FINAL

IMA

CORRECTIVE ACTION PLAN

PART B
ADDENDUM #2

3d Inf Div (Mech)

Former Pumphouse #1 (Release #1)
Facility ID #9-025085*1
Former Building 8060
Hunter Army Airfield, Georgia

Prepared for

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract No. DACA21-02-D-0004
Delivery Order 0044

July 2006

SAIC®

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FORMER PUMPHOUSE #1 (RELEASE #1)
FACILITY ID #9-025085*1
FORMER BUILDING 8060
HUNTER ARMY AIRFIELD, GEORGIA

Prepared for
U. S. Army Corps of Engineers
Savannah District
Under Contract Number DACA21-02-D-0004
Delivery Order Number 0044

Prepared by
SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
151 Lafayette Drive
Oak Ridge, Tennessee 37830

July 2006

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LIST OF ACRONYMS

ACL	alternate concentration limit
ATL	alternate threshold level
BGS	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
COPC	chemical of potential concern
CPT	cone-penetrometer-technology
DAACG	Departure/Arrival Air Control Group
DAF	dilution attenuation factor
DPW	Directorate of Public Works
F&T	fate and transport
GA EPD	Georgia Environmental Protection Division
gpm	gallons per minute
GUST	Georgia Underground Storage Tank
HAAF	Hunter Army Airfield
IWQS	In-Stream Water Quality Standard
MNA	monitored natural attenuation
NAPL	nonaqueous-phase liquid
PAH	polyaromatic hydrocarbon
STL	soil threshold level
USACE	U. S. Army Corps of Engineers
UST	underground storage tank
USTMP	Underground Storage Tank Management Program
VE	vacuum extraction

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I. CORRECTIVE ACTION PLAN CERTIFICATION – PART B

(Form and certification follow this page.)

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Georgia Department of Natural Resources

Environmental Protection Division
Land Protection Branch
Underground Storage Tank Management Program
4244 International Parkway, Suite 104
Atlanta, Georgia 30354
Phone (404) 362-2687
FAX (404) 362-2654

CORRECTIVE ACTION PLAN
PART B

Facility Name: Former Pumphouse #1 Site (Release #1)

Street Address: Former Building 8060, near Taxiway 3

City: Hunter Army Airfield **County:** Chatham

Facility ID #: 9-025085*1

Submitted by UST Owner/Operator:

Name: Thomas C. Fry/Environmental Branch
Company: US Army/HQ 3d Inf. Div (Mech)
Address: Directorate of Public Works, Bldg 1137
1550 Frank Cochran Drive
City: Fort Stewart State: GA
Zip Code: 31314-4927

Prepared by:

Name: Patricia Stoll
Company: Science Applications International Corp.
Address: P.O. Box 2501
City: Oak Ridge State: TN
Zip Code: 37831

I. PLAN CERTIFICATION

A. UST Owner/Operator

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

Name: Thomas C. Fry

Signature: _____ Date: _____

B. Professional Engineer or Professional Geologist

Name: Patricia Stoll

Signature: Patricia A Stoll

Date: 7/11/06

P Stoll 7/11/06

Georgia Stamp or Seal

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

II. SITE INVESTIGATION REPORT

☒ Note Applicable: The extent of contamination and the local and site hydrogeology requirements have been fulfilled under the Corrective Action Plan (CAP)–Part B Addendum #1 Report (SAIC 2002) and approved by GA EPD in correspondence dated February 25, 2004.

☐ Extent of Contamination

☐ Local and Site Hydrology

III. REMEDIAL ACTION PLAN:

A. Corrective Action Completed or In-Progress:

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

☐ Remediation/Treatment of Contaminated Backfill Material & Native Soils

☐ Other (specify) _____

B. Objective of Corrective Action:

☒ Remove Free Product That Exceeds One-Eighth Inch

☐ Remediate Groundwater Contamination That Exceeds:

- ☐ Maximum Contaminant Levels (MCLs)
  OR
- ☐ In-stream Water Quality Standards

☐ Remediate Soil Contamination That Exceeds:

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

☒ Provide Risk Based Corrective Action (Reference CAP B App. VI) (Section III.B.4)

- ☒ Remediate Soil and/or Groundwater Contamination That Exceeds Alternate Concentration Limits (ACLs) and Monitor Residual Contaminants
  OR
- ☐ Monitor Soil and/or Groundwater Contamination That Exceeds Levels in Rule -.09 (3) But Is Less Than ACLs
  OR
- ☐ No Further Action Required - Soil and/or Groundwater Contamination is Below Levels in Rule -.09 (3)

C. Design Operation of Corrective Action Systems

☒ **Soil** ☒ **Groundwater** ☒ **Free Product** ☐ **Surface Water**

☐ **Not Applicable**

D. Implementation (Section III.D)

Includes, as a minimum, the following:

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

IV. PUBLIC NOTICE

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

☒ Legal Notice in Newspaper, as approved by EPD (CAP-Part B Addendum #1 Report)

☐ Other EPD-approved Method (specify)_____

V. CLAIM FOR REIMBURSEMENT: (FOR GUST TRUST FUND SITES ONLY)

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

☐ Cost Proposal

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

☐ Proposed Schedule For Reimbursement

- ☐ Lump Sum Payment Upon Completion Of Corrective Action
  OR
- ☐ Interim Payments With Final Payment Upon Completion

☒ Not Applicable

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II. SITE INVESTIGATION REPORT

II.A PROJECT HISTORY

Former Underground Storage Tanks (USTs) 30 through 39 and 50 at former Pumphouse #1, Facility ID #9-025085 were located near former Building 8060 at Hunter Army Airfield (HAAF), Georgia. Former Pumphouse #1 was an aviation-gas fuel island located along the east-west taxiway of HAAF (Figure 1) that was used from about 1953 until the early 1970s, and it consisted of ten 25,000-gal USTs and a 50,000-gal underground defueling tank. The pumphouse was inactive from the 1970s to 1995. Eight of the 25,000-gal USTs were removed in 1995. The 50,000-gal defueling tank and two of the 25,000-gal tanks remained in-place, partially under the pumphouse structure. In 1998, the pumphouse structure was removed, along with the two remaining 25,000-gal USTs, and the 50,000-gal defueling tank was closed in-place. The piping from the boundary of the pumphouse facility to the bulk fuel farm was also drained, pigged, and grouted in-place.

Various closure activities and Corrective Action Plan (CAP)–Part A and CAP–Part B investigations were performed at the former Pumphouse #1 site between 1995 and 2000. The former Pumphouse #1 investigations covered an area south of the active taxiway. CAP–Part A and CAP–Part B investigations were conducted at the Departure/Arrival Air Control Group (DAACG) facility in 1995 and 1996, respectively. These investigations covered the active tarmac north of the active taxiway. Review of the analytical data from all of the investigations indicated that it was necessary to combine the DAACG facility data and the former Pumphouse #1 data to document the nature and extent of contamination. As a result, the former Pumphouse #1 CAP–Part B Report (SAIC 2000) combined the results of all the investigations into a single report, which was submitted to the Georgia Environmental Protection Division (GA EPD) in August 2000 and approved by GA EPD in correspondence dated December 18, 2000 (Logan 2000).

As indicated in the former Pumphouse #1 CAP–Part B Report, two distinct and separate plumes are located within the vicinity of the former Pumphouse #1 site. Release #1 is an area of soil and groundwater contamination located near the DAACG facility that is in the vicinity of former Fuel Pits 1A and 1B, located approximately 900 ft west of former Building 8060 (i.e., Pumphouse #1). Release #2 is an area of soil and groundwater contamination located near the former Pumphouse #1 facility and former Fuel Pits 1C and 1D, located approximately 200 ft north of the former Tank Pits. The corrective actions at Release #1 and Release #2 are being addressed separately.

For the former Pumphouse #1 Tank Pit area (Release #2), the CAP–Part B Report recommended semiannual monitoring for benzene, toluene, ethylbenzene, and xylenes (BTEX). Release #2 has been under the monitoring only program since September 2001 and the results have been presented in annual monitoring only reports for the site.

For the former Fuel Pit 1A/DAACG area (Release #1), the CAP–Part B Report recommended additional investigation activities to further delineate the free product activities. In May 2000, an interim action to remove the free product through the use of absorbent socks was implemented. Upon completion of the additional investigation, a CAP–Part B Addendum #1 Report (SAIC 2002) was prepared that recommended groundwater extraction and free product removal in a manner to cause minimal impact to the active flight operations. GA EPD provided comments on the CAP–Part B Addendum #1 Report in correspondence dated November 20, 2001. Fort Stewart submitted a response to comments on December 20, 2001, and GA EPD approved the report in correspondence dated February 25, 2004.

The use of absorbent socks for free product removal at Release #1 was continued until July 2003. In addition, an additional investigation was conducted in 2003 to further delineate the horizontal and vertical extent of the free product in the subsurface at Release #1 and Release #2 using cone-penetrometer-technology (CPT) equipment with fluorescence detection. The results of this investigation were presented in the *Data Summary Report for the 2003 Free Product CPT Investigation at Former Pumphouse #1, Facility ID #9-025805, Former Building 8060, Hunter Army Airfield, Georgia* (SAIC 2004), which was also included as an appendix in the *Third Annual Monitoring Only Report for Former Pumphouse #1, Facility ID #9-025805, Former Building 8060, Hunter Army Airfield, Georgia* (SAIC 2005).

Due to funding limitations as a result of an increase in military obligations world-wide, the corrective action described in the CAP–Part B Addendum #1 has not been implemented. However, in an effort to address the free product, the interim action to remove free product through the use of absorbent socks was implemented again in 2004. In 2005, the free product removal method was changed to bi-monthly vacuum extraction (VE) from numerous wells located throughout Release #1.

This addendum to the former Pumphouse #1 CAP–Part B Report is being submitted to the GA EPD Underground Storage Tank Management Program (USTMP) to change the remedial alternative for the former Fuel Pit 1A/DAACG area (Release #1). Science Applications International Corporation prepared this report for the HAAF Directorate of Public Works (DPW) Environmental Branch through the U. S. Army Corps of Engineers (USACE), Savannah District under contract DACA21-02-D-0004, delivery order 0044.

II.B HORIZONTAL AND VERTICAL EXTENT OF CONTAMINATION

The horizontal and vertical extent of petroleum-related contamination in soil and groundwater was delineated by activities performed during the previous investigations at the former Pumphouse #1 site and the DAACG facility, which were documented in the CAP–Part B Report (SAIC 2000) and the CAP–Part B Addendum #1 Report (SAIC 2002). A summary of the results from these investigations is presented below.

II.B.1 Delineation of Soil Contamination

In the vicinity of the former Fuel Pit 1A/DAACG area (Release #1), the horizontal extent of petroleum-related contamination in soil was determined during the various investigations and was discussed in detail in the CAP–Part B Report (SAIC 2000). Concentrations of benzene, toluene, ethylbenzene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, chrysene, and indeno(1,2,3-*cd*)pyrene exceeded the applicable Georgia Underground Storage Tank (GUST) soil threshold levels (STLs) (i.e., Table B, Column 1), and concentrations of benzene, benzo(*a*)pyrene, chrysene, and indeno(1,2,3-*cd*)pyrene exceeded their respective alternate threshold levels (ATLs). The area of soil contamination, as determined in 2001, associated with Release #1 is presented in Figure 2. The analytical results for subsurface soil samples collected during the 2001 supplemental investigation are presented in Table 1.

In the vicinity of the former Pumphouse #1 Tank Pit area (Release #2), benzene, toluene, ethylbenzene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and chrysene exceeded the applicable GUST STLs (i.e., Table B, Column 1), and benzene and chrysene exceeded their respective ATLs.

II.B.2 Delineation of Groundwater Contamination

In the vicinity of the former Fuel Pit 1A/DAACG area (Release #1), the horizontal extent of petroleum-related contamination in groundwater was determined during the various investigations and

was discussed in detail in the CAP–Part B Report (SAIC 2000) and CAP–Part B Addendum #1 Report (SAIC 2002). The vertical extent of groundwater contamination at the former Fuel Pit 1A/DAACG area (Release #1) was delineated through soil sampling during the CAP–Part B investigation and was discussed in the CAP–Part B Report (SAIC 2000). Benzene, ethylbenzene, toluene, benzo(*a*)pyrene, chrysene, and naphthalene were identified as chemicals of potential concern (COPCs) for groundwater. Based on the results of fate and transport (F&T) modeling, alternate concentration limits (ACLs) were calculated for these constituents. Benzene was the only constituent at the former Fuel Pit 1A/DAACG area (Release #1) to exceed its In-Stream Water Quality Standard (IWQS) and ACL during the various investigations. An ACL of 285 µg/L was proposed for benzene in groundwater and was approved by GA EPD in correspondence dated December 18, 2000 (Logan 2000). The area of benzene contamination, as determined in 2001, associated with Release #1 is presented in Figure 3. The analytical results for groundwater samples collected during the 2001 supplemental investigation are presented in Table 2.

In the vicinity of the former Pumphouse #1 Tank Pit area (Release #2), benzene, ethylbenzene, toluene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, chrysene, dibenzo(*a,h*)anthracene, indeno(1,2,3-*cd*)pyrene, and naphthalene were identified as COPCs for groundwater. Benzene was the only constituent at the former Pumphouse #1 Tank Pit area (Release #2) to exceed its IWQS and ACL during the various investigations. An ACL of 285 µg/L was proposed for benzene in groundwater and was approved by GA EPD in correspondence dated December 18, 2000 (Logan 2000). A monitoring only program for Release #2 was implemented in September 2001 and the results are being provided in annual monitoring only reports.

II.B.3 Delineation of Free Product

Free product was identified at the former Fuel Pit 1A/DAACG area (Release #1) in February 2000. The free product was observed in wells D-MW1, D-MW2, D-MW8, D-MW11, D-MW13, and D-MW17 at thicknesses ranging from a sheen to 0.88 ft. There horizontal extent of the free product was bounded by existing wells at the site. Following the CAP–Part B investigation, the interim corrective action consisted of free product recovery in the wells via absorbent socks, which were installed on February 22, 2000. The absorbent socks were removed and replaced on a bimonthly basis from May 2000 through July 2003.

In February 2001, 11 4-in. monitoring wells (D-MW33 through D-MW43) were installed to supplement CAP–Part B investigation activities at this site. In March and July 2001, field bailout tests were conducted in wells D-MW2, D-MW34, and D-MW35 using the field bailout test method (Gruszczenski 1987). The results of the field bailout tests were presented in the CAP–Part B Addendum #1 Report (SAIC 2002). From an aerial extent, the free product plume is located underneath an active tarmac that is associated with active military flight operations. However, the thickest and most recoverable portion of the free product plume is located in the vicinity of wells D-MW2, D-MW34, and D-MW35.

In September/October 2003, additional activities were performed with CPT equipment with fluorescence detection to delineate the horizontal and vertical extent of the free product at both Release #1 and Release #2. The investigation concluded that the likely zones of nonaqueous-phase liquid (NAPL) contamination tend to occur between 6 and 13 ft below ground surface (BGS), which is in the vicinity of the water table and smear zone, and at a thickness ranging from 1 to 5 ft. There are a few locations, however, in which pockets of NAPL exist below the water table at depths greater than 20 ft BGS. These locations are D-CPT-3 in the area associated with Release #1 and P1-CPT-1, P1-CPT-11, and P1-CPT-11 associated with Release #2.

Absorbent socks have been replaced in numerous wells associated with both Release #1 and Release #2 between February 2000 to July 2003 and June 2004 and March 2005. Absorbent socks remained in the wells between August 2003 and May 2004; however, there was no contract to changeout the socks during

this time. Beginning in June 2005, bi-monthly VE activities were initiated on approximately 50 wells located throughout Release #1 and Release #2. Prior to conducting VE, the depth to product and water were recorded. The well evacuation apparatus was installed and the drop tube was set approximately 1 ft below the groundwater level. A vacuum was applied to the well for approximately 45 min. The quantity of the water/product mixture varied from well to well; however, it appears that the amount of free product removed from each well was very small (i.e., less than 0.5 gal). A summary of the free product thickness measured during the absorbent sock replacement or VE activities from June 2004 to January 2006 for Release #1 is provided in Table 3. The aerial extent of the free product area for Release #1 is shown in Figure 4.

II.B.4 Delineation of Surface Water and Sediment Contamination

Results from the surface water and sediment samples collected during the CAP–Part B investigation were discussed in the CAP–Part B Report (SAIC 2000). BTEX constituents were detected in the surface water samples collected from the drainage ditch located south of the former Tank Pit area. No polyaromatic hydrocarbon (PAH) constituents were detected in the surface water samples. Total petroleum hydrocarbons and PAHs were detected in some of the sediment samples.

II.C REGIONAL, LOCAL, AND SITE HYDROGEOLOGY

A discussion of the regional, local, and site hydrogeology was presented in the CAP–Part B Report (SAIC 2000).

II.C.1 Groundwater Usage

According to the *Groundwater Pollution Susceptibility Map of Georgia* (GA EPD 1992), the former Pumphouse #1 site, Facility ID #9-025085 is located within an average or higher groundwater pollution susceptibility area. Nine water supply wells are located within the confines of the HAAF area. These wells have the potential to provide up to 3,890 gallons per minute (gpm) of water to occupants of the HAAF installation.

II.C.2 Aquifer Description

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 ft 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, ranging from 55 to 150 ft in thickness. 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 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 no hydraulic interconnection between HAAF UST sites (and associated plumes) and water supply withdrawal points.

II.C.3 Surface Water

The water resources survey conducted during the CAP–Part B site investigation is presented in the CAP–Part B Report (SAIC 2000) and CAP–Part B Addendum #1 Report (SAIC 2002). Surface water bodies at HAAF include Hallstrom Lake, Lamar Canal, Buckhalter Canal, Springfield Canal, Pond 29 located northwest of Buildings 336 and 232, and an unnamed pond located along the southeastern boundary of the HAAF installation. Several unnamed drainage canals and ditches exist throughout HAAF. Most of these canals drain southwest into the Little Ogeechee River, which is part of the Lower Ogeechee watershed. The remaining drainage canals located on the eastern side of the HAAF installation flow east and eventually drain into the Vernon River, which is located southeast of the HAAF installation. Surface water bodies at HAAF and adjacent areas are not used as public water supplies. The ponds and lakes, as well as Lamar Canal, are perennial, whereas most of the drainage canals and ditches are intermittent. Most of the drainage canals are at least partially enclosed in culverts.

II.C.4 Site Stratigraphy

The lithology encountered at the site is predominantly a white, pale brown, or light gray, very fine to medium-grained sand, with variable silt and clay content. Generally, the samples with higher silt and clay content were within a few feet of the surface. Less silt and clay content was noted with depth. The boring log of deep well P1-MW40 indicates an increasing clay content from approximately 26 to 30 ft BGS, becoming a clayey, coarse-grained sand/gravel at 30 ft BGS.

II.C.5 Direction of Groundwater Flow

Table 4 summarizes construction details for the monitoring wells associated with the former Fuel Pit 1A/DAACG area (Release #1). During the interim action free product removal activities in October 2005, groundwater elevations were measured in numerous monitoring wells associated with Release #1 to prior to free product removal. In October 2005, the groundwater flow in the vicinity of the former Fuel Pit 1A/DAACG area is to the northwest at a gradient of approximately 0.0083 ft/ft. Figure 5 shows the potentiometric surface at the site in October 2005.

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III. REMEDIAL ACTION PLAN

III.A CORRECTIVE ACTION COMPLETED OR IN PROGRESS

III.A.1 Recovery/Removal of Free Product

During sampling activities in February 2000, free product was measured in wells D-MW1, D-MW2, D-MW8, D-MW11, D-MW13, and D-MW17 at thicknesses of 0.01, 0.88, 0.15, 0.74, and 0.15 ft and a sheen, respectively. Absorbent socks were placed in each well following these measurements on February 24, 2000. The free product covered an area of approximately 400 by 500 ft at the former Fuel Pit 1A/DAACG area (Release #1) in February 2000. GA EPD was notified of the free product in correspondence dated March 8, 2000 (Stanley 2000). As an interim action until a corrective action could be implemented, the absorbent socks were removed and replaced in wells with free product on a bi-monthly basis from May 2000 through June 2003 and September 2004 through May 2005.

Beginning in June 2005, bi-monthly VE activities were initiated on approximately 50 wells located throughout Release #1 and Release #2. Prior to conducting VE, the depth to product and water were recorded. The well evacuation apparatus was installed and the drop tube was set approximately 1 ft below the groundwater level. A vacuum was applied to the well for approximately 45 min. The quantity of the water/product mixture varied from well to well; however, it appears that the amount of free product removed from each well was very small (i.e., less than 0.5 gal). The results of the free product removal activities were presented in the CAP–Part B Addendum #1 Report (SAIC 2002) and the 2004-2005 Free Product Removal Report (SAIC 2006).

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

No contaminated backfill material or native soil associated with the former Fuel Pit 1A/DAACG area (Release #1) have been excavated, remediated, or treated.

III.B OBJECTIVES OF CORRECTIVE ACTION

III.B.1 Remove Free Product That Exceeds One-Eighth Inch at the Former Fuel Pit 1A/DAACG Area (Release #1)

In February 2000, free product in excess of 1/8 in. in thickness was observed in wells D-MW1, D-MW2, D-MW8, D-MW11, D-MW13, and D-MW17. The free product plume is located underneath an active tarmac that is associated with military flight operations. In 2000, the thickest amount of free product was located near the southwestern boundary of the product plume in the vicinity of wells D-MW2, D-MW34, and D-MW35. Between February 2000 and May 2005, free product has been removed via absorbent socks, which were removed and replaced on a periodic basis. In June 2005, the free product removal method was changed to removal via a vacuum truck. In 2004 and 2005, the thickness underneath the active tarmac ranged from a sheen to 0.10 ft.

It is recommended that free product removal activities utilizing a vacuum truck be continued as the corrective action to address the free product.

III.B.2 Remediate Groundwater Contamination at the Former Fuel Pit 1A/DAACG Area (Release #1)

As discussed in the CAP–Part B Report (SAIC 2000), previous investigations documented benzene contamination in groundwater at the former Fuel Pit 1A/DAACG area (Release #1) at concentrations that exceeded the IWQS of 71.28 µg/L and the ACL of 285 µg/L.

The supplemental groundwater sampling conducted in March 2001 indicated that the benzene plume was similar to the plume that had been observed during the CAP–Part A and CAP–Part B investigations. The benzene concentrations in 12 wells exceeded the IWQS. The benzene concentrations in D-MW2 (400 µg/L), D-MW34 (388 µg/L), D-MW35 (765 µg/L), D-MW37 (601 µg/L), and D-MW40 (313 µg/L) exceeded the ACL of 285 µg/L in 2001. These wells are located in the southwestern portion of the groundwater plume where the free product was the thickest in 2000 and 2001.

The groundwater plume in 2001 covered an area of approximately 500 by 850 ft (i.e., ~9 acres) underneath an active tarmac that is associated with military flight operations. The corrective action for the groundwater plume at the former Fuel Pit 1A/DAACG area should consist of alternatives that are protective of the environment, but can be implemented in a manner that causes minimal disruption of the active military flight operations. Monitored natural attenuation (MNA) appears to be the most viable alternative once the free product has been removed because (1) the free product continues to act as a source for the groundwater contamination, but has been accumulating at a slower rate than in previous years and (2) the maximum benzene concentrations during the CAP–Part B and supplemental investigations were less than three times the ACL. MNA would provide for monitoring of the groundwater plume without impacting the military flight operations. It is recommended that the corrective action for groundwater consist of free product removal in conjunction with MNA of the groundwater plume in the vicinity of the former Fuel Pit 1A/DAACG area (Release #1) until the free product is removed. At that point, the corrective action will be re-evaluated.

III.B.3 Remediate Soil Contamination at the Former Fuel Pit 1A/DAACG Area (Release #1)

As discussed in the CAP–Part B Report (SAIC 2000), previous investigations documented that benzene, toluene, ethylbenzene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, chrysene, and indeno(1,2,3-*cd*)pyrene contamination in soil at the former Fuel Pit 1A/DAACG area (Release #1) exceeded the applicable GUST STLs. Benzene was the only constituent in soil to exceed its ATL of 9.3 mg/kg in six boring locations. Benzo(*a*)pyrene, chrysene, and indeno(1,2,3-*cd*)pyrene concentrations in one soil sample exceeded the ATLs of 1.4, 2.1, and 0.66 mg/kg, respectively. The soil samples with these concentrations exceeding the ATLs were collected from the capillary fringe above the soil/water interface in the area of free product, and the presence of free product may have contributed to the high concentrations. The soil contamination exceeding ATLs follows the area of free product and groundwater contamination, and is located underneath an active tarmac that is associated with military flight operations. Active remediation of the soil contamination underneath the tarmac will impact active military operations.

It is recommended that the corrective action for removal of the free product be implemented prior to recommendation of a corrective action for the soil contamination. Once the majority of the free product has been removed, additional soil borings should be installed in the vicinity of the boreholes that had constituents exceeding ATLs to determine if the soil concentrations have degraded to below the ATLs.

III.B.4 Provide Risk-Based Corrective Action

A risk-based approach was used in the CAP–Part B Report (SAIC 2000) to identify COPCs for soil and groundwater and to develop ATLs and ACLs for various constituents. The results of the risk screening for

both areas were presented in the CAP–Part B Report (SAIC 2000) and the results for the former Fuel Pit 1A/DAACG area are summarized below.

In summary, benzene, ethylbenzene, toluene, xylenes, benzo(*a*)pyrene, benzo(*b*)fluoranthene, chrysene, and indeno(1,2,3-*cd*)pyrene were identified as COPCs for soil. ATLs of 9.3 mg/kg for benzene, 187 mg/kg for ethylbenzene, 479 mg/kg for toluene, 893 mg/kg for xylenes, 1.4 mg/kg for benzo(*a*)pyrene, 5.8 mg/kg for benzo(*b*)fluoranthene, 2.1 mg/kg chrysene, and 0.66 mg/kg for indeno(1,2,3-*cd*)pyrene were proposed in the CAP–Part B Report (SAIC 2000) and approved by GA EPD in correspondence dated December 18, 2000 (Logan 2000). Benzene, benzo(*a*)pyrene, chrysene, and indeno(1,2,3-*cd*)pyrene were the constituents that exceeded their respective ATLs during the CAP–Part A and Part B investigations.

Benzene, ethylbenzene, toluene, benzo(*a*)pyrene, chrysene, and naphthalene were identified as COPCs for groundwater. ACLs of 285 µg/L for benzene; 114,800 µg/L for ethylbenzene; 800,000 µg/L for toluene; 1.2 µg/L for benzo(*a*)pyrene; 1.2 µg/L for chrysene; and 260 µg/L for naphthalene were proposed in the CAP–Part B Report (SAIC 2000) and approved by GA EPD in correspondence dated December 18, 2000 (Logan 2000). Benzene was the only compound to exceed its respective ACL during the CAP–Part B investigation.

The F&T modeling results were provided in the CAP–Part B Report (SAIC 2000). A storm drain located 230 ft northeast (downgradient) of the center of the plume 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 potential receptor. Modeling of leaching to groundwater by percolating rainwater was performed using the Seasonal Soil Compartment Model to determine the predicted maximum concentration in the leachate at the water table interface. The predicted leachate concentration of 12,500 µg/L was above the maximum groundwater concentration of 700 µg/L at the source. The Analytical Transient 1-, 2-, 3-Dimensional Model was calibrated to the maximum predicted concentration of benzene (i.e., 12,000 µg/L) assuming a steady-state (continuous) concentration at the source.

Based on modeling results, the estimated dilution attenuation factor (DAF) for benzene at the storm drain was 4.0. The modeling results indicated that benzene should be reaching the storm drain at a concentration of 3,100 µg/L, which is above the state IWQS of 71.28 µg/L, thereby predicting that the potential receptor is impacted by the current site conditions. However, actual groundwater results indicated that groundwater contamination at concentrations near the IWQS reaches the storm drain. A similar model was run for the former Tank Pit area, which resulted in a DAF of 5.25. Due to the close proximity of both releases to each other, the most conservative F&T modeling results were used for developing one set of ACLs and ATLs for both areas of contamination.

ACLs for constituents in groundwater [i.e., benzene, toluene, ethylbenzene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, chrysene, dibenzo(*a,h*)anthracene, indeno(*1,2,3,-cd*)pyrene, and naphthalene] and ATLs for constituents in soil [i.e., benzene, toluene, ethylbenzene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, chrysene, and indeno(*1,2,3,-cd*)pyrene] were calculated in the CAP–Part B Report dated August 2000. The ACLs and ATLs were approved by the GA EPD in correspondence dated December 18, 2000. A summary of the approved ACLs and ATLs is provided in Table 5.

III.C DESIGN AND OPERATION OF CORRECTIVE ACTION SYSTEMS AT THE FORMER FUEL PIT 1A/DAACG AREA (RELEASE #1)

III.C.1 System Effectiveness/Basis for Selection

The presumed remedies evaluated for aromatic hydrocarbons in soil and groundwater at the former Fuel Pit 1A/DAACG area included free product removal, MNA, oxygen-injection-enhanced bioremediation, air-sparging with soil VE, six-phase heating, and PHOSter® II-enhanced bioremediation. The primary focus of the alternative evaluation was to find a cost-effective method of remediating the site with minimal impact to the military flight operations. Active remediation of the majority of the soil and groundwater contamination underneath the active tarmac would either impact military flight operations for a significant period of time or not be cost effective to implement because of the requirements that would be necessary to minimize the impact to flight operations.

In selecting the corrective action for the former Fuel Pit 1A/DAACG area, the following items were taken into consideration: (1) the free product is acting as a continuous source for soil and groundwater contamination, (2) the benzene concentrations in groundwater underneath the active tarmac are less than three times the ACL, and (3) the soil contamination is primarily associated with the interval above the soil/water interface where the free product is located. Based on these considerations and the active military flight operations, a phased approach to the corrective action is recommended for the former Fuel Pit 1A/DAACG area. The first phase will consist of removing the free product without impacting active military flight operations in conjunction with MNA of the groundwater plume until free product recovery activities are terminated. Once the removal of the free product reaches a quantity removed or well thickness that is agreed upon by GA EPD and HAAF, and the results of any MNA can be evaluated, HAAF will re-evaluate the need for an active corrective action addressing any remaining soil and groundwater contamination.

III.C.1.a Theory and feasibility

Data indicate that free product is tied up in the soil pores at the soil/water interface at the former Fuel Pit 1A/DAACG area (Release #1), dissolved-phase hydrocarbons exist in the groundwater beneath the site, and residual saturation of hydrocarbons exists in soil at the site. The seasonal water table fluctuations of approximately 2 ft have further transported and smeared free-phase petroleum product onto soil. The BTEX compounds are both volatile and aerobically degradable by bacteria, which already exist in the subsurface.

Since 2000, an interim action of free product removal via absorbent socks and VE has been implemented to address the free product. Both of these methods have been shown to reduce the quantity of free product accumulating in the wells.

During the 2001 investigation, the Georgia IWQS for benzene of 71.28 μg/L was exceeded in 12 monitoring wells. However, only five of the wells contained benzene concentrations that exceeded the GA EPD-approved benzene ACL of 285 μg/L. HAAF proposes to continue with quarterly VE to remove free product in conjunction with MNA of the groundwater plume.

III.C.1.b Remediation system

The former Fuel Pit 1A/DAACG area (Release #1) is located underneath a tarmac associated with active military flight operations. The proposed first phase of the corrective action is a remediation system consisting of periodic VE in various wells to remove the free product. Initially, “periodic” will be conducted on a quarterly basis; however, with the concurrence of GA EPD, the frequency of VE activities

may be changed. Prior to conducting VE, product level and water level measurements will be made in numerous wells located throughout Release #1 and Release #2 to determine which wells may be accumulating free product. These wells may include, but are not limited to, D-MW-02, D-MW-05, D-MW-06, D-MW-08, D-MW-11, D-MW-12, D-MW-13, D-MW-17, D-MW-34, D-MW-35, D-MW-36, D-MW-37, D-MW-38, D-MW-39, D-MW-40,D-MW-41, D-MW-42, D-MW-43, D-CPT-1, D-CPT-2, D-CPT-3, D-CPT-4, D-CPT-5, D-CPT-6, D-CPT-7, D-CPT-8, D-CPT-10, D-CPT-11, D-CPT-12, D-CPT-14, D-CPT-17, D-CPT-18, D-CPT-21, D-CPT-29, D-CPT-31, D-CPT-37, D-CPT-39, D-CPT-40, D-CPT-42, P1-MW-01, P1-MW-02, P1-MW-03, P1-MW-18, P1-MW-21, P1-MW-22, P1-CPT-2, P1-CPT-3, P1-CPT-7, P1-CPT-8, P1-CPT-11, P1-CPT-17, and P1-CPT-18.

Upon completion of the product and water level measurements, the VE activities will be conducted in the wells with the greatest amount of free product. The well evacuation apparatus was installed and the drop tube was set approximately 1 ft below the groundwater level. Depending on the number of wells to be vacuum extracted, the vacuum will applied a well for 4 to 8 hr. The purge water will be containerized in a tanker truck and transported off-site for disposal.

In conjunction with the VE activities for free product removal, a monitoring only program will be implemented for the former Fuel Pit 1A/DAACG area and will consist of annual sampling of up to 30 wells. Any changes to the remediation system proposed in this document will be submitted to GA EPD.

III.D IMPLEMENTATION

III.D.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 6. The actual time required to achieve free produce recovery may be greater, or less, than presented in Figure 6; therefore, Fort Stewart will notify GA EPD USTMP of any significant changes to the schedule and will provide GA EPD USTMP with an updated Gantt chart, as necessary.

III.D.2 Progress Reporting

For the former Fuel Pit 1A/DAACG area (Release #1), quarterly free product removal letter reports will be submitted to GA EPD that will summarize the free product removal activities for each quarter. At a minimum, the quarterly letter report will consist of an e-mail with a table summarizing the free product removal activities. In addition, annual free product removal reports will be submitted to GA EPD that will summarize free product removal activities for the preceding year. The annual free product removal report for the former Fuel Pit 1A/DAACG area (Release #1) will be a separate document from the annual monitoring only report for the former Pumphouse #1 Tank Pit area (Release #2).

III.D.3 Certificate of Completion Report

Petition for permanent closure will be submitted with the final progress report (i.e., completion report) for the first release to reach closure criteria. An addendum to the completion report will be submitted for the second release to reach the GA EPD-approved closure criteria. GA EPD will provide final approval for decommissioning the monitoring wells, which will be requested in the final completion addendum report. Decommissioning of the monitoring wells will be completed in accordance with the USACE design manual for monitoring wells. Decommissioning will comply with all applicable state and federal standards.

The following certification will be submitted to GA EPD within 30 days of submittal of the final progress report:

> I hereby certify that the Corrective Action Plan–Part B, dated ___, 20__, for Hunter Army Airfield, Former Pumphouse #1 site (Release #1 and Release #2), Facility ID 9-025085, 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)

III.D.4 Inspection Schedule and Preventative Maintenance Program

There will not be a permanent system installed at HAAF; thus, on-site inspection and preventative maintenance will not be required.

III.D.5 Periodic Monitoring

For the former Fuel Pit 1A/DAACG area (Release #1), groundwater samples will be collected annually from up to 26 wells (D-MW1, D-MW2, D-MW8, D-MW11, D-MW12, D-MW13, D-MW17, D-MW18, D-MW19, D-MW22, D-MW33, D-MW34, D-MW35, D-MW36, D-MW37, D-MW38, D-MW39, D-MW40, D-MW41, D-MW42, D-MW43, P1-MW11, P1-MW12, P1-MW13, P1-MW42, and one additional well to be installed along the storm drain) and analyzed for BTEX. The wells in the monitoring program may be adjusted based on the results of analytical data. PAH compounds observed during the CAP–Part A and Part B investigations were detected at concentrations below their respective ACLs; therefore, it is recommended that PAH analysis not be performed during the annual sampling. Monitoring will continue at the site until the recovery of free product reaches a quantity removed or well thickness that is agreed upon by GA EPD and HAAF. Recommendations regarding free product removal end points will be made in the quarterly and annual reports. Free product removal activities will not be discontinued until GA EPD grants approval to terminate them. Once free product removal activities have been terminated, HAAF will provide a recommendation to GA EPD on the next phase of the corrective action. The monitoring only portion of the corrective action will continue until the benzene concentrations in groundwater are below the ACL of 285 µg/L for two sampling events. Wells may be added or removed from the monitoring plan as the boundaries of the plume change. These changes will be documented in the monitoring only reports.

During each sampling event, water levels will be measured in all monitoring wells. Specific conductivity, pH, and temperature analyses will be measured on each sample from the monitoring wells from which analytical samples are collected. The samples will be shipped to an approved laboratory for BTEX analysis in accordance with U. S. Environmental Protection Agency Method 8021B/8260B and GA EPD laboratory certification requirements.

III.D.6 Effectiveness of Corrective Action

For the former Fuel Pit 1A/DAACG area (Release #1), the corrective action (i.e., product recovery followed by MNA) will be discontinued once the objectives of the monitoring only plan have been achieved—the recovery of free product has reached a quantifiable goal agreed upon by GA EPD and HAAF based on the quarterly free product removal reports; the benzene concentrations in groundwater

are below the ACL of 285 µg/L; and the benzene, benzo(*a*)pyrene, chrysene, and indeno(1,2,3-*cd*)pyrene concentrations in soil are reduced to below their ATLs of 9.3 , 1.4, 2.1, and 0.66 mg/kg, respectively.

III.D.7 Confirmatory Soil Sampling Plan

For the former Fuel Pit 1A/DAACG area (Release #1), no excavation of soil is planned under the free product removal and monitoring only plan; therefore, confirmatory sampling associated with excavation of soil will not be performed. However, because there is an area of soil contamination that exceeds the benzene ATL of 9.3 mg/kg, the benzo(*a*)pyrene ATL of 1.4 mg/kg, the chrysene ATL of 2.1 mg/kg, and the indeno(1,2,3-*cd*)pyrene ATL of 0.66, three confirmatory soil samples will be collected from the area of soil contamination. The soil samples will be collected once the free product has reached a quantifiable goal agreed to by GA EPD and HAAF and the benzene concentrations in groundwater are approaching the ACL. The soil samples will be analyzed for only benzene, benzo(*a*)pyrene, chrysene, and indeno(1,2,3-*cd*)pyrene only. The location of these samples will be determined during the monitoring only program and will be submitted to GA EPD in a letter or annual report for approval.

III.D.8 Stockpiled Bulk Soil Sampling

For the former Fuel Pit 1A/DAACG area (Release #1), no stockpiled soil will be generated by this corrective action; therefore, no soil sampling will be conducted.

III.D.9 Monitoring Only Termination Conditions

For the former Fuel Pit 1A/DAACG area (Release #1), concentrations of benzene in groundwater must be at or below the ACL, and concentrations of benzene, benzo(*a*)pyrene, chrysene, and indeno(1,2,3-*cd*)pyrene in soil must be at or below their respective ATLs prior to termination of the monitoring only program. Once the product removal activities have reached a quantifiable goal agreed to by GA EPD and HAAF based on the quarterly free product removal reports and the benzene ACL and the benzene, benzo(*a*)pyrene, chrysene, and indeno(1,2,3-*cd*)pyrene ATLs have been achieved, the remedial system and monitoring may be terminated regardless of the site ranking score.

III.D.10 Post-Completion Site Restoration Activities

No modifications will be made to the former Fuel Pit 1A/DAACG area (Release #1), because there is no permanent equipment or systems located at the site as part of this remediation.

III.E PUBLIC NOTIFICATION

The former Pumphouse #1 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 DPW has complied with the public notice requirements defined by GA EPD guidance by publishing an announcement in the *Savannah Morning News* on April 1 and 8, 2001. Because the corrective action still consists of free product removal with MNA, an updated public notice has not been made.

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IV. CLAIM FOR REIMBURSEMENT

HAAF is a federally owned facility and has funded the investigation for the former Pumphouse #1 site (Release #1 and Release #2), Facility ID #9-025085 using U. S. Department of Defense Environmental Restoration Funds. Application for GUST Trust Fund reimbursement is not being pursued at this time.

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V. REFERENCES

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SAIC 2004. *Data Summary Report for the 2003 Free Product CPT Investigation at Former Pumphouse #1, Facility ID #9-025805, Former Building 8060, Hunter Army Airfield, Georgia,* January.

SAIC 2005. *Third Annual Monitoring Only Report for Former Pumphouse #1, Facility ID #9-025805, Former Building 8060, Hunter Army Airfield, Georgia*, June.

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Stanley 2000. Letter to Shaheer Muhammed (Georgia Environmental Protection Division, Underground Storage Tank Management Program) with notice regarding the presence of free product at the site, March 8.

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APPENDIX I

REPORT FIGURES

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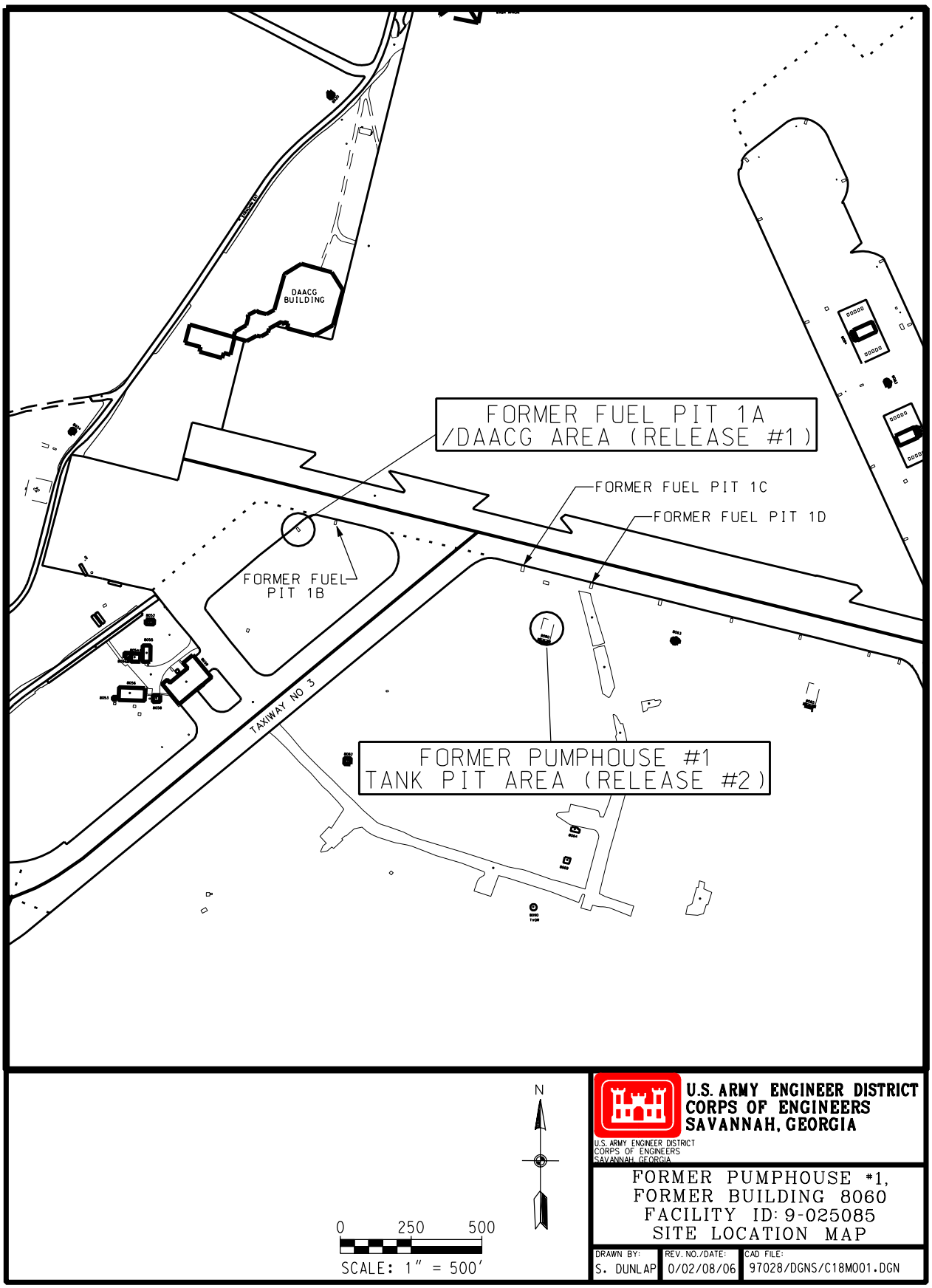

Figure 1. Location Map for the Former Pumphouse #1 Site, Facility ID #9-025085

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D-MW33	
AK3311	5.0 - 7.5 FT
Benzene	<0.269
Toluene	<0.269
Ethylbenzene	0.464
Xylenes, Total	0.456

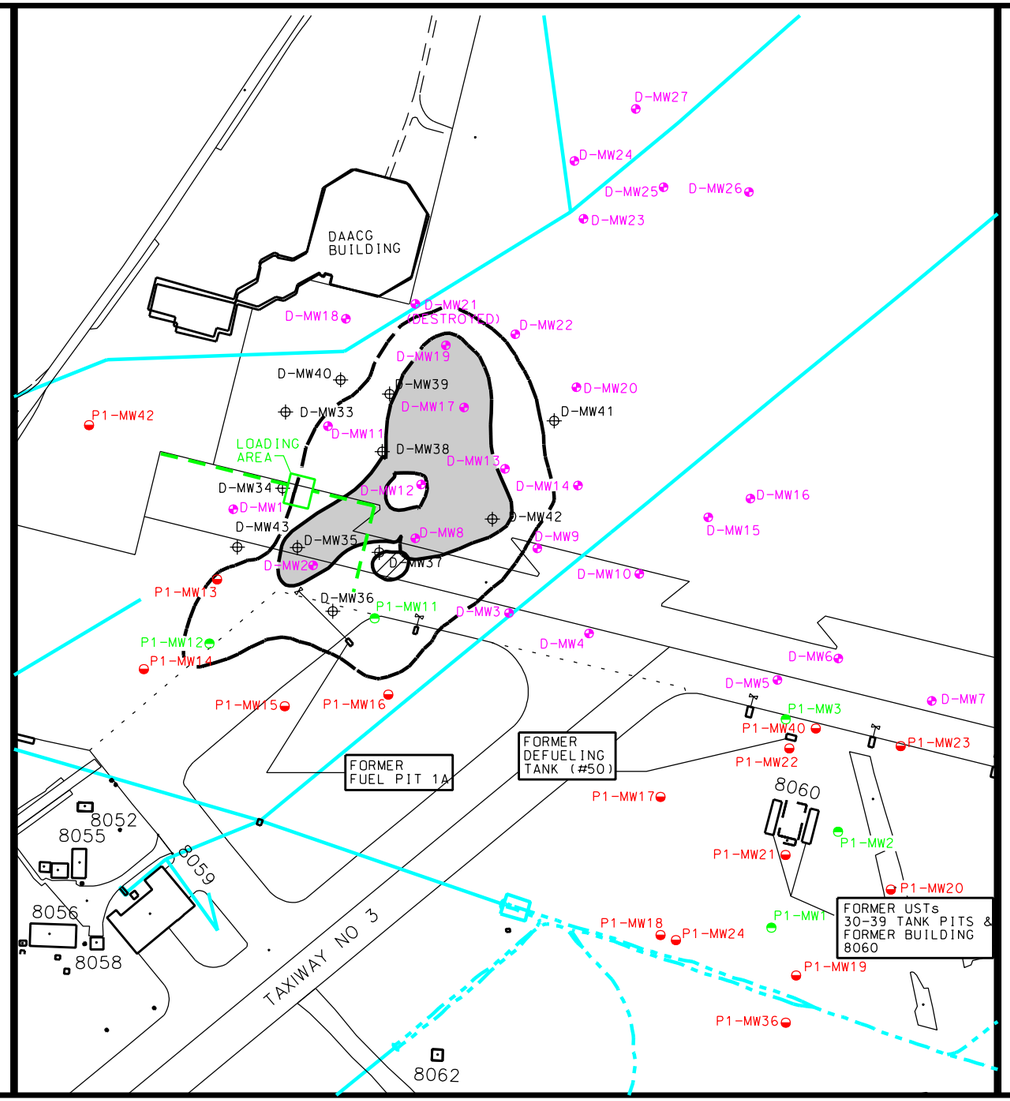
D-MW34	
AK3411	10.0 - 12.5 FT
Benzene	<0.22
Toluene	5.51
Ethylbenzene	4.32
Xylenes, Total	17.8
Pyrene	0.0141 J

D-MW35	
AK3511	11.0 - 12.5 FT
Benzene	<11.3
Toluene	2550
Ethylbenzene	355
Xylenes, Total	1860
Anthracene	0.0133 J
Fluoranthene	0.0688
Fluorene	0.0722
Naphthalene	0.828

D-MW36	
AK3611	5.0 - 7.0 FT
Benzene	1.44 J
Toluene	74.4
Ethylbenzene	16.2
Xylenes, Total	80.9

D-MW37	
AK3711	10.0 - 12.0 FT
Benzene	1.3
Toluene	45.6
Ethylbenzene	3.87
Xylenes, Total	15.7
Naphthalene	0.147

D-MW38	
AK3811	10.0 - 11.5 FT
Benzene	<0.131
Toluene	<0.196
Ethylbenzene	0.58
Xylenes, Total	3.93
Fluorene	0.0188 J



D-MW39	
AK3911	7.0 - 11.0 FT
Benzene	<0.232
Toluene	0.0949 J
Ethylbenzene	1.24
Xylenes, Total	3.08
Fluoranthene	0.0095 J

D-MW40	
AK4011	10.0 - 12.5 FT
Benzene	<1.48
Toluene	0.381 J
Ethylbenzene	0.345 J
Xylenes, Total	13.3

D-MW41	
AK4111	10.0 - 12.5 FT
Benzene	0.00048 J
Xylenes, Total	0.0015 J

D-MW42	
AK4211	7.0 - 9.2 FT
Toluene	0.0087
Ethylbenzene	0.136 J
Xylenes, Total	0.593
Acenaphthene	0.0186 J
Anthracene	0.0209 J
Benzo(a)anthracene	0.0256 J
Chrysene	0.0207 J
Fluoranthene	0.0901
Fluorene	0.0203 J
Phenanthrene	0.119
Pyrene	0.0675

D-MW43	
AK4311	7.0 - 9.2 FT
NO DETECTS	

LEGEND

- MONITORING WELL LOCATIONS (4")
- PUMPHOUSE # 1 CAP A MONITORING WELLS
- PUMPHOUSE # 1 CAP B MONITORING WELL
- DAACG MONITORING WELLS
- STORM DRAIN SYSTEM
- FLIGHT LINE TRAFFIC CONTROL BARRICADES

- ESTIMATED LIMIT OF BENZENE CONTAMINATION ABOVE STL
- ESTIMATED LIMIT OF BENZENE CONTAMINATION ABOVE ATL
- ESTIMATED LIMIT OF PAH CONTAMINATION ABOVE ATL

NOTES:
1. CONCENTRATION IN mg/mg.
2. BLUE VALUES EXCEED STLs.
3. RED VALUES EXCEED ATLs.

	STL (mg/kg)	ATL (mg/kg)
Benzene	0.017	9.3
Toluene	115	479
Ethylbenzene	118	187
Xylenes, Total	700	893
Acenaphthene	NONE	NONE
Anthracene	NONE	NONE
Benzo(a)anthracene	0.66	NONE
Chrysene	0.66	2.1
Fluoranthene	NONE	NONE
Fluorene	NONE	NONE
Naphthalene	NONE	NONE
Phenanthrene	NONE	NONE
Pyrene	NONE	NONE

N

0 150 300

SCALE: 1" = 300'

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

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SAVANNAH, GEORGIA

FORMER PUMPHOUSE #1, FORMER BUILDING 8060, FACILITY ID:9-025085
SUPPLEMENTAL INVESTIGATION
SOIL ANALYTICAL RESULTS (FEB 2001)

DRAWN BY:	REV. NO./DATE:	CAD FILE:
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Figure 2. Supplemental Investigation Soil Analytical Results for the Former Pumphouse #1 Site, Release #1 (February 2001)

D-MW01	
AK0122	7.0 - 17.0 FT
Benzene	99.8
Toluene	17.3
Ethylbenzene	119
Xylenes, Total	776

D-MW02	
AK0222	7.6 - 17.6 FT
Benzene	400
Toluene	11200
Ethylbenzene	1050
Xylenes, Total	4940

D-MW03	
AK0322	6.0 - 16.0 FT
Ethylbenzene	0.21 J
Xylenes, Total	0.74 J

D-MW08	
AK0822	7.0 - 17.0 FT
Benzene	156
Toluene	31.4
Ethylbenzene	389
Xylenes, Total	1930

D-MW09	
AK0922	6.0 - 16.0 FT
Xylenes, Total	0.54 J

D-MW11	
AK1122	6.6 - 16.6 FT
Benzene	179
Toluene	398
Ethylbenzene	187
Xylenes, Total	1490

D-MW12	
AK1222	5.6 - 15.6 FT
Benzene	58.1
Toluene	123
Ethylbenzene	222
Xylenes, Total	2020

D-MW13	
AK1322	5.0 - 15.0 FT
Benzene	<25.0
Toluene	<36.2
Ethylbenzene	861
Xylenes, Total	3200

D-MW14	
AK1422	5.0 - 15.0 FT
Ethylbenzene	0.2 J
Xylenes, Total	1.4 J

D-MW17	
AK1722	6.5 - 16.5 FT
Benzene	159
Toluene	3550
Ethylbenzene	364
Xylenes, Total	3250

D-MW18	
AK1822	6.6 - 16.6 FT
Benzene	0.32 J
Toluene	1.4
Ethylbenzene	0.61 J
Xylenes, Total	4.3

D-MW19	
AK1922	6.0 - 16.0 FT
Benzene	64.2
Toluene	1510
Ethylbenzene	365
Xylenes, Total	1450

D-MW20	
AK2022	7.0 - 17.0 FT
NO DETECTS	

D-MW22	
AK2222	6.0 - 16.0 FT
Toluene	0.33 J

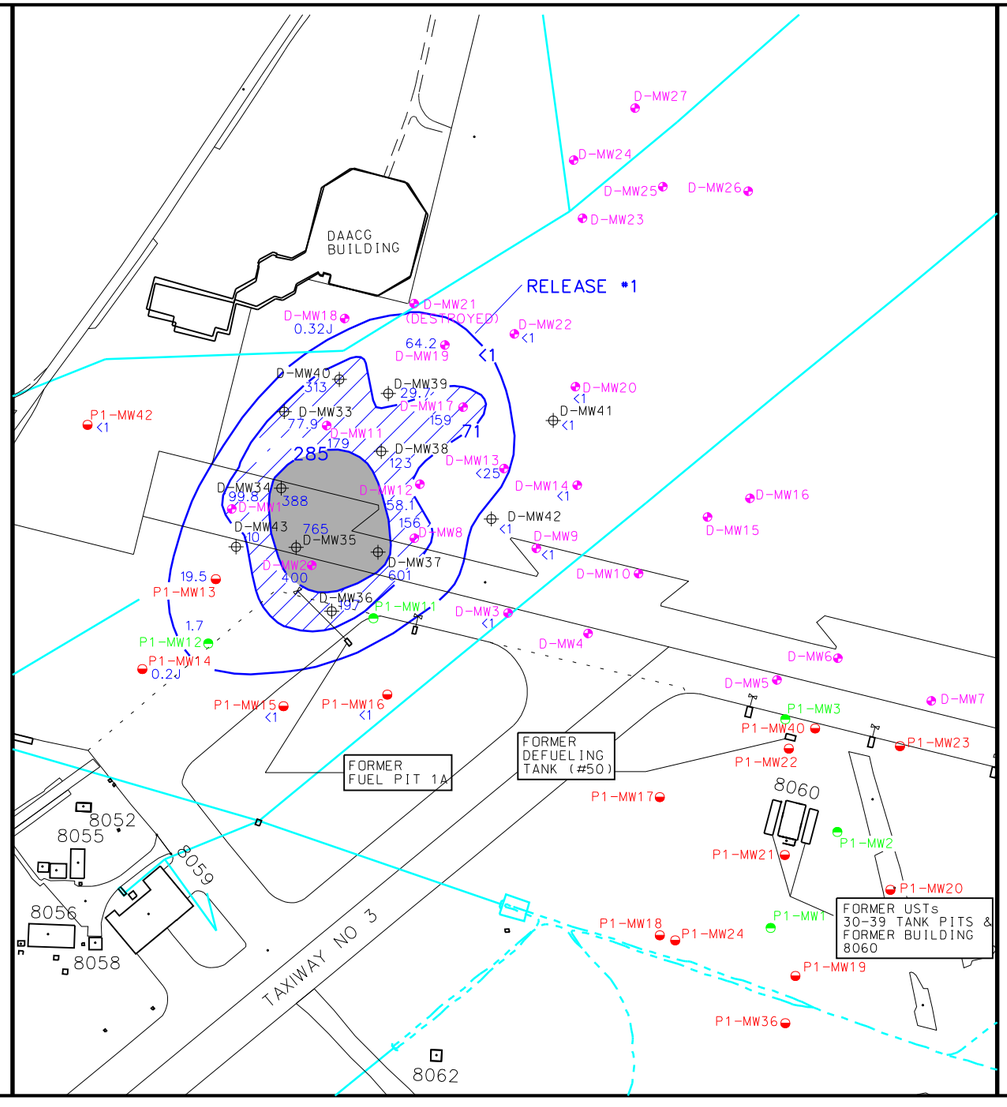
D-MW33	
AK3322	9.0 - 19.0 FT
Benzene	77.9
Toluene	774
Ethylbenzene	470
Xylenes, Total	2060

D-MW34	
AK3422	7.0 - 17.0 FT
Benzene	388
Toluene	8180
Ethylbenzene	1060
Xylenes, Total	4740

D-MW35	
AK3522	7.0 - 17.0 FT
Benzene	765
Toluene	29600
Ethylbenzene	1280
Xylenes, Total	6370

D-MW36	
AK3622	7.0 - 17.0 FT
Benzene	197
Toluene	2050
Ethylbenzene	586
Xylenes, Total	2120

D-MW37	
AK3722	7.0 - 17.0 FT
Benzene	601
Toluene	5340
Ethylbenzene	423
Xylenes, Total	1860



D-MW38	
AK3822	7.0 - 17.0 FT
Benzene	123
Toluene	2410
Ethylbenzene	738
Xylenes, Total	3730

D-MW39	
AK3922	7.0 - 17.0 FT
Benzene	29.7
Toluene	98.4
Ethylbenzene	340
Xylenes, Total	2010

D-MW40	
AK4022	8.0 - 18.0 FT
Benzene	313
Toluene	75.3
Ethylbenzene	959
Xylenes, Total	4230

D-MW41	
AK4122	7.0 - 17.0 FT
Xylenes, Total	0.43 J

D-MW42	
AK4222	7.0 - 17.0 FT
Toluene	112
Ethylbenzene	192
Xylenes, Total	962

D-MW43	
AK4322	7.0 - 17.0 FT
Benzene	10
Toluene	157
Ethylbenzene	36.8
Xylenes, Total	161

P1-MW12	
AN1222	6.5 - 16.5 FT
Benzene	1.7
Toluene	2.1
Ethylbenzene	138
Xylenes, Total	440

P1-MW13	
AN1322	7.0 - 17.0 FT
Benzene	19.5
Toluene	493
Ethylbenzene	182
Xylenes, Total	788

P1-MW14	
AN1422	7.0 - 17.0 FT
Benzene	0.2 J
Toluene	1.5
Ethylbenzene	1.2
Xylenes, Total	6

P1-MW15	
AN1522	6.0 - 16.0 FT
Toluene	0.29 J
Ethylbenzene	0.24 J
Xylenes, Total	1.3 J

P1-MW16	
AN1622	6.0 - 16.0 FT
Toluene	0.27 J

P1-MW42	
AN4222	5.6 - 15.6 FT
Xylenes, Total	0.48 J

LEGEND

- ⊕ ..... MONITORING WELL LOCATIONS (4")
- ..... PUMPHOUSE # 1 CAP A MONITORING WELLS
- ..... PUMPHOUSE # 1 CAP B MONITORING WELLS
- ..... DAACG MONITORING WELLS
- ..... STORM DRAIN SYSTEM
- <1 ..... BENZENE CONCENTRATION CONTOUR
- ..BENZENE CONCENTRATIONS EXCEEDING IWQS
- ...BENZENE CONCENTRATIONS EXCEEDING ACL

NOTES:
1. CONCENTRATION IN ug/L.
2. BLUE VALUES EXCEED IWQSs.
3. RED VALUES EXCEED ACLs.

	IWQS (ug/L)	ACL (ug/L)
Benzene	71.28	285
Toluene	200,000	800,000
Ethylbenzene	28,718	114,800
Xylenes, Total	NONE	NONE

N

0 150 300

SCALE: 1" = 300'

U.S. ARMY ENGINEER DISTRICT
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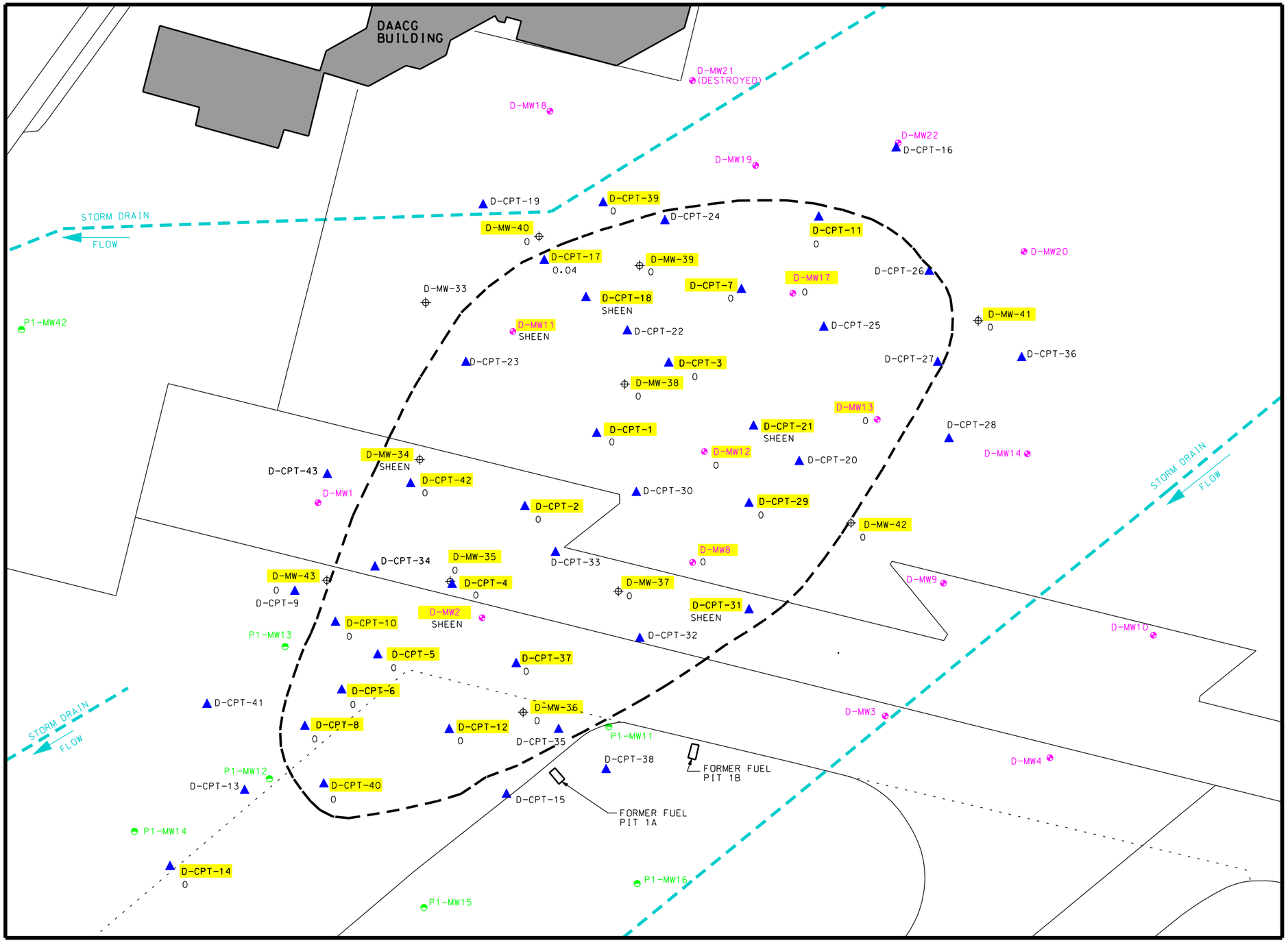
FORMER PUMPHOUSE #1 FORMER BUILDING 8060, FACILITY ID:9-025085
SUPPLEMENTAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS (MARCH 2001)

DRAWN BY:	REV. NO./DATE:	CAD FILE:
S.DUNLAP	1/07-10-06	97028/DGNS/C185085B.DGN

Figure 3. Supplemental Investigation Groundwater Analytical Results for the Former Pumphouse #1 Site, Release #1 (March 2001)



LEGEND

- MONITORING WELL LOCATIONS (4 IN.)
- PUMPHOUSE #1 MONITORING WELLS
- DAACG MONITORING WELLS
- CPT BOREHOLE LOCATION
- CPT WELL LOCATION
- D-CPT-18 — WELLS FOR PRODUCT REMOVAL
- 0.04 — FREE PRODUCT THICKNESS (FT) MEASURED PRIOR TO PRODUCT REMOVAL ACTIVITIES
- ESTIMATED LIMIT OF FREE PRODUCT BASED ON 2005 MEASUREMENTS

NOTE:

1.) FREE PRODUCT MAY BE PRESENT INTERMITTENTLY IN SOME WELLS IN 2004 AND 2005.

N

0 50 100 200

SCALE: 1" = 100'

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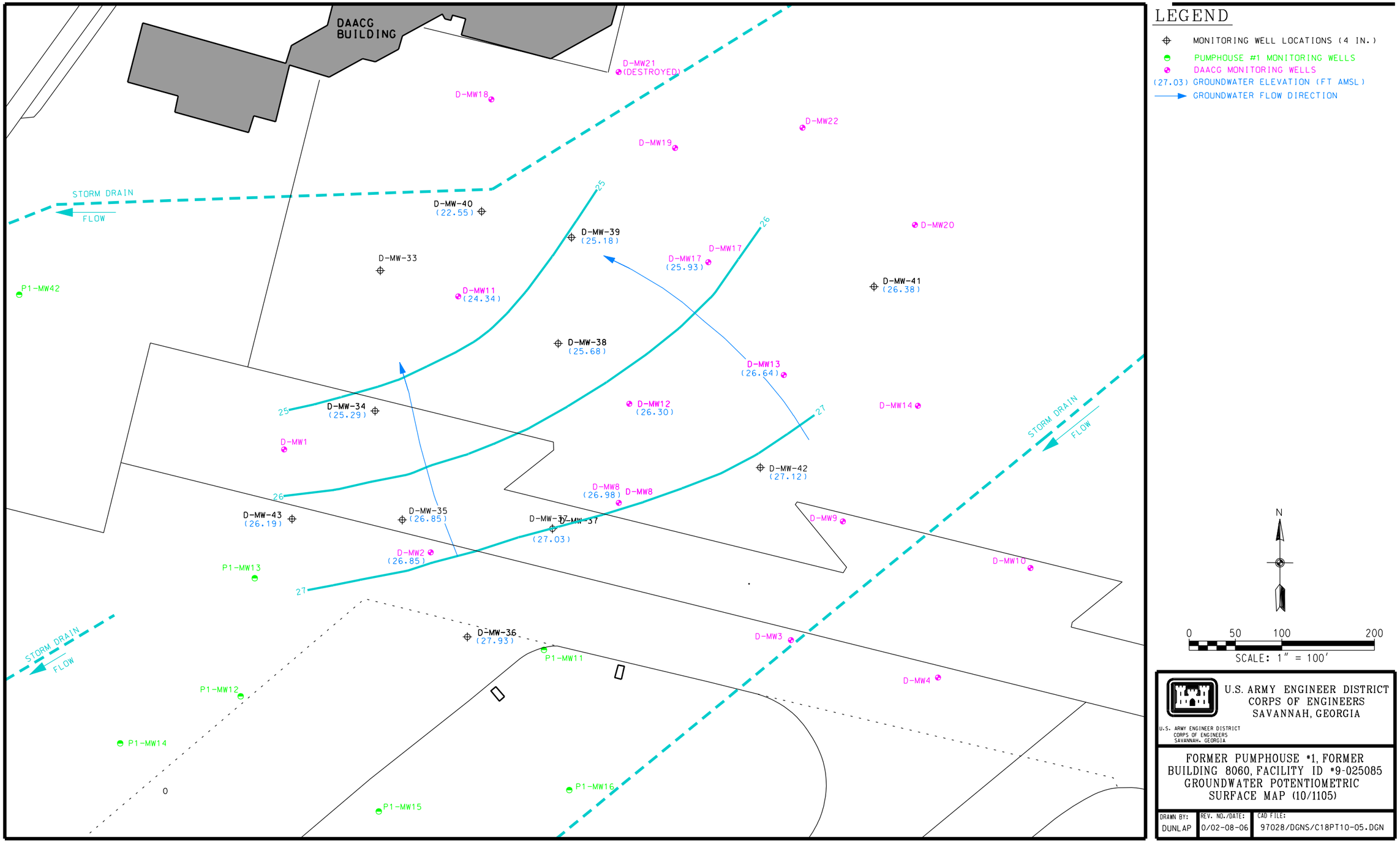
FORMER PUMPHOUSE #1, FORMER BUILDING 8060, FACILITY ID #9-025085
FREE PRODUCT THICKNESS
FOR RELEASE #1 (OCTOBER 2005)

DRAWN BY:	REV. NO./DATE:	CAD FILE:
DUNLAP	0/01-25-06	97028/DGNS/C185085M.DGN

Figure 4. Free Product Extent for the Former Pumphouse #1 Site, Release #1 (October 2005)



LEGEND

- MONITORING WELL LOCATIONS (4 IN.)
- PUMPHOUSE #1 MONITORING WELLS
- DAACG MONITORING WELLS
- (27.03) GROUNDWATER ELEVATION (FT AMSL)
- GROUNDWATER FLOW DIRECTION

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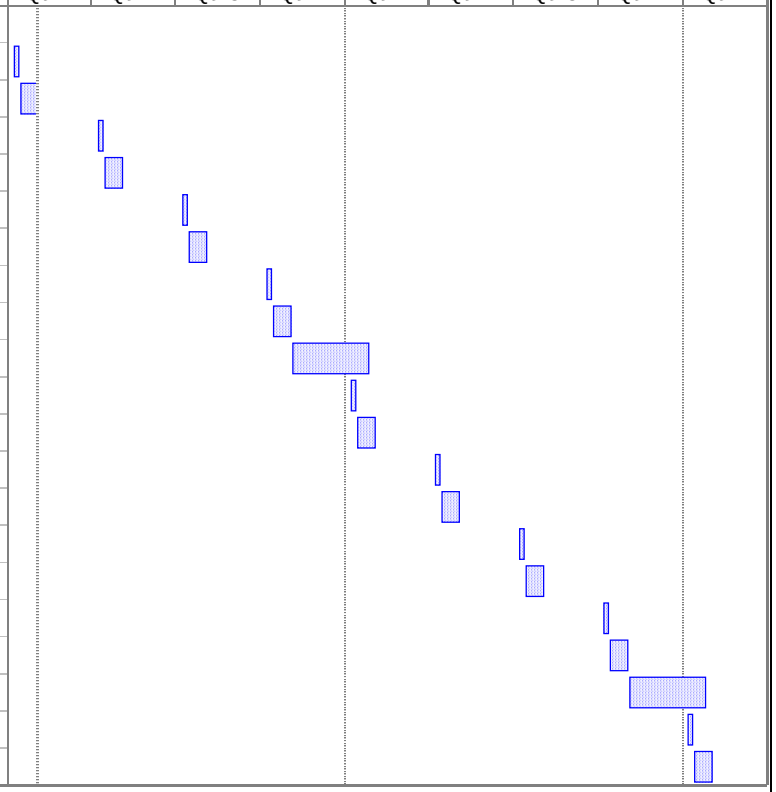
FORMER PUMPHOUSE #1, FORMER BUILDING 8060, FACILITY ID #9-025085
GROUNDWATER POTENTIOMETRIC SURFACE MAP (10/1105)

DRAWN BY:	REV. NO./DATE:	CAD FILE:
DUNLAP	0/02-08-06	97028/DGNS/C18PT10-05.DGN

Figure 5. Groundwater Potentiometric Surface Map for the Former Pumphouse #1 Site, Release #1 (October 2005)

ID	Task Name	Duration	Start
1			
2	Free Product Removal	5 days	Mon 1/9/06
3	Quarterly Free Product Removal Report	15 days	Mon 1/16/06
4	Free Product Removal	5 days	Mon 4/10/06
5	Quarterly Free Product Removal Report	15 days	Mon 4/17/06
6	Free Product Removal	5 days	Mon 7/10/06
7	Quarterly Free Product Removal Report	15 days	Mon 7/17/06
8	Free Product Removal	5 days	Mon 10/9/06
9	Quarterly Free Product Removal Report	15 days	Mon 10/16/06
10	Annual Free Product Removal Report	60 days	Mon 11/6/06
11	Free Product Removal	5 days	Mon 1/8/07
12	Quarterly Free Product Removal Report	15 days	Mon 1/15/07
13	Free Product Removal	5 days	Mon 4/9/07
14	Quarterly Free Product Removal Report	15 days	Mon 4/16/07
15	Free Product Removal	5 days	Mon 7/9/07
16	Quarterly Free Product Removal Report	15 days	Mon 7/16/07
17	Free Product Removal	5 days	Mon 10/8/07
18	Quarterly Free Product Removal Report	15 days	Mon 10/15/07
19	Annual Free Product Removal Report	60 days	Mon 11/5/07
20	Free Product Removal	5 days	Mon 1/7/08
21	Quarterly Free Product Removal Report	15 days	Mon 1/14/08



Project: Former Pumphouse #1
(Release #1)

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary

Figure 6. Remedial Action Milestone Schedule for the Former Pumphouse #1 Site, Release #1

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APPENDIX II

REPORT TABLES

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Table 1a. Soil Analytical Results
(Volatile Organic Compounds)

Sample Location	Sample ID	Depth (ft BGS)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)
Supplemental Corrective Action Plan–Part B Investigation, 2001								
Former Fuel Pit 1A/DAACG (Release #1)								
D-MW33	AK3311	5.0 - 7.5	02/02/01	**0.269 U**	0.269 U	0.464 =	0.456 =	0.92
D-MW34	AK3411	10.0 - 12.5	02/03/01	**0.220 U**	5.51 =	4.32 =	17.8 =	27.63
D-MW35	AK3511	11.0 - 12.5	02/05/01	***11.3 U***	***2550 =***	***355 =***	***1860 =***	4765
D-MW36	AK3611	5.0 - 7.0	02/03/01	**1.44 J**	74.4 =	16.2 =	80.9 =	172.94
D-MW37	AK3711	10.0 - 12.0	02/06/01	**1.3 =**	45.6 =	3.87 =	15.7 =	66.47
D-MW38	AK3811	10.0 - 11.5	02/04/01	**0.131 U**	0.196 U	0.58 =	3.93 =	4.51
D-MW39	AK3911	7.0 - 11.0	02/02/01	**0.232 U**	0.0949 J	1.24 =	3.08 =	4.4149
D-MW40	AK4011	10.0 - 12.5	02/02/01	**1.48 U**	0.381 J	0.345 J	13.3 =	14.026
D-MW41	AK4111	10.0 - 12.5	02/06/01	0.00048 J	0.0024 U	0.0024 U	0.0015 J	0.00198
D-MW42	AK4211	7.0 - 9.2	02/06/01	0.0025 U	0.0087 =	0.136 J	0.593 =	0.7377
D-MW43	AK4311	7.0 - 9.2	02/05/01	0.0013 U	0.0013 U	0.0013 U	0.0039 U	ND
GUST Soil Threshold Levels (Table B, Column 1)				0.017	115	18	700	NRC
Alternate Threshold Levels				9.3	479	187	893	—

NOTES:

Bold values exceed soil threshold levels.
Italic values exceed alternate threshold levels.

BGS Below ground surface.
BTEX Benzene, toluene, ethylbenzene, and xylenes.
GUST Georgia Underground Storage Tank.
ND Not detected.
NRC No regulatory criteria.

Laboratory Qualifiers

U Indicates that the compound was not detected above the reported sample quantitation limit.
UJ Indicates that the compound was not detected above an approximated sample quantitation limit.
J Indicates that the value for the compound was an estimated value.
= Indicates that the compound was detected at the concentration reported.

Table 1b. Soil Analytical Results
(Polynuclear Aromatic Hydrocarbons)

Sample Location	Sample ID	Depth (ft BGS)	Date Sampled	Detected PAH Compounds (mg/kg)									Total PAHs (mg/kg)
				Acenaphthalene	**Anthracene**	**Benzo(*a*)anthracene**	**Chrysene**	**Fluoranthene**	**Fluorene**	**Naphthalene**	**Phenanthrene**	**Pyrene**	
Former Fuel Pit 1A/DAACG (Release #1)													
D-MW33	AK3311	5.0 - 7.5	02/02/01										ND
D-MW34	AK3411	10.0 - 12.5	02/03/01									0.0141 J	0.0141
D-MW35	AK3511	11.0 - 12.5	02/05/01		0.0133 J			0.0688	0.0722	0.828			0.9823
D-MW36	AK3611	5.0 - 7.0	02/03/01										ND
D-MW37	AK3711	10.0 - 12.0	02/06/01							0.147			0.147
D-MW38	AK3811	10.0 - 11.5	02/04/01						0.0188 J				0.0188
D-MW39	AK3911	7.0 - 11.0	02/02/01					0.0095 J					0.0095
D-MW40	AK4011	10.0 - 12.5	02/02/01										ND
D-MW41	AK4111	10.0 - 12.5	02/06/01										ND
D-MW42	AK4211	7.0 - 9.2	02/06/01	0.0186 J	0.0209 J	0.0256 J	0.0207 J	0.0901	0.0203 J		0.119	0.0675	0.3827
D-MW43	AK4311	7.0 - 9.2	02/05/01										ND
GUST Soil Threshold Levels (Table B, Column 1)				NRC	NRC	0.66	0.66	NRC	NRC	NRC	NRC	NRC	NRC
Alternate Threshold Levels				—	—	—	2.1	—	—	—	—	—	—

NOTES:

BGS Below ground surface.
GUST Georgia Underground Storage Tank.
ND Not detected; refer to tables in Appendix V for complete list of PAH results.
NRC No regulatory criteria.
PAH Polynuclear aromatic hydrocarbon.

<u>Laboratory Qualifiers</u>

U Indicates that the compound was not detected above the reported sample quantitation limit.
UJ Indicates that the compound was not detected above an approximated sample quantitation limit.
J Indicates that the value for the compound was an estimated value.
= Indicates that the compound was detected at the concentration reported.

Table 2. Groundwater Analytical Results
(Volatile Organic Compounds)

Sample Location	Sample ID	Screened Interval (ft BGS)	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)
Supplemental Corrective Action Plan–Part B Investigation, 2001								
Former Fuel Pit 1A/DAACG (Release #1)								
D-MW01	AK0122	7.0 - 17.0	03/10/01	**99.8** =	17.3 =	119 =	776 =	1,012.1
D-MW02	AK0222	7.6 - 17.6	03/11/01	***400*** =	11,200 =	1,050 =	4,940 =	17,590
D-MW03	AK0322	6.0 - 16.0	03/11/01	1 U	1 U	0.21 J	0.74 J	0.95
D-MW08	AK0822	7.0 - 17.0	03/11/01	**156** =	31.4 =	389 =	1,930 =	2,506.4
D-MW09	AK0922	6.0 - 16.0	03/09/01	1 U	1 U	1 U	0.54 J	0.54
D-MW11	AK1122	6.6 - 16.6	03/10/01	**179** =	398 =	187 =	1,490 =	2,254
D-MW12	AK1222	5.6 - 15.6	03/11/01	58.1 =	123 =	222 =	2,020 =	2,423.1
D-MW13	AK1322	5.0 - 15.0	03/09/01	25.0 U	36.2 U	861 =	3,200 =	4,061
D-MW14	AK1422	5.0 - 15.0	03/09/01	1 U	1 U	0.2 J	1.4 J	1.6
D-MW17	AK1722	6.5 - 16.5	03/11/01	**159** =	3,550 =	364 =	3,250 =	7,323
D-MW18	AK1822	6.6 - 16.6	03/10/01	0.32 J	1.4 =	0.61 J	4.3 =	6.63
D-MW19	AK1922	6.0 - 16.0	03/09/01	64.2 =	1,510 =	365 =	1,450 =	3,389.2
D-MW20	AK2022	7.0 - 17.0	03/09/01	1 U	1 U	1 U	3 U	ND
D-MW22	AK2222	6.0 - 16.0	03/09/01	1 U	0.33 J	1 U	3 U	0.33
D-MW33	AK3322	9.0 - 19.0	03/09/01	**77.9** =	774 =	470 =	2,060 =	3,381.9
D-MW34	AK3422	7.0 - 17.0	03/11/01	***388*** =	8,180 =	1,060 =	4,740 =	14,368
D-MW35	AK3522	7.0 - 17.0	03/11/01	***765*** =	29,600 =	1,280 =	6,370 =	38,015
D-MW36	AK3622	7.0 - 17.0	03/09/01	**197** =	2,050 =	586 =	2,120 =	4,953
D-MW37	AK3722	7.0 - 17.0	03/10/01	***601*** =	5,340 =	423 =	1,860 =	8,224
D-MW38	AK3822	7.0 - 17.0	03/09/01	**123** =	2,410 =	738 =	3,730 =	7,001
D-MW39	AK3922	7.0 - 17.0	03/09/01	29.7 =	98.4 =	340 =	2,010 =	2,478.1
D-MW40	AK4022	8.0 - 18.0	03/09/01	***313*** =	75.3 =	959 =	4,230 =	5,577.3
D-MW41	AK4122	7.0 - 17.0	03/09/01	1 U	1 U	1 U	0.43 J	0.43
D-MW42	AK4222	7.0 - 17.0	03/09/01	1 U	112 =	192 =	962 =	1,266
D-MW43	AK4322	7.0 - 17.0	03/09/01	10 =	157 =	36.8 =	161 =	364.8
P1-MW12	AN1222	6.5 - 16.5	03/11/01	1.7 =	2.1 =	138 =	440 =	581.8
P1-MW13	AN1322	7.0 - 17.0	03/09/01	19.5 =	493 =	182 =	788 =	1,482.5
P1-MW14	AN1422	7.0 - 17.0	03/10/01	0.2 J	1.5 =	1.2 =	6 =	8.9
P1-MW15	AN1522	6.0 - 16.0	03/10/01	1 U	0.29 J	0.24 J	1.3 J	1.83
P1-MW16	AN1622	6.0 - 16.0	03/10/01	1 U	0.27 J	1 U	0.4 U	0.67
P1-MW42	AN4222	5.6 - 15.6	03/09/01	1 U	1 U	1 U	0.48 J	0.48
In-Stream Water Quality Standards (GA Chapter 391-3-6)				71.28	200,000	28,718	NRC	NRC
Alternate Concentration Limits				285	800,000	114,800	—	—

NOTES:

Bold values exceed the In-Stream Water Quality Standards.
Italic values exceed alternate concentration limits.
BGS Below ground surface.
BTEX Benzene, toluene, ethylbenzene, and xylenes.
ND Not detected.
NRC No regulatory criteria.

Laboratory Qualifiers

U Indicates that the compound was not detected above the reported sample quantitation limit.
UJ Indicates that the compound was not detected above an approximated sample quantitation limit.
J Indicates that the value for the compound was an estimated value.
= Indicates that the compound was detected at the concentration reported.

Table 3. Free Product Thickness

Well ID	Free Product Thickness (ft) After Absorbent Sock Removal												Free Product Thickness (ft) Prior to Vacuum Extraction			
	June 2004	July 2004	Aug. 2004	Sept. 2004	Oct. 2004	Nov. 2004	Dec. 2004	Jan. 2005	Feb. 2005	Mar. 2005	Apr. 2005	May 2005	June 2005	Aug. 2005	Oct. 2005	Jan. 2006
D-MW-02	0	0	0	0.01	0	sheen	sheen	0	sheen	sheen	sheen	sheen	0	0	sheen	0
D-MW-08	0	0	0	0.01	0	sheen	sheen	0	0	0	sheen	0	0	0	0	sheen
D-MW-11	0	0	0	0.01	0	0	sheen	0	0	0	0	0	0.01	0	sheen	0.01
D-MW-12	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0
D-MW-13	0	0	0	0	0	sheen	0	0	0	0	0	0.01	0	0	0	sheen
D-MW-17	0	0	0	0	0	sheen	sheen	sheen	sheen	sheen	0	0	0	0	0	sheen
D-MW-34	0.02	0	0	0	0	sheen	sheen	sheen	sheen	0	0	0	0	0	sheen	0
D-MW-35	0	0	0.01	0	0	sheen	sheen	0	sheen	0	0	0	0	0	0	0.01
D-MW-36	0	0	0	0	0	0	0	0	0	0	0.1	0.01	0	0	0	0
D-MW-37	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0
D-MW-38	0	0	0	0	0	0	sheen	0	sheen	0	0	0	0	0	0	0
D-MW-39	0	0	0	0	0	sheen	sheen	0	0	0	sheen	0	0	0	0	0
D-MW-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D-MW-41	0	0	0	0	0	0	0	0	0	0	sheen	0	0	0	0	0
D-MW-42	0	0	0	0.01	0	0	0	0	0.01	sheen	0	0	0	0	0	0
D-MW-43	0	0	0	0	0	0	0	0	sheen	0	0	0	0	0	0	0
D-CPT-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D-CPT-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D-CPT-3	0	0	0	0	0	0	0	0	sheen	0	sheen	0	0	0	0	0.01
D-CPT-4	0	0	0.02	0	0	sheen	sheen	0	sheen	0	0	0	0	0	0	sheen
D-CPT-5	0.03	0	0	0	sheen	0	0	0	0	sheen	sheen	0	0	0	0	0
D-CPT-6	0.04	0	0	0	sheen	sheen	sheen	0	0	0	sheen	0	0	0.03	0	0
D-CPT-7	0.07	0	0	0	0	sheen	sheen	0	sheen	0	sheen	0	0	0	0	0
D-CPT-8	0.02	0	0	0	0	sheen	0.06	0	sheen	sheen	sheen	sheen	0	0	0	0
D-CPT-10	0	0	0.01	0	0	sheen	0.01	0	0	0	sheen	sheen	NR	0	0	0.01
D-CPT-11	0	0	0	0	0	0	0	0	0.02	0	sheen	0	0	0	0	sheen
D-CPT-12	0	0	0	0	0	0.01	sheen	0	0	0	sheen	0.01	0	0	0	0
D-CPT-14	0	0	0	0	0	0	sheen	0	0	0	sheen	0	0	0	0	0
D-CPT-17	0.10	0	0	0	sheen	sheen	sheen	0	0	sheen	0	0	0	0.07	0.07	sheen
D-CPT-18	0	0	0.05	0	0	sheen	sheen	0	0	sheen	sheen	sheen	0	0.01	sheen	0
D-CPT-21	0.02	0.02	0	0	0	0	sheen	0	0.01	0	sheen	0.01	0	0	sheen	0.01
D-CPT-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D-CPT-31	0.08	0	0	0	0	sheen	sheen	0	sheen	sheen	0	0	0	sheen	sheen	0
D-CPT-37	0.07	0	0	0	0	sheen	0	0	0	0	sheen	0	0	0	0	0
D-CPT-39	0	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0
D-CPT-40	0.02	0.03	0	0	0	sheen	0.02	0	0	sheen	sheen	0	0	sheen	0	0
D-CPT-42	0	0.02	0	0	sheen	sheen	sheen	0	sheen	0	0	0	0	0	0	0

Table 4. Well Construction Details

Boring/ Well Number	Date Installed	Boring Depth (ft BGS)	Screened Interval (ft BGS)	Type of Completion	Coordinates (NAD83)[a]		Elevation (NGVD88)	
					Northing	Easting	Ground Surface	Top of Casing
Corrective Action Plan–Part A Investigation, 1996								
P1-MW11	11/21/96	18.0	7.0 - 17.0	2-in. PVC	734649.15	973338.76	36.60	36.42
P1-MW12	11/21/96	18.0	6.5 - 16.5	2-in. PVC	734599.32	973011.39	35.34	35.14
Corrective Action Plan–Part B Investigation, 1997, 1999								
P1-MW13	05/12/97	18.0	7.0 - 17.0	2-in. PVC	734726.70	973026.74	36.15	35.85
P1-MW14	05/12/97	18.0	7.0 - 17.0	2-in. PVC	734548.76	972881.25	34.95	34.78
P1-MW15	05/12/97	17.0	6.0 - 16.0	2-in. PVC	734475.11	973160.31	35.48	35.24
P1-MW16	05/12/97	17.0	6.0 - 16.0	2-in. PVC	734497.89	973365.89	34.89	34.77
P1-MW42	09/27/99	18.0	5.6 - 15.6	2-in. PVC	735032.45	972772.82	34.56	34.29
DAACG Facility Investigation Wells								
D-MW1	04/23/96	17.4	7.0 - 17.0	2-in. PVC	734865.68	973058.72	36.39	36.28
D-MW2	04/23/96	18.0	7.6 - 17.6	2-in. PVC	734754.28	973216.83	37.05	36.90
D-MW3	04/24/96	16.5	6.0 - 16.0	2-in. PVC	734659.31	973605.33	37.21	36.97
D-MW4	04/24/96	16.0	7.0 - 17.0	2-in. PVC	734618.70	973763.86	37.46	37.31
D-MW8	04/24/96	17.5	7.0 - 17.0	2-in. PVC	734807.62	973419.79	36.80	36.58
D-MW9	04/24/96	16.5	6.0 - 16.0	2-in. PVC	734787.14	973661.55	36.38	36.21
D-MW10	04/24/96	16.5	6.0 - 16.0	2-in. PVC	734736.63	973863.88	36.74	34.59
D-MW11	04/23/96	17.0	6.0 - 16.0	2-in. PVC	735030.37	973246.80	34.25	34.10
D-MW12	04/22/96	16.0	5.6 - 15.6	2-in. PVC	734914.42	973431.24	36.08	35.87
D-MW13	04/22/96	15.5	5.0 - 15.0	2-in. PVC	734945.03	973597.82	36.35	36.17
D-MW14	04/22/96	15.5	5.0 - 15.0	2-in. PVC	734911.72	973742.45	35.18	35.03
D-MW15	04/25/96	15.0	4.7 - 14.7	2-in. PVC	734848.80	974000.95	35.37	35.18
D-MW16	04/25/96	15.0	4.9 - 14.9	2-in. PVC	734884.97	974084.47	35.70	35.48
D-MW17	04/22/96	17.0	6.5 - 16.5	2-in. PVC	735067.03	973516.64	35.55	35.35
D-MW18	04/23/96	17.0	6.6 - 16.6	2-in. PVC	735242.75	973282.66	35.00	34.82
D-MW19	04/22/96	16.5	6.0 - 16.0	2-in. PVC	735190.02	973480.86	35.24	34.94
D-MW20	04/23/96	17.5	7.0 - 17.0	2-in. PVC	735106.75	973739.62	36.43	36.25
D-MW22	04/23/96	16.5	6.0 - 16.0	2-in. PVC	735211.78	973618.31	35.09	34.88
D-MW23	04/23/96	15.5	5.0 - 15.0	2-in. PVC	735440.83	973753.82	34.07	33.80
D-MW24	04/23/96	15.3	5.0 - 15.0	2-in. PVC	735555.59	973736.04	34.44	34.24
D-MW25	04/24/96	15.2	4.8 - 14.8	2-in. PVC	735502.82	973912.83	34.68	34.54
D-MW26	04/24/96	15.0	4.7 - 14.7	2-in. PVC	735493.54	974081.96	35.87	35.63
D-MW27	04/24/96	15.0	4.5 - 14.5	2-in. PVC	735658.75	973857.54	34.45	34.25
Supplemental Corrective Action Plan–Part B Investigation, 2001								
D-MW33	02/02/01	20.0	9.0 - 19.0	4-in. PVC	735059.31	973158.38	33.89	33.48
D-MW34	02/04/01	18.0	7.0 - 17.0	4-in. PVC	734907.85	973152.66	35.88	35.55
D-MW35	02/05/01	18.0	7.0 - 17.0	4-in. PVC	734790.43	973182.01	36.89	36.46
D-MW36	02/03/01	18.0	7.0 - 17.0	4-in. PVC	734664.20	973252.29	36.61	36.24
D-MW37	02/06/01	18.0	7.0 - 17.0	4-in. PVC	734780.91	973344.15	37.07	36.83
D-MW38	02/04/01	18.0	7.0 - 17.0	4-in. PVC	734980.63	973350.28	35.14	34.89
D-MW39	02/03/01	17.5	7.0 - 17.0	4-in. PVC	735095.08	973364.58	34.18	33.73
D-MW40	02/02/01	19.0	8.0 - 18.0	4-in. PVC	735123.10	973267.69	33.81	33.43
D-MW41	02/06/01	18.0	7.0 - 17.0	4-in. PVC	735041.89	973691.07	36.42	36.12
D-MW42	02/06/01	18.0	7.0 - 17.0	4-in. PVC	734846.82	973568.48	36.11	35.87
D-MW43	02/05/01	18.0	7.0 - 17.0	4-in. PVC	734791.37	973063.02	36.79	36.42

NOTES:
[a] Wells installed during the Pumphouse #1 Corrective Action Plan (CAP)–Part A and CAP–Part B investigations and DAACG facility investigation were resurveyed in February 2001 so that the reference datum would be consistent.
BGS Below ground surface.
PVC Polyvinyl chloride.

Table 5. Site-Specific Alternate Concentration Limits and Alternate Threshold Levels

Constituent	ACL (µg/L)	ATL (mg/kg)
Benzene	285	9.3
Toluene	800,000	479
Ethylbenzene	114,800	187
Xylenes	—	893
Benzo(*a*)anthracene	1.2	—
Benzo(*a*)pyrene	1.2	1.4
Benzo(*b*)fluoranthene	3.6	5.8
Benzo(*k*)fluoranthene	1.2	—
Chrysene	1.2	2.1
Dibenzo(*a*,*h*)anthracene	1.2	—
Indeno(1,2,3-*cd*)pyrene	1.2	0.66
Naphthalene	260	—

ACL Alternate concentration limit.
ATL Alternate threshold level.

APPENDIX III

SITE RANKING FORM

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SITE RANKING FORM

Facility Name: Former Fuel Pit 1A/DAACG Area (Release #1) **Ranked by:** S. Stoller

County: Chatham **Facility ID #:** 9-025085 **Date Ranked:** 1/30/2006

SOIL CONTAMINATION

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

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

** 1996 DAACG CAP-Part B sample H833-WB1302 at 3.5′ – 5.5′*

B. Total Benzene -
Maximum Concentration found on the site

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

** 1996 DAACG CAP-Part B sampleH833-WB1702 at 8′ – 10′*

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

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

Fill in the blanks: (A. 50) + (B. 50) = (100) x (C. 10) = (D. 1000)

GROUNDWATER CONTAMINATION

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

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

* *0.01 ft (1/8-inch) in five wells (Oct 2005)*

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

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

* *Sample from D-MW35 (March 2001)*

Fill in the blanks: (E. 250) + (F. 50) = (G. 300)

Facility Name: **Former Fuel Pit 1A/DAACG Area (Release #1)** **Facility ID #:** **9-025085**

POTENTIAL RECEPTORS (MUST BE FIELD-VERIFIED)

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

H. Public Water Supply

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

For lower susceptibility areas only:

☐	>1 mi	=	0

I. Non-Public Water Supply

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

For lower susceptibility areas only:

☐	>¼ mi	=	0

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

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

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

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

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

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

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

(G. **300** **) x (L.** **50** **) = M.** **15,000**

(M. **15,000** **) + (D.** **1000** **) = N.** **16,000**

P. **SUSCEPTIBILITY AREA MULTIPLIER**

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

☒ All other sites = 1

Q. **EXPLOSION HAZARD**

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

☐ Yes = 200,000

☒ No = 0

Fill in the blanks: (N. **16,000** **) x (P.** **1** **) = (** **16,000** **) + (Q.** **0** **)**

= 16,000 (for Former Fuel Pit 1A/DAACG Area based on 2001 groundwater concentration in D-MW35 and October 2005 free product thickness)

ENVIRONMENTAL SENSITIVITY SCORE

OTHER GEOLOGIC AND HYDROLOGIC DATA

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

1.0 REGIONAL AND LOCAL GEOLOGY

Southeastern Georgia is located within the coastal plain physiographic province of the southeastern United States (Clark and Zisa 1976). In this region, the thickness of southeastward-dipping subsurface strata ranges from 0 ft at the fall line, located approximately 150 miles inland from the Atlantic coast, to approximately 4,200 ft below ground surface at the coast. Herrick (1961) provides detailed lithologic descriptions of the stratigraphic units encountered during the installation of water and petroleum exploration wells in Chatham County. The well log of GGS Well 125, located on White Bluff Road 700 ft west and 0.3 mile north of Buckhalter Road, Savannah, provides one of the more complete lithologic descriptions of upper Eocene, Miocene, and Pliocene to Recent sedimentary strata in Chatham County.

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

HAAF is located within the barrier island sequence district of the coastal plain physiographic province of the southeastern United States (Clark and Zisa 1976). The barrier island sequence district in Chatham and Bryan counties is characterized by the existence of several marine terraces (step-like topographic surfaces that decrease in elevation toward the coast). These marine terraces, and their associated deposits, are the results of sea level fluctuations that occurred during the Pleistocene epoch. The surficial (Quaternary) deposits in Chatham and Bryan counties, in decreasing elevation and age, are part of the Okefenokee, Wicomico, Penholoway, Pamlico, and Silver Bluff terrace complexes.

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

Based on the coring and sampling of unconsolidated strata at HAAF during the Corrective Action Plan–Part A investigations, it was concluded that all former underground storage tanks (USTs) were buried within the Satilla Formation, which is overlain by various soil types. Soil groups at HAAF include the Chipley, Leon, Ellabelle, Kershaw, Pelham, Albany, Wahee, and Ogeechee (Wilkes et al. 1974).

2.0 REGIONAL AND LOCAL HYDROGEOLOGY

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

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

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

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

3.0 REFERENCES

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