SITE: HAA-09 R3, HAAF, GEORGIA

FSGA CAP-Part B Submittal to GA EPD -	6 Apr 2009
GA EPD CAP-Part B Approval -	17 Apr 2009
FSGA CAP-Part B Addendum # 1 Submittal to GA EPD -	10 Nov 2009
GA EPD CAP-Part B Addendum #1 Approval -	20 Nov 2009

Georgia Department of Natural Resources
2 Martin Luther King Jr. Dr., S.E., East Floyd Tower, Atlanta, Georgia 30334
Chris Clark, Commissioner
F. Allen Barnes, Director
Environmental Protection Division
(404) 656-4713

Reply To:
Environmental Protection Division
Suite 400
19 Martin Luther King, Jr. Dr. S.W.
Atlanta, Georgia 30334
(404) 657-6136

November 20, 2009

Mr. Thomas Fry
Directorate of Public Works/Environmental Branch
US Army/HQ 3rd Inf. Div.
1550 Frank Cochran Dr. Bldg. 1137
Fort Stewart, Georgia 31314-4927

Subject: Former ASTs 7001 & 7003, Bulk Facility – HAA-09, Release #3 - Hunter Army Airfield, Savannah, Georgia

Dear Mr. Fry:

The Georgia Environmental Protection Division (EPD) has reviewed the October 29, 2009 Corrective Action Plan – Part B Addendum #1 submitted by ARCADIS for the petroleum release at the former ASTs referenced above. EPD approves of the CAP-Part B Addendum #1 contingent on the following:

- The estimated extent of excavation shown on Figure 3-1 does not appear to be exactly consistent with the area of soil and groundwater impacts determined from the recent investigation. Therefore, the proposed excavation at former AST 7003 and at former AST 7001 should be sure to include the area around FP-06 and GW-02, and the area around FP-13 and SB-33, respectively.

- After backfilling, monitoring wells should be installed at FP-06 and FP-04 in addition to the monitoring wells proposed on Figure 3-1.

According to the approved milestone schedule, the excavation activities and monitoring well installation should be completed by the middle of January 2010. Please contact our office if you have any comments or questions.

Sincerely,

James S. Guentert
Geologist III

cc: Tressa Rutland, Department of Army
Chris Bertz, ARCADIS
Melanie Henry, EPD
File

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

NOV 10 2009

Office of the Directorate

CERTIFIED MAIL

7008 2810 0000 7784 0657

Georgia Environmental Protection Division
UST Management Program
Attention: Mr. Jim Guentert
4244 International Parkway, Suite 104
Atlanta, GA 30354

Dear Mr. Guentert:

Fort Stewart is pleased to submit one copy of the Corrective Action Plan - Part B Addendum #1 Report for Aboveground Storage Tanks (ASTs) 7001 and 7003, Bulk Fuel Facility, HAA-09 Release #3, Facility Identification Number 9-025113*3, Hunter Army Airfield, Georgia, dated October 2009, for your review and approval. This report documents the results of the soil and groundwater samples taken in June 2009. In accordance with the approved Corrective Action Plan - Part B samples were taken with direct push technology.

Fort Stewart will proceed with the proposed excavation of the soil that exceeds the alternate threshold level (ATL) and contain free product. Contaminated soil will be excavated in the areas impacted above the applicable limits as determined by the collected samples. Upon completion of the excavation four new groundwater monitoring wells will be installed. Groundwater concentrations will be monitored to ensure levels are less that the approved Alternate Concentration Levels (ACLs) or In-stream Water Quality Standards (IWQS).

Fort Stewart appreciates your consideration of this report. If you have any questions or comments regarding the enclosed report, please contact Ms. Algeana Stevenson at (912)315-5144 or Ms. Tressa Rutland, Directorate of Public Works, Environmental Branch, at (912)767-2010.

Sincerely,

Thomas C. Frey
for Robert R. Baumgardt
Director, Public Works

Enclosure

ARCADIS

CORRECTIVE ACTION PLAN-PART B

Facility Name:	Former AST 7001/7003 (HAA-9)			Street Address:	Bulk Fuel facility		
Facility ID:	9-025113*3	City:	Hunter Army Airfield	County:	Chatham	Zip Code:	31409
Latitude:	32° 00′ 54″	Longitude:	81° 08′ 26″				

Submitted by UST Owner/Operator:				Prepared by Consultant/Contractor:			
Name:	Thomas C. Fry/ Environmental Branch			Name:	Charles Bertz		
Company:	U. S. Army/HQ 3d, Inf. Div. (Mech)			Company:	ARCADIS		
Address:	DPW ENRD ENV. Br. (Fry)			Address:	801 Corporate Center Dr.		
	1550 Frank Cochran Drive, Bldg. 1137				Suite 300		
City:	Fort Stewart	State:	GA	City:	Raleigh	State:	NC
Zip Code:	31314-4927			Zip Code:	27607		
Telephone:	(912) 767-2010			Telephone:	(919) 854-1282		

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 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. REGISTERED PROFESSIONAL ENGINEER OR PROFESSIONAL GEOLOGIST CERTIFICATION

I hereby certify that I have directed and supervised the fieldwork and preparation of this plan in accordance with State Rules and Regulations. As a registered professional geologist and/or professional engineer, I certify that I am a qualified groundwater professional, as defined by the Georgia State Board of Professional Geologists. All of the information and laboratory data in this plan and in all of the attachments are true, accurate, complete, and in accordance with applicable State Rules and Regulations.

Name: Scott Bostian, PE

Signature: _____

Date: 10/29/09

GEORGIA REGISTERED PROFESSIONAL ENGINEER CURTIS SCOTT BOSTIAN PE 026133 10/29/09

Georgia Stamp or Seal

Check all boxes 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

☐ Not Applicable The extent of contamination, and the local & site hydrogeology requirements have been fulfilled under the CAP Part A, therefore additional SIR reporting is not necessary.

☒ **Extent of Contamination:**

☒ Soil ☐ Groundwater ☒ Free Product ☐ Surface water

☒ **Local and Site Hydrogeology:**

☒ 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

III. REMEDIAL ACTION PLAN

A. Corrective Action Completed or In-Progress:

☐ Not Applicable

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

☐ Remediation/Treatment of Contaminated Soils

☐ Other (specify)

_____

_____

B. Objectives of Corrective Action:

☐ No Further Action

☒ Remove Free Product That Exceeds One-Eighth Inch

☒ Remediate Groundwater Contamination That Exceeds:

☐ Maximum Contaminant Levels (MCLs)

OR

☒ In-stream Water Quality Standards

B. Objectives of Corrective Action (CONTINUED):

☒ Remediate Soil Contamination That Exceeds:

☐ Threshold Values Listed In Table A

OR

☐ Threshold Values Listed In Table B

OR

☒ Alternate Threshold Levels (ATLs) (Reference CAP A App. I)

☐ Provide Risk-Based Corrective Action (Reference CAP B App. I):

☒ 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 – 391-3-15-.09(3).

C. Design and Operation of Corrective Action Systems:

☒Soil ☒Groundwater ☒Free Product ☐Surface water ☐Not Applicable

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

AND / OR

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 A have not changed.**

☐ Certified Letters to Adjacent, 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 (specify) _____

_____

☐ GUST Trust Fund Application - (attach if applicable)

☐ Cost Proposal:

☐ A Total of All Costs Incurred To Date (MUST INCLUDE THE FOLLOWING):

- ▶ Invoices and Proofs-of-Payment For All Costs Incurred To Date
- ▶ Invoices itemized on the GUST-4D
- ▶ All Non-Eligible Costs Clearly Identified as such
- ▶ Incurred Costs Itemized per GUST-92 form or EPD provided form/specifications

☐ A Total of Estimated Costs To Complete Corrective Action

- ▶ Estimated Costs Itemized per GUST-92 form or EPD provided form or specifications

☐ Total Project Costs

☐ Proposed Schedule For Reimbursement

☐ Lump Sum Payment Upon Completion Of Corrective Action

OR

☐ Interim Payments With Final Payment Upon Completion

OR

☐ EPD Established Payment Schedule

2. Site Investigation Report

Addendum #1 to the Corrective Action Plan (CAP) Part-B for Release #3 at the Bulk Fuel Facility (BFF) has been prepared to summarize the soil and groundwater investigation conducted in June 2009. The BFF is located at Hunter Army Airfield (HAAF) and is approximately 600 by 1,200 feet covering approximately 16.5 acres (Figure 2-1). The site status and release history in the area were described in the CAP-Part B (ARCADIS 2009).

In the past, remediation activities have been conducted to address impacts identified as Release #1 and Release #2. Release #1 (Underground Storage Tank (UST) 117, Facility ID #9-025113*1) was granted no further action by Georgia Environmental Protection Division (GA EPD) UST Management Program (USTMP) on October 6, 2003 (Lewis 2003). Release #2 is associated with free product observed in well BF-MW-E5, which is in the vicinity of above ground storage tank (AST) 7009 (Facility ID #9-025113*2). Free product removal activities are currently being conducted for Release #2 and will be addressed in a separate report. The concrete foundations of former ASTs 7001 and 7003 were removed in May 2006. Free product was discovered approximately 3 to 4 feet (ft) below ground surface (bgs) at the former location of AST 7003 and identified as Release #3. Four 2-foot diameter sumps were installed in the area of former AST 7003 to collect free product. The level of free product was measured in the sumps and free product was removed on a routine basis from May through August 2006. In November 2006, forty-two (42) free product (FP) monitoring points (FP-1 through FP-42) were installed on 50-foot centers in the area of former ASTs 7001 and 7003 (Figure 2-2). Monitor wells associated with Release #1 located throughout the BFF were abandoned in 2006 and there are currently no monitor wells in the Release #3 area. In December 2008, liquid levels were measured in the 42 FP monitoring points and 4 sumps. Free product was detected in 6 FP monitoring points and two sumps in the area around former AST 7003 and one FP monitoring point around former AST 7001. Free product was detected in a similar distribution in April 2009.

The CAP-Part B for release #3 was approved by GA EPD USTMP in April 2009. The approved corrective action includes excavation of impacted soil and installation of monitor wells to address potential groundwater impacts. In accordance with the approved CAP-Part B, soil and groundwater samples were taken with direct push technology (DPT) in June 2009 to evaluate the extent of impacts prior to excavation. The results of the June 2009 investigation are presented in this addendum.

2.1 Regional, Local, and Site Hydrogeology

A discussion of the regional, local, and site hydrogeology was included in the CAP-Part B for release #3. The information was based on the CAP Part A, Former Underground Storage Tank 117, Building 7002, Facility Identification Number 9-025113*1, Bulk Fuel Facility (HAA-09) Hunter Army Airfield, Georgia (Science Applications International Corporation (SAIC) 2000), which addressed Release #1. The area impacted by Release #1 is the same as that impacted by Release #3 and the hydrogeology and geological information is applicable to Release #3. Updates to the geology and hydrogeology previously presented are summarized below.

2.1.1 Groundwater Usage

No additional information on groundwater usage was obtained.

2.1.2 Aquifer Description

Data obtained confirmed the aquifer description previously provided.

2.1.3 Surface Water

Further investigation was conducted to confirm the presence of a series of storm drains and catch basins located along the southern border of the BFF. The storm drains and catch basins were formerly used to drain the bermed area around each of the ASTs. The CAP-Part B for UST 117 (SAIC 2000) stated that one of the storm drains was located approximately 120 feet from the area of greatest soil and groundwater contamination for release #1 in the vicinity of AST 7003. The drain could not be located but a valve box matching the previously described location was noted in the approximate area. The drain may have been removed or obstructed during previous demolition activities. Since the pipes from the drains potentially convey water to the Lamar Canal, the location will be used as a conservative receptor. The Lamar Canal is located approximately 650 ft from the former ASTs. Historical figures indicate that Lamar Canal is lined with concrete in some areas down gradient of the BFF (SAIC 1999).

2.1.4 Site Stratigraphy

The soil descriptions from borings installed in June 2009 confirmed the site stratigraphy from soil borings drilled during the UST 117 CAP-Part A (SAIC 2000) and CAP-Part B

(SAIC 2001) Site Investigations. The lithology present within 15 feet of the surface at the site correlates with the regional stratigraphic section. The lithology consists of interbedded layers of fine sand with varying amounts of silt and clay. Boring logs from the June 2009 DPT investigation are provided in Appendix D.

2.1.5 Direction of Groundwater Flow

Historic groundwater flow direction is southeast toward the Lamar Canal (SAIC 2001). All monitor wells in the area have been abandoned and groundwater potentiometric surface measurements were not taken during the June 2009 DPT investigation. Monitor wells will be installed as part of this corrective action. Historical groundwater potentiometric surface maps from the CAP-Part B are included in Appendix I.

2.2 Horizontal and Vertical Extent of Contamination

Liquid levels were measured in free product monitor points and sumps prior to starting DPT investigation. The liquid level results from June 2009 and previous measurements from December 2008 and April 2009 are provided in Tables 2-1c, a and b, respectively and free product thicknesses are presented on Figure 2-2.

Fifty-six (56) DPT points were installed in the vicinity of former ASTs 7001 and 7003. Please note that DPT points are numbered to 58 because numbers 46 and 47 were inadvertently omitted in the numbering sequence. The DPT investigation was conducted to define the limits of soil with petroleum hydrocarbon impacts that exceed the regulatory limits. All soil within these limits will be excavated and transported off-site as described in the CAP-Part B (ARCADIS 2009). There were fewer DPT locations in areas where free product is known to be present since these areas will be excavated to remove free product. The initial DPT points were outside of the known free product areas with the goal of investigating the extent of impacts. The vertical extent of impacts through the entire historical smear zone was also evaluated. Additional DPT points were located based on the first set of screening results as time and weather allowed. Three (3) DPT points were installed in the area manifesting free product to provide additional data on vertical free product distribution. Field screening results were used to determine extent of impacts and select samples for laboratory analysis. Screening results were obtained through visual inspection of soil samples and measurement of volatile organic compound (VOC) headspace concentrations. For each 2-foot interval, soil grab samples were collected in plastic bags. The samples were set aside for at least 15 minutes for volatilization and temperature equilibration. After 15 minutes, the headspace VOC concentration was measured with a photo-ionization detector (PID)

with the proper lamp to quantify the VOCs. DPT locations for soil delineation extended to a depth of 8 ft bgs. Samples were collected at intervals determined with field screening equipment. Samples were collected from the subset of initial borings that indicated elevated vapors but were outside the area obviously impacted by free product. When no VOCs were detected during screening, a laboratory confirmatory sample was taken at the interval just above the water table. When VOCs are detected in one or more of the borehole intervals, samples for laboratory analysis were selected from the interval with the highest PID reading. Some sample locations with adjacent locations with similar screening results were not selected for laboratory analysis. Soil samples were analyzed by the United States Environmental Protection Agency (USEPA) Method 8260B and USEPA Method 8270C in accordance with GA EPD USTMP Guidance. Because groundwater samples were collected at the worst-case locations, only three soil samples were analyzed for USEPA Method 8015B gasoline range organics (GRO) and diesel range organics (DRO). Two samples were collected in "clean" areas for analysis of total organic carbon (TOC). Laboratory analytical results are included in Appendix C. Survey data for all sample locations are included in Appendix E.

Groundwater samples were taken at four locations to evaluate vertical and horizontal groundwater impacts and to select the location and screen interval for monitor wells that will be installed after the excavation activities are complete. The groundwater samples were taken in two selected "hotspot" locations and at two locations slightly down gradient of the source areas. A screen-point sampler was advanced to depth of 15 ft to collect groundwater samples. The average depth for the initial collection of groundwater was approximately 6 ft bgs. Samples were collected at 5-foot intervals to 15 ft bgs. Groundwater samples were analyzed for benzene, toluene, ethylbenzene and xylene (BTEX) and polyaromatic hydrocarbons (PAHs) in accordance with USEPA Method 8260B and USEPA Method 8270C respectively. Previous vertical investigations in the area for Release #1 indicated the dissolved impacts were predominantly above 15 ft bgs.

Soil samples were taken from investigation derived waste (IDW) drums for analysis of additional parameters (e.g., toxicity characteristic leaching procedure [TCLP]) as required for transportation and disposal of impacted soil and water.

2.2.1 Delineation of Soil Contamination

The data from samples analyzed with field and laboratory methods are displayed on Figures 2-3, 2-4 and 2-5. All analytical data from soil samples are summarized in Table

2-2. In general, the PID screening results correlated well with the laboratory results. The soil contamination was more widespread than expected and the extent of soil impacts above soil threshold levels (STL) was not reached in some directions. BTEX were detected at concentrations that exceeded the STL in the three samples from the known free product area and in the samples taken from the northern and southern line of samples points intended to establish extent of soil contamination. Isolated hotspots exceeding the STL were also discovered on the eastern and western line of extent points. PAH concentrations did not exceed STLs in any soil sample. The results indicated that most of the hydrocarbon mass was located between 2 and 6 ft bgs. Contaminant mass located between 0 and 2 ft bgs was mostly located in points in known free product areas.

2.2.2 Delineation of Groundwater Contamination

As stated previously, the monitor wells in the area of former ASTs 7001 and 7003 were abandoned. Consequently, there is no groundwater concentration data subsequent to the May 2006 discovery of the impacts designated as Release #3.

An assessment of the vertical and horizontal extent of groundwater impacts was performed with DPT in June 2009 in conjunction with the delineation of soil impacts. The groundwater samples were analyzed for BTEX and PAH constituents. Concentrations are presented in Table 2-3 and on Figure 2-6. The data from the vertical profile borings indicate groundwater impacts are predominantly located in the upper interval of the shallow aquifer and dissolved concentrations are much lower in samples from 11 to 15 ft bgs. Down gradient groundwater samples did not contain BTEX above the In-stream Water Quality Standard (IWQS). PAH compounds detected above the IWQS in down gradient groundwater samples were Dibenzo(a,h)anthracene at an estimated concentration of 0.59 µg/L and Indeno(1,2,3-c,d)pyrene at an estimated concentration of 0.56 µg/L.

Following excavation and site restoration activities, monitor wells will be installed to further evaluate groundwater impacts.

2.2.3 Delineation of Free Product

The extent of free product associated with Release #3 was first delineated by activities performed from May through August 2006 with installation of 4 sumps and product recovery. In November 2006, 42 FP points were installed on 50-ft centers. Free product was not detected in November 2006 when liquid levels were measured. Liquid

levels in FP points were measured in December 2008 and in April and June 2009. Free product was detected during all three events. The data from these activities are provided in Tables 2-1a, b and c and are presented on Figure 2-2.

When liquid levels were measured in the sumps and monitoring points in December 2008, April 2009 and June 2009, free product was detected in monitoring points FP-04, FP-06, FP-08, FP-16 and FP-38. Free product was also detected in Sump 1 and Sump 4. Free Product thickness measurements in the sumps ranged from 0.07 to 0.22 ft. In December 2008, free product was also detected in monitoring points FP-05, FP-13 and FP-38.

2.2.4 Delineation of Surface Water and Sediment Contamination

Results from the surface water and sediment samples collected during the CAP–Part A investigation for Release #1 indicated that the surface water in Lamar Canal was not being impacted by impacts from the BFF and additional samples were not recommended (SAIC 2000). Surface water and sediment samples have not been collected since. After monitor well installation, the need for surface water samples or sediment samples will be evaluated based on contaminant concentrations in down gradient wells. Surface water features at the site are shown on Figure 2-7.

3. Remedial Action Plan

3.1 Corrective Action Completed or in Progress

3.1.1 Recovery/Removal of Free Product

Four 2-foot sumps were installed in the area of the former AST 7003 foundation to collect free product in May 2006. Free product in the sumps was measured and pumped on a routine basis from May through August 2006. Forty-two free product monitoring points were installed in November 2006. The monitoring points contained no free product or other liquids when measured in November 2006. No free product removal activities were conducted in 2007, 2008 or to date in 2009. Free product measurements were conducted in December 2008, April 2009 and June 2009. Free product was detected during all three events but not in sufficient thickness to indicate vacuum recovery would be effective.

3.1.2 Remediation/Treatment of Contaminated Backfill Material and Native Soil

The concrete foundations of former ASTs 7001 and 7003 and UST 117 were removed in May 2006 (SAIC 2007). During the removal of the concrete foundations, free product was discovered approximately 3 to 4 ft bgs at the former location of AST 7003. Soil that was excavated during the removal of the concrete foundations was temporarily staged on the site pending sample analysis. Analytical results from the soil samples indicated detections of BTEX and GRO. The contaminated soil was removed as part of these activities.

3.2 Objectives of Corrective Action

3.2.1 Remove Free Product That Exceeds One-Eighth Inch at the Former AST 7001/7003 (Release #3)

Removal of free product that exceeds 1/8-inch will be achieved through excavation of saturated and unsaturated soil containing free product. The excavation interval will encompass the historic smear zone. The target excavation area is presented on Figure 3-1. The extent of the excavation area will be expanded as necessary to include free product and soil exceeding approved limits. The excavation will remain open and will be monitored for free product recharge. A vacuum truck will be onsite to remove any free product detected.

3.2.2 Remediate Groundwater Contamination at the Former AST 7001/7003 (Release #3)

Groundwater impacts will be remediated to the IWQS or approved alternate concentration limit (ACL) through the excavation of the source mass and application of an oxygen source (Calcium Peroxide) to the groundwater through the excavation. There are no monitor wells in the vicinity of Former AST 7001/7003. Monitor wells will be installed after excavation to determine the extent of groundwater concentrations exceeding IWQS or approved ACLs and to monitor the enhanced natural attenuation of residual mass. The estimated optimal monitor well locations are shown on Figure 3-1. Proposed monitor well locations were selected based on DPT investigation results and may be adjusted based on excavation results with GA EPD approval.

3.2.3 Remediate Soil Contamination at the Former AST 7001/7003 (Release #3)

Soil impacts will be reduced to below STLs or approved Alternate Threshold Limits (ATLs). The corrective action for soil remediation is excavation of soil with concentrations exceeding approved limits. Proposed ATLs were calculated for Release #3 and are included in Appendix F. The estimated location of this excavation is provided on Figure 3-1. Prior to backfilling, an oxygen source (Calcium Peroxide) will be applied to the bottom of the excavation to enhance biodegradation of residual contamination.

3.2.4 Provide Risk-Based Corrective Action

Due to the nature of the contamination and land use, the risk-based approach was limited to human health concerns. Ecological risk concerns are negligible because of the land use surrounding the site. During evaluation for Release #1, the analytical results from surface water and sediment sampling in the drainage ditch indicated that habitat potentially associated with Lamar Canal was not impacted by the former AST operations. The methods for assessing human health concern for the site were derived from Georgia USTMP CAP-Part B guidance (GA EPD 1995). Results from the site investigation were screened against the available regulatory levels to identify chemicals of potential concern (COPCs). Site specific ACLs and ATLs were developed for COPCs using the receptor locations and fate and transport modeling in accordance with the referenced guidance.

3.2.4.1 Potential Receptor Survey

The exposure assessment identified potentially complete pathways between the contaminant source and potential current and future receptors. The Former AST 7001 and 7003 sites are located within an active military installation and within an access-controlled fence. Lamar Canal is located approximately 180 ft south-southeast (downgradient) of the southern boundary of the site. A series of storm drains and catch basins are located along the southern border of the BFF and were used to drain the formerly bermed area around former ASTs 7001 and 7003. The drains associated with 7001 and 7003 could not be located but drain valves were noted in the drain locations depicted on historical figures.

No connection between site impacts and current off-site receptors was identified during current or previous evaluations. Site impacts associated with Release #1 migrated to the surficial aquifer only. The data indicates Release #3 is behaving similarly to release #3. The Hawthorne Group, which is approximately 90 ft of clay, separates the surficial aquifer from the deep drinking water aquifer, known as the Floridian aquifer. The Hawthorn Group, a thick and highly effective confining unit, separates the water supply wells from the surficial aquifer.

Current on-site receptors have not been identified for the site. Potential future on-site receptors might include industrial workers and military residents. Potential future on-site industrial receptors may come in direct contact with site impacted soil during construction or excavation activities. Due to the restricted access to the site, no near-term on-site receptors are likely to come into contact with groundwater unless the surficial aquifer discharges into the drainage basin or Lamar Canal (SAIC 2001).

3.2.4.2 Screening for Chemicals of Potential Concern

3.2.4.2.1 Screening Methodology

The DPT data were used to identify the COPCs and areas of concern at a site. Free product associated with Release #3 has been identified and remedial action will be implemented. The COPCs were determined using screening levels which are conservative and can be used to indicate site risk status. Screening criteria are the Georgia UST STL (GA EPD 2005), Georgia IWQS (Environmental Rule 391-3-6-.03) and USEPA Regional Screening Level Table (USEPA 2009).

3.2.4.2.2 Site-Specific Levels

BTEX concentrations in soil exceeded the STLs. Consequently, BTEX were identified as COPCs for soil. None of the PAH constituents exceeded their STLs.

The limited groundwater data indicated that benzene and 2 PAHs (dibenzo(a,h)anthracene and indeno(1,2,3-c,d)pyrene) exceeded the IWQS. These constituents were identified as COPCs for groundwater. Naphthalene does not have an IWQS but exceeded the EPA Region III RBC and was also designated as a COPC for groundwater. Detection limits exceeded the IWQS for 6 PAHs with an IWQS of 0.018 µg/L. For these constituents, screening levels represent values below achievable analytical levels. No additional COPCs were selected for groundwater based on detection limits for these PAHs.

ATLs and ACLs were developed for the COPCs using site-specific information for fate and transport modeling and applicable regulatory levels.

3.2.4.2.3 Alternate Threshold Levels

The ATLs were calculated after soil data indicated concentrations of BTEX exceeded the Soil Threshold Levels. Fate and transport modeling was used to develop a site-specific dilution attenuation factor (DAF) between the source mass and the receptor location, a drain located approximately 100 ft down gradient. ATL calculations for these compounds are presented in Appendix F. The ATLs were calculated in accordance with GA EPD USTMP guidance (GA EPD 2005). The ATLs were determined as follows:

- Benzene 0.3 milligram per kilogram (mg/kg)
- Toluene 54.3 mg/kg
- Ethylbenzene 25.3 mg/kg
- Xylenes 436.6 mg/kg

3.2.4.2.4 Alternate Concentration Limits

Benzene and 3 PAHs (naphthalene, dibenzo(a,h)anthracene and indeno(1,2,3-c,d)pyrene) were identified as COPCs for groundwater. Benzene was modeled to the potential downgradient receptor, a storm drain previously noted as located approximately 100 feet downgradient from the center of the source area (based on the current free product distribution). Fate and transport modeling was used to develop a site-specific DAF between the approximate center of source mass and receptor location. The modeling results estimated a DAF for benzene of 14.5. A DAF of 10

times the benzene DAF was used as a conservative DAF for the other BTEX constituents and PAH constituents. Compound specific regulatory levels were used in conjunction with site-specific DAFs identified for the potential migration of contaminants from the site to determine the ACL for each compound. The ACLs were calculated as follows:

- Benzene 700 micrograms per liter (µg/L)
- Napthalene 942.5 µg/L
- Dibenzo(a,h)anthracene 2.6 µg/L
- indeno(1,2,3-c,d)pyrene 2.6 µg/L

The ACL calculations are included in Appendix F.

3.2.4.2.5 Fate and Transport Model

Site specific DAFs between the source and the receptor locations were developed in accordance with Georgia UST guidance. The DAF is the ratio of chemical concentrations at the source and at the receptor and is used to conservatively quantify the natural attenuation of COPC. Bioscreen was used to model fate and transport for developing DAFs for groundwater. Bioscreen is a well known analytical fate and transport model for groundwater (USEPA 1996). The maximum soil concentration at the site was not above the water table and modeling of leaching to groundwater by percolating rainwater was not performed. The potential receptor is a storm drain approximately 100 ft southwest (downgradient) of the most highly impacted area of the site. This storm drain was part of a series of drains used to drain the formerly bermed areas around the ASTs at the BFF. These drains empty into Lamar Canal. This is the nearest possible location at which a receptor might encounter migrating groundwater contamination due to a possible hydraulic connection between the groundwater and the surface water in Lamar Canal (SAIC 2001). The drain could not be located but a valve was located during a recent site inspection. The drain may have been damaged or obstructed during past demolition activities. The drain was used as an extremely conservative receptor for modeling. If the drains are no longer conveying water to the canal then the canal, which is approximately 250 ft from the impacted area, would be the nearest receptor.

The model could not be calibrated to match the limited groundwater data. Parameter values were conservatively selected. Predicted contaminant transport exceeded actual results providing additional evidence that the model is protective.

The fate and transport modeling results are presented in Appendix G.

3.2.4.2.6 Conclusions and Recommendations

The initial goal of the proposed remedial approach will be removal of free product so that no hydrocarbon layer which exceeds 1/8-inch in thickness is detected in the monitoring points, sumps or monitor wells. Along with free product removal, soil impacts exceeding STLs or approved ATLs will be excavated and transported off site for disposal. Groundwater concentrations will be monitored to ensure levels are less than the IWQS or approved ACLs and are attenuating.

4. Design and Operation of Corrective Action

The approved corrective actions include excavation of contaminated soil and installation of groundwater monitor wells. Prior to any invasive site work all required permits and utility clearances will be obtained.

4.1 Excavation

Impacted soil will be excavated in the areas with concentrations above the approved applicable limits. The available data on groundwater elevations indicate that depth to water in the area of former AST 7001/7003 has ranged from 1.5 to 5 ft bgs (smear zone.) Therefore, the initial target depth of the excavation will be 5 ft bgs. DPT results indicated some contaminant mass in deeper intervals. The initial estimate of excavation depth was adjusted based on DPT data and will also be adjusted based on field results during excavation. Confirmatory soil samples will be taken from the sidewalls as part of the excavation activities. Soil samples will be taken for field screening. Remediation of impacted soil by excavation will be confirmed with samples taken for laboratory analysis of BTEX and PAHs by USEPA Method 8260 and USEPA Method 8270 respectively. Confirmatory samples will be taken approximately every 30 linear feet along the base of the side walls. The excavation depth will extend into the water table in all areas and soil samples will not be taken from the bottom of the excavation. Groundwater samples from the most impacted areas of the excavation will be collected and analyzed in order to comply with USTMP Guidance. Groundwater samples will be analyzed for BTEX and PAHs by USEPA Method 8260 and USEPA Method 8270, respectively.

Free product points and product recovery sumps in the area targeted for excavation will be removed during excavation.

All excavated soils will be stockpiled on polyethylene sheeting with hay bales or bermed soil around the perimeter to prevent runoff of sediments. All stockpiles will be sampled in accordance with USEPA guidance procedures. Soil excavated from the saturated zone will be allowed to drain back into the excavation. Dewatering pumps will be utilized if necessary to allow effective excavation to the target depth. Storage tanks will be brought to the site for containment of water extracted from the excavation. The storage areas will be staged in accordance with direction from HAAF personnel and in compliance with all applicable regulations.

If the excavated material is contaminated below the applicable STLs or ATLs, it may be returned to the excavation. Analytical results from representative samples taken from the staged soil will be required to demonstrate compliance with reuse criteria. All excavated materials contaminated above applicable threshold levels will be disposed off-site at an EPD-approved facility, in accordance with the guidance document on Petroleum Contaminated Soil Disposal/Treatment (GUST-39). Waste Profile Manifests will be submitted for soil disposition.

The excavated area will be maintained open for free product evaluation. The area around the excavation will be marked with warning tape and access will be controlled. Enhanced fluid recovery (EFR) events will be performed to address any free product that is detected in the excavation. Backfilling of the excavation will commence following completion of the removal of the impacted soil and verification of free product removal. An oxygen-releasing compound (calcium peroxide) will be applied to the bottom of the excavation along with approximately 1 ft of coarse sand. The backfill will be soil from an approved borrow source. The remediation area will be cleaned of all sediment and debris. All areas will be graded to match existing conditions.

4.2 Installation of Monitor Wells

At least four groundwater monitor wells will be installed after backfill and compaction activities are completed. The estimated optimal locations for the monitor wells are shown on Figure 3-1. With GA EPD concurrence, monitor well locations and number will be adjusted if necessary based on data from the excavation. The wells will be constructed to a depth of approximately 15-ft bgs as previously described in the CAP-Part B (ARCADIS 2009).

4.3 Implementation

4.3.1 Milestone Schedule

The milestone schedule for the proposed corrective action was presented in the CAP-Part B. HAAF will notify GA EPD of any significant changes to the schedule and will provide GA EPD with an updated Gantt chart, as necessary.

4.3.2 Progress Reporting

The remedial action completion report will include:

1. Project summary
2. Activities and assessment of existing conditions
3. A site map depicting the areas and dimensions of the soil excavation and showing the location and concentrations of confirmatory samples
4. Description of sampling procedures
5. Analytical data
6. Site ranking
7. Conclusions and recommendations on corrective action status.

4.3.3 Certificate of Completion Report

A completion report will be prepared at the conclusion of the corrective action and post-remediation monitoring work. The report will summarize the corrective actions accomplished and provide data confirming achievement of the remediation objectives. The completion report will include the following certification:

"I hereby certify that the Corrective Action Plan–Part B, dated February 2, 2009, for Hunter Army Airfield, Former AST 7003 site (Release #3), Facility ID #9-025113*3, including any and all certified amendments/addenda 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)

4.3.4 Inspection Schedule and Preventative Maintenance Program

The current plan does not require the installation of a permanent remediation system. Thus, on-site inspection and preventative maintenance are not applicable.

4.3.5 Periodic Monitoring

Monitoring will be conducted initially on a quarterly basis. Recommendations concerning subsequent monitoring periods will be included in each report based on the data on contaminant concentrations, attenuation and transport. Monitor wells will be measured and sampled until groundwater concentrations are below the applicable regulatory limit.

4.3.6 Effectiveness of Corrective Action

The effectiveness of the soil excavation will be determined with confirmatory soil samples. The excavation and monitor wells subsequently installed will be monitored to verify effective removal of free product. Groundwater samples will be collected from each monitor well to document groundwater contaminant concentrations. Groundwater contaminant concentrations will be evaluated for trends and compliance with remediation goals.

4.3.7 Confirmatory Soil Sampling Plan

The extent of soil with concentrations above STLs was not determined in some areas during the DPT investigation. Confirmatory sampling of the excavation will be performed with field screening and samples for laboratory analysis in accordance with GA EPD USTMP guidance.

4.3.8 Stockpiled Bulk Soil Sampling

Excavated soil that is stockpiled will be characterized with DPT investigation data and with confirmation samples taken in accordance with GA EPD guidance.

4.3.9 Monitoring Only Termination Conditions

The proposed remedial approach, which includes soil excavation, will remove free product such that no floating hydrocarbon layer that exceeds 1/8 inch in thickness is present. Soil with concentrations above approved limits will be removed via excavation and transported off-site for disposal. Groundwater will be monitored to ensure contaminant concentrations are below approved limits.

4.3.10 Post-Completion Site Restoration Activities

There will be no permanent equipment or systems located at the site as part of this remediation. The excavated area will be backfilled and graded to match existing.

4.4 Public Notification

The former ASTs 7001 and 7003 site is located entirely within the confines of HAAF, a federal facility. The U. S. Government owns all of the property contiguous to the site. The Fort Stewart Directorate of Public Works will comply with the public notice requirements defined by GA EPD guidance.

5. Claim for Reimbursement

HAAF is a federally owned facility. Application for GUST Trust Fund reimbursement is not being pursued at this time.

Georgia Department of Natural Resources
? Martin Luther King Jr. Dr., S.E., East [illegible] Tower, Atlanta, Georgia 30334
Chris Clark, Commissioner
Carol A. Couch, Ph.D., Director
Environmental Protection Division
(404) 656-4713

Reply To:
Environmental Protection Division
Suite 400
19 Martin Luther King, Jr. Dr. S.W.
Atlanta, Georgia 30334
(404) 657-6136

A Stevenson, D. Keiffer & W. Thrasson Given to mr. Kiet

April 17, 2009

Ms Tressa Rutland
Directorate of Public Works/Environmental Branch
US Army/HQ 3rd Inf. Div.
1550 Frank Cochran Dr. Bldg. 1137
Fort Stewart, Georgia 31314-4927

Subject: Former ASTs 7001&7003, Bulk Fuel Facility – HAA-09, Release #3 – Hunter Army Airfield, Savannah, Georgia

Dear Ms Rutland:

The Georgia Environmental Protection Division (EPD) has reviewed a March 9, 2009 Corrective Action Plan – Part B prepared by ARCADIS for the JP-8 fuel release referenced above. EPD approves of the CAP-Part B and milestone schedule contingent on the following:

1. EPD review and final approval of the groundwater ACLs (alternative cleanup levels) and soil ATLs (alternate threshold limits) proposed for the site. It is our understanding that the ACLs and ATLs will be based on the analytical results from soil and groundwater samples collected during the proposed DPT investigation. The proposed ACLs and ATLs should be submitted for approval before the soil excavation begins.

2. Product recovery should continue on an interim basis in the four existing sumps at least until excavation begins.

Please contact our office if you have any comments or questions.

Sincerely,

James S. Guentert
Geologist III

cc: Algeana Stevenson, Department of Army
Charles Bertz, ARCADIS
Melanie Henry, EPD

DEPARTMENT OF THE ARM
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER army AIRFIELD
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

APR 06 2009

Office of the Directorate

CERTIFIED MAIL
7008 2810 0000 7784 0756

Georgia Environmental Protection Division
UST Management Program
Attention: Mr. Jim Guentert
4244 International Parkway, Suite 104
Atlanta, GA 30354

Dear Mr. Guentert:

Fort Stewart is pleased to submit one copy of the Corrective Action Plan (CAP)-Part B for the Bulk Fuel Facility Facility ID #9-025113*3 Former Aboveground Storage Tanks 7001 and 7003, Hunter Army Airfield, Georgia, dated March 2009. This report is being submitted to the Georgia Environmental Protection Division Underground Storage Management Program (USTMP) to document the alternative remedial approach for Release #3 at the Bulk Fuel Facility.

In order to address free product more assertively, Fort Stewart is proposing an excavation of the soil that exceeds the alternate threshold level (ATL) in addition to free product. Contaminated soil will be excavated in the areas impacted above the applicable limits as determined by utilizing the direct push technology field and laboratory data sets. Fort Stewart is also proposing to leave the excavation open in order to monitor any free product recharge. Four new groundwater monitoring wells will be installed. Groundwater concentrations will be monitored to ensure levels are less that the Alternate Concentration Levels (ACLs) or In-stream Water Quality Standards (IWQS).

Fort Stewart appreciates your consideration of this recommendation. If you have any questions or comments regarding the enclosed report, please contact Ms. Algeana Stevenson at (912)315-5144 or Ms. Tressa Rutland, Directorate of Public Works, Environmental Branch, at (912)767-2010.

Sincerely,

for Thomas C. Fry
Acting Director, Public Works

Enclosure

ARCADIS

1. Corrective Action Plan Certification – Part B

Facility Name:	Former AST 7001/7003 (HAA-9)			Street Address:	Bulk Fuel Facility		
Facility ID:	9-025113*3	City:	Hunter Army Airfield	County:	Chatham	Zip Code:	31409
Latitude:	32° 00′ 54″	Longitude:	81° 08′ 26″				

Submitted by UST Owner/Operator:				Prepared by Consultant/Contractor:			
Name:	Tressa Rutland/ Environmental Branch			Name:	Charles Bertz		
Company:	U. S. Army/HQ 3d, Inf. Div. (Mech)			Company:	ARCADIS		
Address:	DPW ENRD ENV. Br. (Fry)			Address:	801 Corporate Center Dr.		
	1550 Frank Cochran Drive, Bldg. 1137				Suite 300		
City:	Fort Stewart	State:	GA	City:	Raleigh	State:	NC
Zip Code:	31314-4927			Zip Code:	27607		
Telephone:	(912) 767-2010			Telephone:	(919) 854-1282		

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 the plan satisfies all criteria and requirements of rule 391-3-15-09 of the Georgia Rules for Underground Storage tank Management.

Name: Tressa Rutland

Signature:_____ Date:_____

B. REGISTERED PROFESSIONAL ENGINEER OR PROFESSIONAL GEOLOGIST CERTIFICATION

I hereby certify that I have directed and supervised the fieldwork and preparation of this plan in accordance with State Rules and Regulations. As a registered professional geologist and/or professional engineer, I certify that I am a qualified groundwater professional, as defined by the Georgia State Board of Professional Geologists. All of the information and laboratory data in this plan and in all of the attachments are true, accurate, complete, and in accordance with applicable State Rules and Regulations.

Name: Scott Bostian, PE

Signature:

Date: 3/10/09

Check all boxes 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

☐ Not Applicable The extent of contamination, and the local & site hydrogeology requirements have been fulfilled under the CAP Part A, therefore additional SIR reporting is not necessary.

☒ Extent of Contamination:

☒ Soil ☐ Groundwater ☒ Free Product ☐ Surface water

☒ Local and Site Hydrogeology:

☒ 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

III. REMEDIAL ACTION PLAN

A. Corrective Action Completed or In-Progress:

☐ Not Applicable

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

☐ Remediation/Treatment of Contaminated Soils

☐ Other (specify)

B. Objectives of Corrective Action:

☐ No Further Action

☒ Remove Free Product That Exceeds One-Eighth Inch

☒ Remediate Groundwater Contamination That Exceeds:

☐ Maximum Contaminant Levels (MCLs)

OR

☒ In-stream Water Quality Standards

B. Objectives of Corrective Action (CONTINUED):

☒ Remediate Soil Contamination That Exceeds:

☐ Threshold Values Listed In Table A

OR

☐ Threshold Values Listed In Table B

OR

☒ Alternate Threshold Levels (ATLs) (Reference CAP A App. I)

☐ Provide Risk-Based Corrective Action (Reference CAP B App. I):

☒ 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 – 391-3-15-.09(3).

C. **Design and Operation of Corrective Action Systems:**

☒ Soil ☒ Groundwater ☒ Free Product ☐ Surface water ☐ Not Applicable

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

AND / OR

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 A have not changed.

☐ Certified Letters to Adjacent, 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 (specify) _____

_____

☐ GUST Trust Fund Application - (attach if applicable)

☐ Cost Proposal:

☐ A Total of All Costs Incurred To Date (MUST INCLUDE THE FOLLOWING):

- ▶ Invoices and Proofs-of-Payment For All Costs Incurred To Date
- ▶ Invoices itemized on the GUST-4D
- ▶ All Non-Eligible Costs Clearly Identified as such
- ▶ Incurred Costs Itemized per GUST-92 form or EPD provided form/specifications

☐ A Total of Estimated Costs To Complete Corrective Action

- ▶ Estimated Costs Itemized per GUST-92 form or EPD provided form or specifications

☐ Total Project Costs

☐ Proposed Schedule For Reimbursement

☐ Lump Sum Payment Upon Completion Of Corrective Action

OR

☐ Interim Payments With Final Payment Upon Completion

OR

☐ EPD Established Payment Schedule

2. Site Investigation Report

This Corrective Action Plan (CAP) Part-B addresses Release #3 at the Bulk Fuel Facility (BFF) at Hunter Army Airfield (HAAF), Georgia. The BFF is approximately 600 by 1,200 feet and covers an area of approximately 16.5 acres (Figure 1). Currently, the facility contains two aboveground storage tanks (ASTs) for the storage of Jet Propellant-8 with capacities of approximately 500,000 gallons each, aboveground and underground piping, and off-loader and pump stations for the distribution of fuel to and from the tanks. Previously, remediation activities have been conducted in the area to address contamination identified as Release #1 and Release #2. Release #1 consisted of contamination associated with former Underground Storage Tank (UST) 117, Facility ID #9-025113*1, which was located near Building 7002. The UST was abandoned in place on September 30, 1996. A soil gas survey was conducted in January 1999 to identify areas of significant contaminant concentrations (SAIC 1999). A CAP-Part A investigation was conducted in December 1999 and January 2000 and a CAP-Part B investigation was conducted from November 2000 to March 2001 to determine the extent of petroleum contamination at the site. 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 for Former Underground Storage Tank 117, Building 7002, Facility ID #9-025113*1, Bulk Fuel Facility (HAA-09), Hunter Army Airfield, Georgia (SAIC 2001) was submitted to Georgia Environmental Protection Division (GA EPD) UST Management Program in July 2001. The report recommended that seven monitoring wells (i.e., BF-MW-19, BF-MW-20, BF-MW-21R, BF-MW-22, BF-MW-32, BF-MW-33, and BF-MW 34) be sampled on a semiannual basis for benzene, toluene, ethylbenzene, xylenes (BTEX) and naphthalene (constituents of potential concern in groundwater).

In July 2002 and January 2003, free product was observed in well BF-MW-E5, which is located in the vicinity of AST 7009. This tank is approximately 500 feet northeast of AST 7003, where the Release #1 groundwater plume was being monitored. Free product had not been observed in this well during the CAP-Part B investigation for Release #1. During that investigation, the BTEX and polyaromatic hydrocarbon (PAH) constituents detected in the well were below the maximum contaminant level, the In-Stream Water Quality Standard (IWQS), and the alternate concentration limit (ACL) and groundwater

monitoring of the area was recommended. It was apparent that there were two separate releases at the BFF. For clarification, Release #1 was associated with the groundwater plume in the vicinity of AST 7003 where the original semiannual monitoring only program was conducted. Georgia EPD granted no further action for Release #1 in correspondence dated October 6, 2003 (Lewis, 2003). Release #2 is associated with the free product observed in well BF-MW-E5, which is in the vicinity of AST 7009 and has been assigned Facility ID #9-025113*2. Free product removal activities are currently being conducted for Release #2 in well BF-MW-E5.

UST 117 was closed in place on September 30, 1996. CAPE Environmental removed UST 117 in May 2006. No concrete pad, dispenser island, or fuel piping was found in association with UST 117 during this removal. The concrete foundations of former ASTs 7001 and 7003 were also removed by CAPE Environmental in May 2006. AST 7005 was removed in October 2007. During the removal of the concrete foundations of former ASTs 7001 and 7003 in May 2006, free product was discovered approximately 3 to 4 feet below ground surface (ft bgs) at the former location of AST 7003. This was identified as Release #3. Four 2-foot diameter sumps were installed by CAPE Environmental in the area of former AST 7003 to collect free product. A subcontractor to HAAF, Griffin Services, was contracted to measure the level of free product in the sumps and pump the free product on a routine basis from May through August 2006. In an effort to delineate free product associated with Release #3, forty-two (42) 1.625-inch diameter monitoring points (FP-1 through FP-42) were installed on approximate 50-foot centers in the area of former ASTs 7001 and 7003 in November 2006 (Figure 2).

In February 2006, 23 monitoring wells associated with Release #1 (MW-01, MW-02, MW-03, MW-06 through 14, MW-17, MW-18, MW-20, MW-21R, MW-22, MW-23, MW-28, MW-29, MW-30, MW-31, and MW-32) located throughout the BFF were abandoned (Figure 3). The abandonment was documented in the Completion Report for Former Underground Storage Tank 117, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia, dated April 2006. Six monitoring wells (MW-15, MW-16, MW-19, MW-24, MW-33, and MW-34) located around the perimeter of the site that could not be located initially were abandoned in January 2008. Monitoring wells around Tank 7009 were left for potential future use for monitoring associated with Release #2.

In December 2008, liquid levels were measured in the 42 Free Product (FP) monitoring points and 4 sumps. Measurements indicated free product in a number of points and two sumps in the area around former AST 7003 and free product in one monitoring point around former AST 7001.

2.1 Regional, Local, and Site Hydrogeology

A discussion of the regional, local, and site hydrogeology was presented in the CAP Part A, Former Underground Storage Tank 117, Building 7002, Facility Identification Number 9-025113*1, Bulk Fuel Facility (HAA-09) Hunter Army Airfield, Georgia (SAIC 2000), which addressed Release #1. The area impacted by Release #1 is predominantly the same as that impacted by Release #3 and the following hydrogeology and geological information is applicable to Release #3. The geology and hydrogeology are summarized below.

2.1.1 Groundwater Usage

According to the Groundwater Pollution Susceptibility Map of Georgia (GA EPD 1992), the impacted area is located within an average or higher groundwater pollution susceptibility area. Five public groundwater supply wells are located within a 2-mile radius of the site. Four of these wells (PWS #1, PWS #2, PWS #3, and PWS #4A) are located within the confines of HAAF. The other well (PWS #25) is located approximately 0.8 mile northwest of the site in Savannah, Georgia. All the groundwater supply wells are classified as public wells and supply water either to HAAF or the City of Savannah for drinking and non-drinking purposes. These wells range in depth from approximately 300 feet to 600 feet deep and draw groundwater from the Principal Artesian (also known as the Floridian) Aquifer. A complete discussion of the water supply wells at HAAF and those near the site is provided in Appendix D. Locations of the wells within the 2-mile radius and within a 500-foot radius are also presented in Figure D-1 in Appendix D.

2.1.2 Aquifer Description

As presented in the CAP Part A (SAIC 2000), which addressed Release #1, 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 to Georgia, Alabama, and most of Florida. Known elsewhere as the Floridan, this aquifer, approximately 800 feet in total thickness, is composed primarily of Tertiary-age limestone, including the Bug Island Formation, the Ocala Group, and the Suwannee Limestone. Groundwater from the Floridan is used primarily for drinking water (Arora 1984).

The confining layer for the 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 utilization (Miller 1990). The surficial aquifer overlies the Hawthorn confining unit.

The surficial aquifer consists of widely varying amounts of sand and clay. 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. Groundwater encountered at HAAF UST/AST investigation sites is part of the surficial aquifer system.

Based on the facts that all public and non-public water supply wells draw water from the Floridan aquifer and that the Hawthorn confining unit separates the Floridan aquifer from the surficial aquifer, it is concluded that there is not likely to be hydraulic interconnection between HAA-09 sites (and associated plumes) and water supply withdrawal points.

2.1.3 Surface Water

The water resources survey conducted during the CAP-Part A Site Investigation for Release #1 is presented in Appendix D (SAIC 2000). The information was revised and updated as noted. Surface water bodies including Lamar Canal, Pond 29, and several unnamed drainage ditches are located within a 1-mile radius of the site and are shown in Appendix D. Lamar Canal is located approximately 180 feet south-southeast (downgradient) of the Release #3 area. A series of storm drains and catch basins are located along the southern border of the BFF. They were formerly used to drain the bermed area around each of the ASTs (Figure 3). One of the storm drains is located approximately 120 feet from the area of greatest soil and groundwater contamination in the vicinity of AST 7003. The invert elevation of the storm

drain is unknown; however, based on shallow depth to the water table, it is assumed that the storm drain is below the water table. Therefore, the storm drain is considered as a preferential pathway. Based on the location of Lamar Canal relative to the associated plumes, the site is classified as being located less than 500 feet from a surface water body.

2.1.4 Site Stratigraphy

As determined from soil borings drilled during the UST 117 CAP-Part A and CAP-Part B Site Investigations, the lithology present within 15 feet of the surface at the site appears to correlate with the regional stratigraphic section. The lithology underlying the area consists of interbedded layers of sand with varying amounts of silt and clay concluded to be part of the Satilla Formation. Soil groups at HAAF include the Chipley, Leon, Etabelle, Kershaw, Pelham, Albany, Wahee, and Ogeechee (Wilkes et al.1974). Boring logs for wells installed as part of the Site Investigation for the June 2000 CAP – Part A and the July 2001 CAP – Part B for UST 117 and not abandoned are provided in Appendix C.

2.1.5 Direction of Groundwater Flow

Water level measurements were collected during the CAP-Part A site investigation after monitor well installation in January 2000 and during CAP-Part B site investigation groundwater sampling activities in March 2001. Water level measurements were also taken during subsequent monitoring events. Groundwater at the site was determined to flow generally to the southeast. Groundwater potentiometric surface measurements taken in January 2003 and January 2005 are presented on Figures 4a and 4b, respectively.

2.2 Horizontal and Vertical Extent of Contamination

The extent of petroleum-related contamination in the form of free product associated with Release #3 was delineated by activities performed in 2006 and 2008. A summary of the results from these activities is presented below.

2.2.1 Delineation of Soil Contamination

Forty-two (42) 1.625-inch diameter free product monitoring points (FP-1 through FP-42) were installed on approximate 50-foot centers in the area of

former ASTs 7001 and 7003 in November 2006 (Figure 2). During the installation, a Photo Ionization Detector (PID) was used to obtain volatile organic compound (VOC) concentrations from the borehole. Readings ranged from less than one part per million (ppm) to 1,400 ppm. The results are presented on Figure 5. Although the method used is imprecise, the results are useful in providing an initial estimate of impacted soil area. The impacted area estimated from these data corresponds in general with the area where free product was detected.

As part of the corrective actions described in Section III, horizontal and vertical extent of soil contamination, including soil contamination at or below the water table, will be delineated to non-detect via analysis of samples taken with Direct Push Technology (DPT). The samples will be analyzed with field and laboratory methods. After the investigation with DPT is complete, horizontal and vertical components of subsurface soil contamination will be displayed on site maps and cross-sections. All analytical data will be summarized in tabular form. Detailed description of the investigation scope is presented in Section III.

Refer to the CAP–Part A (SAIC 2000) and the CAP–Part B (SAIC 2001) for UST 117, for documentation of the previous soil delineation and assessment activities associated with Release #1 in the same area.

2.2.2 Delineation of Groundwater Contamination

There has not been any groundwater sampling conducted in the area since January 2003. Because most of the monitoring wells in the area of former ASTs 7001 and 7003 were abandoned in early 2006 and the rest in 2008, there is not any groundwater contaminant concentration data subsequent to the May 2006 discovery of the contamination designated as Release #3. These monitoring wells were associated with Release #1 and were abandoned based on the granting by Georgia EPD of No Further Action (NFA) status for Release #1. The vertical and horizontal extent of groundwater contamination will be assessed with DPT in conjunction with the delineation of soil contamination. The extent will be determined for each BTEX and PAH constituent. Isoconcentration contours will be plotted on a site map. After excavation and site restoration, monitoring wells will be installed as described in Section III. Previous vertical profile borings for Release #1 (CAP-Part A) investigation indicated that contamination was limited to the upper interval of the shallow aquifer and a similar distribution is anticipated for Release #3.

Refer to the CAP-Part A (SAIC 2000) and the CAP–Part B (SAIC 2001) for UST 117 for detailed documentation of the previous groundwater delineation and assessment activities associated with Release #1.

2.2.3 Delineation of Free Product

After discovery of free product during removal of the foundation for former AST 7003 (Release #3), four 2-foot sumps were installed in the former AST 7003 area to collect free product. Griffin Services was contracted to measure the level of free product in the sumps and to extract free product on a routine basis starting in May 2006 and continuing through August 2006. The results of these activities are in Appendix F.

In order to delineate free product associated with Release #3, 42 monitoring points (FP-01 through FP-42) were installed on approximate 50-foot centers in the area of former ASTs 7001 and 7003 in November 2006. The monitoring points were constructed with 1.625-inch diameter polyvinyl chloride (PVC) 0.010-slot screen and installed from ground surface to 4.5 ft bgs. Filter pack sand was poured around the annulus between the borehole and screen. The locations of the free product monitoring points are presented in Figure 2. Free product monitoring point construction diagrams are included in Appendix E (SAIC 2007). No liquid (water or free product) was measured in the monitoring points after installation in November 2006. Free product removal or monitoring activities were not conducted in 2007.

Liquid levels were measured in the sumps and monitoring points in December 2008. Free product was detected in monitoring points FP-04, FP-05, FP-06, FP-08, FP-13, FP-37 and FP-38. Free product was detected in Sump 1 and Sump 4 at 0.21 feet and 0.12 feet, respectively. Sheen was observed in monitoring point FP-40 and Sumps 2 and 3. The free product detections are illustrated on Figure 6. After additional data are obtained on free product distribution with DPT investigation, site figures will be created presenting the estimated horizontal and vertical extent of the free product.

2.2.4 Delineation of Surface Water and Sediment Contamination

Results from the surface water and sediment samples collected during the CAP–Part A investigation for Release #1 indicated that the surface water in Lamar Canal was not being impacted by contamination from the BFF.

Therefore, additional samples were not recommended (SAIC 2000) and surface water and sediment samples have not been collected since. The need for surface water samples or sediment samples will be evaluated based on contaminant concentrations in downgradient wells and fate and transport modeling.

3. Remedial Action Plan

3.1 Corrective Action Completed or in Progress

3.1.1 Recovery/Removal of Free Product

Four 2-foot sumps were installed in the area of the removed AST 7003 foundation to collect free product in May 2006. A subcontractor to HAAF was contracted to measure the level of free product in the sumps and to pump the free product on a routine basis starting in May 2006 and continuing through August 2006. The pumping activities were documented in the Third Annual Monitoring and Free Product Removal Report (SAIC July 2007) and a table of results from that report is included as Appendix F.

Forty-two free product monitoring points were installed in November 2006. The monitoring points contained no free product or other liquids when measured in November 2006. No free product removal activities were conducted in 2007 or 2008.

3.1.2 Remediation/Treatment of Contaminated Backfill Material and Native Soil

The concrete foundations of former ASTs 7001 and 7003 and UST 117 were removed by CAPE Environmental in May 2006. During the removal of the concrete foundations, free product was discovered approximately 3 to 4 ft bgs at former location of AST 7003. Soil that was excavated to recover and remove the UST and concrete pads was temporarily staged on the site to determine approval for reuse as backfill material. Analytical results from the soil samples indicated positive detections of BTEX (estimated value) and gasoline range organics (GRO). The contaminated soil was removed as part of these activities.

3.2 Objectives of Corrective Action

3.2.1 Remove Free Product That Exceeds One-Eighth Inch at the Former AST 7001/7003 (Release #3)

In 2006, free product was detected in excess of 1/8 inch. Four 2-foot sumps were installed and free product recovery was performed from May through August 2006. In 2006, the maximum free product thickness in the sumps was

0.88 foot. Forty-two monitoring points were installed in November 2006, but liquid was not detected. Liquid levels were measured again in December 2008 and free product in excess of 1/8-inch thickness was observed in monitoring points FP-04, FP-05, FP-06, FP-08, FP-37, FP-38, Sump 1 and Sump 4 in the area of Former AST 7003. Free product in excess of 1/8 inch was also measured in FP-13, which is in the area of Former AST 7001.

The objective of free product removal activities will be the aggressive elimination of saturated and unsaturated soil containing free product such that free product in excess of 1/8-inch thick will not be present. Free product removal activities will include excavation of soil containing free product. The excavation interval will encompass the historic smear zone. The excavation will remain open and will be monitored for free product recharge. Vacuum enhanced free product recovery actions will be initiated if free product is detected.

3.2.2 Remediate Groundwater Contamination at the Former AST 7001/7003 (Release #3)

Groundwater contamination will be remediated to In-Stream Water Quality Standards (IWQS) or ACLs. Monitoring wells in the vicinity of Former AST 7003 have been abandoned and cannot be sampled. Monitoring wells will be installed after excavation to determine the extent, if any, of groundwater contamination exceeding IWQS or ACLs. The estimated optimal monitoring well locations are shown on Figure 7. Monitoring well locations will be evaluated and adjusted after the DPT investigation and excavation are complete. ACLs will be calculated based on the sampling data from the DPT Investigation and the new monitoring wells. Based on the location of the free product associated with Release #3, the ACLs will likely be similar to values calculated for Release #1. A groundwater monitoring plan will be included in the report on DPT Investigation and Excavation.

3.2.3 Remediate Soil Contamination at the Former AST 7001/7003 (Release #3)

Soil contamination will be reduced to below Alternate Threshold Limits (ATLs). The corrective action for soil remediation will include direct push soil borings installed in the area where free product was measured in the monitoring points (Figure 8). Based on concentrations and distribution of soil contamination from this investigation, ATLs will be calculated for Release #3. As with groundwater ACLs, these values will likely be comparable to those calculated for Release

#1 based on similar contaminant and receptor locations. The extent of soil contamination with concentrations exceeding the ATL will be determined from the analytical results and presented on figures included in the subsequent report.

Excavation activities will remove source material (free product) and soil with concentrations exceeding the ATLs. The estimated location of this excavation is provided on Figure 9. Additionally, an oxygen source will be applied to the bottom of the excavation to enhance biodegradation of residual contamination.

3.2.4 Provide Risk-Based Corrective Action

During the development of the CAP for Release #1, a risk-based approach was used to determine the need for further action at the site. Due to the nature of the contamination, which is similar to Release #3, the risk-based approach was limited to human health concerns. Ecological risk concerns are negligible because of the land use surrounding the site. During evaluation for Release #1, the analytical results from surface water and sediment sampling in the drainage ditch indicated that habitat potentially associated with Lamar Canal was not impacted by the former AST operations. Additional sampling of surface water/sediment will be determined based on sampling results from downgradient monitor wells that will be installed after excavation activities are complete.

The methods for assessing human health concern for the site were derived from Georgia Underground Storage Tank (GUST) CAP-Part B guidance (GA EPD 1995) and GA EPD guidance (1996). The detailed risk-based corrective action (RBCA) evaluation and calculations will be performed after additional soil and groundwater data are collected as previously described.

3.2.4.1 Potential Receptor Survey

The exposure assessment identifies any potentially complete pathways between the contaminant source and potential receptors. This involves 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 Former AST 7001 and 7003 sites are located within an active military installation and within an access-controlled fence. Lamar Canal is located approximately 180 feet south-southeast (downgradient) of the site. A series of storm drains and catch basins are located along the southern border of the BFF and were used to drain the area around the former ASTs. One of these storm drains is located 120 feet from former AST 7003 location.

No connection between site contamination and current off-site receptors was identified during current or previous evaluations. Site contamination associated with Release #1 migrated to the surficial aquifer only, and Release #3 will likely behave similarly. The Hawthorne Group, which is approximately 90 feet of clay, separates the surficial aquifer from the deep drinking water aquifer, the Floridian aquifer. The Hawthorn Group, a thick and highly effective confining unit, separates the water supply wells from the surficial aquifer.

Current on-site receptors have not been identified for the site. Potential future on-site receptors might include industrial workers and military residents. Potential future on-site industrial receptors may come in direct 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 (SAIC 2001).

3.2.4.2 Screening for Chemicals of Potential Concern

3.2.4.2.1 Screening Methodology

The purpose of a risk evaluation screening is to identify the chemicals of potential concern (COPCs) and areas of concern at a site. Free product associated with Release #3 has been identified and remedial action will be implemented. The first step in the risk process will use screening levels that are readily obtainable and that, due to their conservative nature, can be used with a high degree of confidence to indicate site risk status.

3.2.4.2.2 Site-Specific Levels

Detections exceeding the conservative generic screening levels are considered to be COPCs. ATLs and ACLs will be developed, when appropriate, for the COPCs using site-specific information from fate and transport modeling and applicable regulatory levels.

3.2.4.2.3 Alternate Threshold Levels

The ATLS will be calculated if soil data indicate that residual soil contamination concentrations exceed the GUST Soil Threshold Levels. Benzene, ethylbenzene, toluene and xylenes were identified as COPCs for soil for Release #1. ATL calculations for Release #1 for these compounds are presented in Appendix G for reference. These ATLs for soil at the site were determined in the previous CAP for Release #1, and ATLs calculated for Release #3 will likely be similar.

3.2.4.2.4 Alternate Concentration Limits

The ACLs will be calculated if groundwater concentrations in the monitor wells exceed IWQS values or risk-based screening criteria. The ACLs will be based on analytical data from the monitor wells installed in the "hot-spots" after excavation. For Release #1, benzene and naphthalene were identified as COPCs for groundwater at the site. Benzene and naphthalene were modeled to the potential downgradient location where a receptor may come in contact with migrating site contamination. This was determined to be a storm drain located 120 feet downgradient from the center of the source area (abandoned Monitor Well MW-22). Based on the current free product distribution, the center of the source area for Release # 3 will likely be roughly the same location. For release #1, fate and transport modeling was used to develop a site-specific dilution attenuation factor (DAF) between the source and receptor location. The modeling results estimated a DAF for benzene of 8.9 and a DAF of 126.3 for naphthalene. Compound specific regulatory levels or risk-based screening criteria were used in conjunction with site-specific DAFs identified for the potential migration of contaminants from the site to determine the ACL for each compound. The ACL calculations for Release #1 are included for reference in Appendix G.

3.2.4.2.5 Fate and Transport Model

As described above, DAFs were calculated for Release #1 and will be recalculated after DPT sampling, monitoring well sampling and excavation data for Release #3 are available. DAFs between the source and the receptor locations specific to Release #3 will be developed. Fate and transport models such as analytical transient 1,2,3-dimensional (AT123D) or other appropriate model are used as tools for developing DAFs. The application of fate and

transport models at any release site must ensure that the modeling results are protective of human health and the environment. Therefore, the selection process of a predictive model at the release site will consider its performance, characteristics, and applicability to the site being considered. If the maximum soil concentration of a COPC at the site is above the water table, modeling of leaching to groundwater by percolating rainwater will be performed using seasonal soil (SESOIL) or other appropriate model in order to determine the predicted maximum concentration in the leachate at the water table interface and the soil ATLs. The potential receptor is a storm drain approximately 120 feet southwest of the site. This storm drain is part of a series of drains used to drain the bermed areas around the ASTs at the BFF. These drains empty into Lamar Canal. This is the nearest possible location at which a receptor might encounter migrating groundwater contamination due to a possible hydraulic connection between the groundwater and the surface water in Lamar Canal (SAIC 2001). The fate and transport modeling results from the CAP-Part B for UST 117 (Release 1) are presented in Appendix H for reference.

3.2.4.2.6 Conclusions and Recommendations

The initial goal of the proposed remedial approach will be removal of free product so that no hydrocarbon layer which exceeds 1/8 inch in thickness is detected in the monitoring points, sumps or monitoring wells.

Along with free product removal, soil contamination exceeding ATLs will be also be excavated and transported off site. Groundwater concentrations will be monitored to ensure levels are less than the ACLs or IWQS and are attenuating.

4. Design and Operation of Corrective Action

Prior to any invasive site work (direct push sampling, excavation, monitor well installation), all required permits and utility clearances will be obtained.

The data available on groundwater elevations consisted of data sets from the CAP Part A Site Investigation (SAIC 2000) for Release #1 in January 2000 through water level data recorded as part of the monitor well abandonment in February 2006. The data show that depth to water in the area of former AST 7003 (based on MW-20, MW-21, MW-22, MW-23) has ranged from 1.5 to 4 ft bgs). The depth to water in the area of former AST 7001 (based on MW-17) has ranged from 1.3 to 3.1 ft bgs. The free product monitoring points installed in the area of former ASTs 7001 and 7003 were measured in November 2006 and recorded as containing no liquid. The points were installed with screen to depth of 4.5 ft bgs. Groundwater elevations from monitor wells were not available to confirm the groundwater elevations during that time. Water levels in those same points ranged from 1.5 to 3 ft bgs in December 2008. Based on the preceding information, the smear zone is estimated to be within 1 to 5 ft bgs.

4.1 Investigation

The goal of the DPT investigation is to define the limits of soil with petroleum hydrocarbon contamination that exceeds the regulatory limits. All soil within these limits will be excavated and transported off-site as described below. Therefore, there will be fewer DPT locations in areas where light non-aqueous phase liquid (LNAPL) is known to be present and more points as the investigation steps out from the known LNAPL areas. The vertical extent of the investigation will include the smear zone to evaluate all source mass. In selected "hotspot" locations, groundwater samples will be taken to establish vertical extent for subsequent monitor well installation.

Liquid levels will be measured in free product monitor points and sumps prior to starting DPT investigation. Approximately 25 DPT points will be installed in the vicinity of former ASTs 7001 and 7003 to delineate the free product and impacted soil. Groundwater samples will also be taken to evaluate vertical and horizontal impacts and to guide location and screen interval selection for monitor wells that will be installed after excavation related activities are completed. The first set of DPT points will be at the estimated limits of free

product. Subsequent DPT points will be located based on the first set of screening results such that the extent of contaminated soil is defined. Approximately five DPT points will be installed in the area known to be impacted by free product to verify vertical free product distribution. DPT for soil and free product investigation will continue until vertical and horizontal distribution of source contamination is defined. Field screening results will be used to determine extent of contamination and guide selection of locations for sample collection for laboratory analysis. Screening results will be obtained through visual inspection of soil samples, measurement of VOC headspace concentrations and other methods if necessary. For each 2-foot interval, soil grab samples will be collected in glass jars and covered with aluminum foil. After allowing at least 15 minutes for volatilization and temperature equilibration, the headspace VOC concentration will be measured with a PID with the proper lamp (11.7 eV) to quantify the VOCs.

DPT locations for contaminated soil delineation will extend to a depth of 5 to 7 ft bgs. Samples will be collected at intervals determined with field screening equipment. A second set of twinned temporary borings will be installed to collect sample tubes from the subset of initial borings that showed elevated vapors but were outside the area obviously impacted by LNAPL. When no VOCs are detected during screening, a laboratory confirmatory sample will be taken at the interval just above the water table. When VOCs are detected in one or more of the borehole intervals, samples for laboratory analysis will be selected from the most contaminated interval. Soil samples will be analyzed for United States Environmental Protection Agency (USEPA) Method 8260B and USEPA Method 8270C in accordance with GUST Guidance. Please note that because groundwater samples will be collected at the worst-case locations, soil samples will not be analyzed for USEPA Method 8015B-GRO and diesel range organics (DRO).

Two soil borings in the area with the highest VOC concentrations will be advanced into the water table to collect groundwater samples for vertical delineation. A screen-point sampler will be advanced to 15 feet to collect groundwater quality samples. The average depth for the initial collection of groundwater samples will be approximately 4 to 5 ft bgs. Samples will also be collected at 5-foot intervals to 15 ft bgs. Two locations will be selected downgradient of the source areas for collecting groundwater samples at 5-foot intervals to a total depth of 15 ft bgs. Groundwater samples will be analyzed for USEPA Method 8260B and USEPA Method 8270C. Please note that previous

vertical investigations in the area for Release #1 determined that dissolved contamination was located predominantly above 15 ft bgs and that the Hawthorne Formation was encountered at approximately 40 ft bgs.

Soil samples will also be taken during the DPT Investigation for analysis of additional parameters (e.g., toxicity characteristic leaching procedure [TCLP]) as required for transportation and disposal of contaminated soil and water in accordance with applicable regulations.

4.2 Excavation

Contaminated soil will be excavated in the areas impacted above the applicable limits as determined utilizing the DPT field and laboratory data sets. The depth of the excavation will be determined based on DPT results and historical water table fluctuations (smear zone). The initial estimate of excavation depth is 5 feet but this depth will be adjusted based on field results. Free product points and product recovery sumps in the area targeted for excavation will be removed during excavation. All excavations will be sloped to prevent collapse. The slope angle will be no greater than 2H:1V (angle of repose for sand). Dewatering pumps will be utilized to allow effective excavation of entire smear zone depth. Storage tanks will be brought to the site for containment of water extracted from the excavation.

All excavated soils that could potentially be reused will be stockpiled on polyethylene sheeting covering a perimeter of hay bales or bermed soil to prevent runoff of sediments. Because of the shallow water table and related high smear zone, reuse of soil is not anticipated. Any soil potentially returned to the excavation will be sampled for laboratory analysis by USEPA Methods 8260 and 8270. Each stockpile considered for reuse will be sampled in accordance with USEPA guidance procedures.

Based on the investigation results, the horizontal and vertical limits of soil contaminated above applicable limits will be established. Soil within that area will be excavated and directly loaded into trucks for transportation to an off-site disposal facility.

In case of transportation interruptions, contaminated soil will be placed on bermed lined storage areas or, if the quantity is small, in plastic-lined construction roll-offs. The storage areas and/or roll-offs will be staged in

accordance with direction from HAAF personnel and in compliance with all applicable regulations.

Any construction debris that is encountered will be transported for disposal in a construction and demolition (C&D) waste landfill.

After excavation activities are complete, soil samples will be taken from the bottom of the excavation and from the sidewalls of the excavation for field screening. If screening results or visual examination indicate the presence of residual soil contamination, samples will taken for analysis by USEPA Method 8260 and USEPA Method 8270. At a minimum, confirmation samples for laboratory analysis will be taken from each sidewall and the bottom of the excavation in accordance with GUST guidance. The effectiveness of bottom samples will evaluated based on relative water level.

The excavated area will be maintained open for free product evaluation. The area around the excavation will be marked with warning tape and access will be controlled. Enhanced fluid recovery (EFR) events may be performed to address any free product that is detected in the excavation. Backfilling of the excavation will commence following completion of the removal of the impacted soil and verification of free product removal. An oxygen-releasing compound will be applied to the bottom of the excavation along with approximately 1 foot of coarse sand. Although unlikely, if the excavation bottom is above the water table, the oxygen-releasing material will be hydrated. After verification of acceptable contaminant levels, uncontaminated soil, if any, will be returned to the excavation. Soil from an approved borrow source will comprise the remainder of the backfill. The remediation area will be cleaned of all sediment and debris. All areas will be graded to match existing conditions.

4.3 Installation of Monitoring Wells

At least four groundwater monitor wells will be installed after backfill and compaction activities are completed. The estimated optimal locations for the wells are shown on Figure 7. Monitor well locations and number will be evaluated and adjusted if necessary based on data from investigation and excavation. The wells will be installed by utilizing hollow-stem auger drilling techniques to a depth of approximately 15 ft bgs. The wells will be constructed with 2-inch schedule 40 PVC pipe and screened from 3 to 13 ft bgs. Monitoring wells installed in areas previously impacted by free product will be 4-inch

schedule 40 PVC pipe with the same screen interval. Screen interval will also be adjusted if necessary based on investigation and excavation data. The wells will be finished with flush-mount surface completions. Each well will be developed to ensure filter packs are clear and free of fines. Well installation will be performed under the supervision of a Professional Engineer or Professional Geologist registered in Georgia. Monitor well installation will be in accordance with the Georgia Environmental Protection Division Manual for Groundwater Monitoring.

Monitor wells installed at the site will be sampled semiannually for analysis of COPCs. Sampling will continue to ensure concentrations are below either IWQS or ACLs as designated by the regulatory agency and are attenuating.

4.4 Implementation

4.4.1 Milestone Schedule

A milestone schedule for the proposed corrective action has been prepared. A Gantt chart showing milestone activities and anticipated duration is provided in Figure 10. HAAF will notify GA EPD of any significant changes to the schedule and will provide GA EPD with an updated Gantt chart, as necessary.

4.4.2 Progress Reporting

A semiannual progress report will include:

1. Project summary
2. Activities and assessment of existing conditions
3. Analytical data
4. Site ranking
5. Conclusions and recommendations on corrective action status.

4.4.3 Certificate of Completion Report

A completion report will be prepared at the conclusion of the corrective action and post-remediation monitoring work. The report will summarize the corrective actions accomplished and provide data confirming achievement of the remediation objectives set forth in Section III.B. The report will be submitted within 30 days of completing all corrective actions specified in this plan. The completion report will include the following certification:

I hereby certify that the Corrective Action Plan–Part B, dated February 2, 2009, for Hunter Army Airfield, Former AST 7003 site (Release #3), Facility ID #9-025113*3, including any and all certified amendments/addenda 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)

4.4.4 Inspection Schedule and Preventative Maintenance Program

The current plan does not require the installation of a permanent remediation system for HAA-09 Release #3. Thus, on-site inspection and preventative maintenance are not applicable.

4.4.5 Periodic Monitoring

Monitoring wells will be measured and sampled on a semiannual basis until groundwater contaminant concentrations are below the regulatory limit.

4.4.6 Effectiveness of Corrective Action

Monitor wells will be measured to verify effective removal of free product. Groundwater samples will be collected from each monitoring well to document groundwater contaminant concentrations. Groundwater contaminant concentrations will be evaluated for trends and progress toward remediation goals.

4.4.7 Confirmatory Soil Sampling Plan

For the former AST 7001 and 7003 site (Release #3), excavation of soil is planned in accordance with limits determined by DPT investigation. Confirmatory sampling of the excavation associated with excavation of soil will be performed with field screening and samples for laboratory analysis.

4.4.8 Stockpiled Bulk Soil Sampling

For the former AST 7001 and 7003 site (Release #3), stockpiled soil will not be generated by this corrective action. The soil will have been characterized with DPT investigation prior to excavation and will be directly loaded into trucks.

4.4.9 Monitoring Only Termination Conditions

The proposed remedial approach, which includes excavation will remove free product such that no measurable floating hydrocarbon layer (that which exceeds 1/8 inch in thickness) is detected in monitoring points. Soil contamination will be reduced to below threshold applicable limits with excavation and off-site disposal. Groundwater will be monitored to ensure contaminant concentrations are below applicable limits.

4.4.10 Post-Completion Site Restoration Activities

There will be no permanent equipment or systems located at the site as part of this remediation. The excavated area will be backfilled and properly compacted. The area will be graded to match existing.

4.5 Public Notification

The former ASTs 7001 and 7003 site is located entirely within the confines of HAAF, which is part of the Fort Stewart Military Reservation, a federal facility. The U. S. Government owns all of the property contiguous to the site. The Fort Stewart Directorate of Public Works (DPW) will comply with the public notice requirements defined by GA EPD guidance by publishing an announcement in the Savannah Morning News.

5. Claim for Reimbursement

HAAF is a federally owned facility and has funded the investigation for the former AST 7003 site (Release #3), Facility ID #9-025113*3 using U. S. Department of Defense Environmental Restoration Funds. Application for GUST Trust Fund reimbursement is not being pursued at this time.