liquid removed during 6-hr EFR® event
10/21/08	4.7 – 14.7	3.73	**4.02**	0.29	1,281 gal of liquid removed during 6-hr EFR® event
01/15/09	4.7 – 14.7	4.32	**4.78**	0.46	1,281 gal of liquid removed during 6-hr EFR® event
04/22/09	4.7 – 14.7	3.01	**3.90**	0.89	1,200 gal of liquid removed during 5.75-hr EFR® event
07/15/09	4.7 – 14.7	4.19	5.08	0.89	726 gal of liquid removed during 7.5-hr EFR® event
10/09/09	4.7 – 14.7	3.84	5.79	1.95	1,447 gal of liquid removed during 6-hr EFR® event
03/05/10	4.7 – 14.7	3.27	**4.55**	1.28	1,420 gal of liquid removed during 6.5-hr EFR® event

NOTES:
Bold indicates the water table is above the screened interval.
BTOC Below top of casing.
EFR® Enhanced Fluid Recovery®.

APPENDIX III

SITE RANKING FORM

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SITE RANKING FORM

Facility Name: **Bulk Fuel Facility (HAA-09)** **Ranked by:** **J. Kovalchik**

County: **Chatham** **Facility ID #:** **9-025113*2** **Date Ranked:** **2/14/2011**

SOIL CONTAMINATION

A. Total PAHs –
Maximum Concentration found on the site
(Assume <0.660 mg/kg if only gasoline was stored on-site.)

☐	≤0.660 mg/kg	=	0
☐	>0.66 - 1 mg/kg	=	10
* ☒	>1 - 10 mg/kg	=	25
☐	>10 mg/kg	=	50

* *CAP-Part B sample from Well MW-E1 (Release #2)*

B. Total Benzene -
Maximum Concentration found on the site

* ☒	≤0.005 mg/kg	=	0
☐	>0.005 - .05 mg/kg	=	1
☐	>0.05 - 1 mg/kg	=	10
☐	>1 - 10 mg/kg	=	25
☐	>10 - 50 mg/kg	=	40
☐	>50 mg/kg	=	50

* *CAP-Part B sample from Well MW-E3 (Release #2)*

C. Depth to Groundwater
(bls = below land surface)

☐	>50' bls	=	1
☐	>25' - 50' bls	=	2
☐	>10' - 25' bls	=	5
☒	≤10' bls	=	10

Fill in the blanks: **(A.** **25** **) + (B.** **0** **) = (** **25** **) x (C.** **10** **) = (D.** **250** **)**

GROUNDWATER CONTAMINATION

E. Free Product (Nonaqueous-phase liquid hydrocarbons; see Guidelines for definition of "sheen.")

☐	No free product	=	0
☐	Sheen - 1/8"	=	250
☐	>1/8" - 6"	=	500
☐	>6" - 1ft.	=	1,000
* ☒	For every additional inch, add another 100 points = 1,000 + 300		

* *1.28 ft in BF-MW-E5 (AST 7009), March 2010*

F. Dissolved Benzene -
Maximum Concentration at the site
(One well must be located at the source of the release.)

* ☒	≤5 µg/L	= 0
☐	>5 - 100 µg/L	= 5
☐	>100 - 1,000 µg/L	= 50
☐	>1,000 - 10,000 µg/L	= 500
☐	>10,000 µg/L	= 1500

* *Sample BFE592 (October 2009)*

Fill in the blanks: **(E.** **1300** **) + (F.** **0** **) = (G.** **1300** **)**

Facility Name: Bulk Fuel Facility (HAA-09) **County:** Chatham **Facility ID #:** 9-025113*2

POTENTIAL RECEPTORS (MUST BE FIELD-VERIFIED)

Distance from nearest contaminant plume boundary to the nearest downgradient and hydraulically connected Point of Withdrawal for water supply. **If the point of withdrawal is not hydraulically connected, evidence as outlined in the CAP-A guidance document MUST be presented to substantiate this claim.**

H. Public Water Supply

☐	Impacted	=	2000
☐	≤500'	=	500
☐	>500' - ¼ mi	=	25
☐	¼ mi - 1 mi	=	10
☐	>1 mi - 2 mi	=	2
* ☒	> 2 mi	=	0

For lower susceptibility areas only:

☐	>1 mi	=	0

Note: If site is in lower susceptibility area, do not use the shaded areas.

* For justification that withdrawal point is not hydraulically connected, see attached text.

I. Non-Public Water Supply

☐	Impacted	=	1000
☐	≤100'	=	500
☐	>100' - 500'	=	25
☐	>500' - ¼ mi	=	5
☐	>¼ - ½ mi	=	2
☒	>½ mi	=	0

For lower susceptibility areas only:

☐	>¼ mi	=	0

J. Distance from nearest Contaminant Plume boundary to downgradient Surface Waters **OR UTILITY TRENCHES & VAULTS** (A utility trench may be omitted from ranking if its invert elevation is more than 5 feet above the water table.)

☐	Impacted	=	500
☒	≤500'	=	50
☐	>500' - 1,000'	=	5
☐	>1,000'	=	2

K. Distance from any Free Product to basements and crawl spaces

☐	Impacted	=	500
☐	<500'	=	50
☐	>500' - 1,000'	=	5
☒	>1,000' or no free product.	=	0

Fill in the blanks: (H. 0) + (I. 0) + (J. 50) + (K. 0) = L. 50

(G. 1300) x (L. 50) = M. 65000

(M. 65000) + (D. 250) = N. 65250

P. **SUSCEPTIBILITY AREA MULTIPLIER**

☐ If site is located in a Low Ground-Water Pollution Susceptibility Area = 0.5

☒ All other sites = 1

Q. **EXPLOSION HAZARD**

Have any explosive petroleum vapors, possibly originating from this release, been detected in any subsurface structure (e.g., utility trenches, basements, vaults, crawl spaces, etc.)?

☐ Yes = 200,000

☒ No = 0

Fill in the blanks: (N. 65250) x (P. 1) = (65250) + (Q. 0)

= 65250 (CAP-Part B Addendum #1; plume in the vicinity of BF-MW-E5, AST 7009)

ENVIRONMENTAL SENSITIVITY SCORE

ADDITIONAL GEOLOGIC AND HYDROGEOLOGIC DATA

The following is presented to provide supplemental information to Item H of the Site Ranking Form and details relating to the geologic and hydrogeologic conditions at Hunter Army Airfield (HAAF), which support HAAF's determination that the water withdrawal points located at the airfield cannot be hydraulically connected to the surficial aquifer.

1.0 REGIONAL GEOLOGY

Southeast Georgia is located within the coastal plain physiographic province of the southeast United States (Clark and Zisa 1976). In this region, the thickness of the southeastward-dipping subsurface strata ranges from 0 ft at the fall line, located approximately 350 miles inland from the Atlantic coast, to approximately 4,200 ft below ground surface (BGS) at the coast. Herrick (1961) provides detailed lithologic descriptions of the stratigraphic units encountered during the installation of water and petroleum exploration wells in Chatham County. The well log of GGS Well 125, located on White Bluff Road, 700 ft west and 0.3 mile north of Buckhalter Road, Savannah, Georgia, provides one of the more complete lithologic descriptions of upper Eocene, Miocene, and Pliocene to Recent sedimentary strata in Chatham County.

The upper Eocene (Ocala Limestone) section of GGS Well 125 is approximately 225 ft thick and dominated by light gray to white fossiliferous limestone. The Miocene section is approximately 250 ft thick and consists of limestone, with a 160-ft-thick cap of dark green phosphatic clay. This clay is regionally extensive and is known to occupy the Coosawatchie Formation of the Hawthorn Group (Furlow 1969; Arora 1984; Huddlestun 1988). The interval from approximately 80 ft to the surface is Pliocene to Recent in age and composed primarily of sand interbedded with clay and silt. This section is occupied by the Satilla and Cypresshead Formations (Huddlestun 1988).

2.0 LOCAL GEOLOGY

HAAF is located within the barrier island sequence district of the coastal plain physiographic province of the southeast United States (Clark and Zisa 1976). The barrier island sequence district in Chatham and Bryan Counties is characterized by the existence of several marine terraces (step-like topographic surfaces that decrease in elevation toward the coast). These marine terraces, and their associated deposits, are the result of sea-level fluctuations that occurred during the Pleistocene epoch. The surficial (Quaternary) deposits in Chatham and Bryan Counties, in decreasing elevation and age, are part of the Okefenokee, Wicomico, Penholoway, Pamlico, and Silver Bluff Terrace Complexes (Wilkes et al. 1974; GA DNR 1976; Huddlestun 1988).

HAAF, as well as most of Chatham County, is underlain by the Pleistocene Pamlico Terrace. The Pleistocene Satilla Formation (formerly known as the Pamlico Formation) consists of deposits of the Pamlico Terrace Complex and other terrace complexes in the region (Huddlestun 1988). The Satilla Formation is a lithologically heterogeneous unit that consists of variably bedded to non-bedded sand and variably bedded silty to sandy clay. During the Pleistocene epoch, these sand and clay deposits were formed in offshore and inner continental shelf, Barrier Island, and marsh/lagoonal-type environments (Huddlestun 1988). According to the *Geologic Map of Georgia* (GA DNR 1976), clay beds of marsh origin, which were deposited on the northwestern side of the former Pamlico Barrier Island Complex, exist in the western quarter of HAAF. Very fine- to coarse-grained sand deposits of barrier island origin are more common throughout the remaining areas of HAAF.

Based on the coring and sampling of unconsolidated strata at HAAF during the Corrective Action Plan-Part A investigations, it was concluded that all former underground storage tanks (USTs) were buried

within the Satilla Formation, which is overlain by various soil types. Soil groups at HAAF include the Chipley, Leon, Ellabelle, Kershaw, Pelham, Albany, Wahee, and Ogeechee (Wilkes et al. 1974).

3.0 REGIONAL AND LOCAL HYDROGEOLOGY

The hydrogeology in the vicinity of HAAF is mostly influenced by two aquifer systems. These are referred to as the Principal Artesian (Floridan) Aquifer and the surficial aquifer (Miller 1990). The Principal Artesian Aquifer is the lowermost hydrologic unit and is regionally extensive from South Carolina through Georgia, Alabama, and most of Florida. Known elsewhere as the Floridan, this aquifer, approximately 800 ft in total thickness, is composed primarily of Tertiary-age limestone, including the Bug Island Formation, Ocala Group, and Suwannee Limestone. Groundwater from the Floridan is used primarily for drinking water (Arora 1984). According to Miller (1990), one of the largest cones of depression produced in the Upper Floridan Aquifer exists directly beneath Savannah, Georgia. Net water-level decline in the Floridan system between the predevelopment period and 1980 exceeded 80 ft beneath Savannah. In addition, according to 1980 estimates, more than 500 million gal of water per day were withdrawn from the Floridan for public and industrial use in southeast Georgia, more than in any other region.

The confining layer for the Principal Artesian (Floridan) Aquifer is the phosphatic clay of the Hawthorn Group. There are minor occurrences of aquifer material within the Hawthorn Group; however, they have limited use (Miller 1990). The surficial aquifer overlies the Hawthorn confining unit.

The surficial aquifer consists of widely varying amounts of sand and clay, ranging from 55 to 150 ft in thickness, and is composed primarily of the Satilla and Cypresshead Formations in the Savannah vicinity (Arora 1984). This aquifer is primarily used for domestic lawn and agricultural irrigation. The top of the water table ranges from approximately 2 to 10 ft BGS (Miller 1990). Groundwater in the surficial aquifer system is under unconfined, or water table, conditions. Locally, however, thin clay beds create confined or semiconfined conditions, as is the case at HAAF where thin, surficial clay beds are present in the western quadrant (GA DNR 1976).

Groundwater encountered at all the UST investigation sites is part of the surficial aquifer system. Based on the fact that all public and non-public water supply wells draw water from the Principal Artesian (Floridan) Aquifer and that the Hawthorn confining unit separates the Principal Artesian Aquifer from the surficial aquifer, it is concluded that there is no hydraulic interconnection between the surficial aquifer (and associated groundwater plumes, if applicable) located beneath former UST sites and identified water-supply withdrawal points at HAAF.

4.0 REFERENCES

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