



FORSUM

Corrective Action Plan
Part A
260th Quartermaster Motor Pool
Facility ID #9-025008



3d Inf Div (Mech)

Underground Storage Tanks #25 and #26
at Building 1343
3rd Infantry Division
Hunter Army Airfield
Savannah, Georgia

March 1999

Prepared for:
HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
Oak Ridge, Tennessee 37831-7606
Managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
For the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

Prepared by:
Earth Tech, Inc.
800 Oak Ridge Turnpike, Suite C-100
Oak Ridge, Tennessee 37830

**CORRECTIVE ACTION PLAN - PART A REPORT
FOR
UNDERGROUND STORAGE TANKS #25 AND #26
AT
BUILDING 1343
260TH QUARTERMASTER MOTORPOOL
3RD INFANTRY DIVISION
HUNTER ARMY AIRFIELD
FACILITY ID #9-025008
HUNTER ARMY AIRFIELD, GEORGIA**

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List of Abbreviations and Acronyms

AAF	Army Airfield
AMSL	above mean sea level
ASTM	American Society for Testing and Materials
ATL	alternate threshold level
BDL	below detection limit
BGS	below ground surface
BLS	below land surface
BTEX	benzene, toluene, ethylbenzene, and xylene
BTL	below threshold level
CAP	Corrective Action Plan
CL	clay
COE	(U.S. Army) Corps of Engineers
CX	Center of Excellence
DPW	Directorate of Public Works
DQA	data quality assessment
DQCR	Data Quality Control Report
DQO	data quality objective
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
EPD	Environmental Protection Division

FM	Formation
FS	Fort Stewart
GA DNR	Georgia Department of Natural Resources
gpm	gallons per minute
GRO	gasoline-range organics
GRP	Group
GUST	Georgia Underground Storage Tank
GW	groundwater
HAAF	Hunter Army Airfield
ID	inside diameter
LS	limestone
MCL	maximum contaminant level
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MS	matrix spike
MW	monitoring well
N/A	not applicable
NRC	no regulatory criteria
OVM	organic vapor meter
PAH	polynuclear aromatic hydrocarbon
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
PZ	piezometer
QA	quality assurance
QA/QC	quality assurance/quality control
QAPjP	Quality Assurance Project Plan
QC	quality control
QCSR	Quality Control Summary Report
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
SC	clayey soil
SC-SM	clayey, silty sand
SM	silty sand
SP-SC	poorly graded, clayey sand
SVOC	semivolatile organic compound
SW	sand
TBD	to be determined
TCLP	Toxicity Characteristic Leaching Procedure
TOC	total organic carbon
TPH	total petroleum hydrocarbon
UNK	unknown
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compound

CORRECTIVE ACTION PLAN PART A

**Underground Storage Tanks #25 and #26
Building 1343, 260th QM Motorpool
Hunter Army Airfield
Facility ID #9-025008
Hunter Army Airfield, Georgia**

CORRECTIVE ACTION PLAN PART A

Facility Name: Hunter AAF/FAC1343/260th QM Street Address: FAC 1343
Facility ID: 9-025008 City: Savannah County: Chatham Zip Code: 31409
Latitude: 32 1.35' Longitude: 81 7.44'

Submitted by UST Owner/Operator:

Name: Tom Fry, Chief, Env. Branch
Company: U.S. Army, 3rd Inf. Div.
Mech
Address: 1557 Frank Cochran Drive
City: Ft. Stewart State: GA
Zip Code: 31314-4928
Telephone: (912) 767-1078/2010

Prepared by Consultant/Contractor:

Name: Keith Owens
Company: Earth Tech, Inc.
Address: 800 Oak Ridge Turnpike
Suite C-100
City: Oak Ridge State: TN
Zip Code: 37830
Telephone: (423) 483-9404

I. PLAN CERTIFICATION:

A. UST Owner/Operator Certification

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: Tom Fry

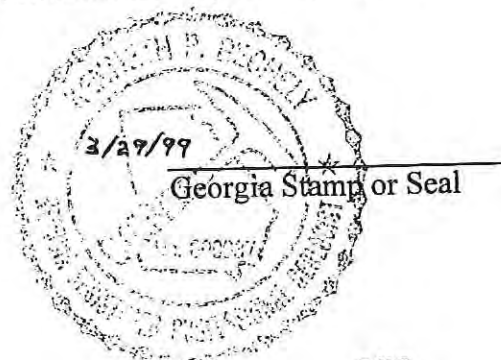
Signature: Thomas C. Fry Date: 03/30/99

B. Registered Professional Engineer or Professional Geologist Certification

I hereby certify that I have directed the 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: Kenneth Bechely

Signature: Kenneth P. Bechely
Date: 3/29/99



General: READ THE GUIDANCE DOCUMENT FOR CAP PART-A BEFORE COMPLETING THIS FORM. FAILURE TO READ THE GUIDANCE DOCUMENT WILL MOST LIKELY RESULT IN PREPARATION OF AN UNACCEPTABLE REPORT. All text, figures, and tables requested in their respective sections should be prepared strictly in accordance with the Georgia EPD CAP-A guidance document. Please fill out this form as provided. Do not change the size of the fields or alter the placement of each section on each page.

(Appendix I: All Report Figures)

(Appendix II: All Report Tables)

II. INITIAL RESPONSE REPORT

A. Initial Abatement

Were initial abatement actions initiated?

YES ____ NO X

If Yes, please summarize. If No, please explain why not.

Actions were not required to abate imminent hazards and/or emergency conditions at the underground storage tank (UST) system, Building 1343 site. Contaminant migration and release prevention, fire and vapor mitigation, or emergency free product removal were not performed prior to, or during, the closure in place (CIP) of the UST system.

B. Free Product Removal

(Table 1: Summary of Free Product Removal - must include Free Product thickness in each well in which it was detected, and volume of product removed)

Free product detected?

YES ____ NO X

If Yes, please summarize free product recovery efforts.

Continuing free product recovery proposed?

YES ____ NO X

If yes, please indicate the method and frequency of removal.

C. Tank History

List current and former UST's operated at site based on owner/operator knowledge (consistent with EPA 7530-1 Form). Systems must be illustrated on Figure 2 (Site Plan), as described in section D below.

CURRENT UST SYSTEMS (if applicable)

<u>Tank ID Number</u>	<u>Capacity (gal)</u>	<u>Substance Stored</u>	<u>Age (yrs)</u>	<u>Meets 1998 Upgrade Standards (Yes/No)</u>
N/A	N/A	N/A	N/A	N/A

FORMER UST SYSTEMS (if applicable)

<u>Tank ID Number</u>	<u>Capacity (gal)</u>	<u>Substance Stored</u>	<u>Date Removed</u>
UST #25	30,000	Diesel	Closed in Place - July 1998
UST #26	6,000	Gasoline	Closed in Place - July 1998

D. Initial Site Characterization

(Figure 1: Vicinity/Location Map)

(Figure 2: Site Plan)

1. Regulated Substance Released (gasoline, diesel, used oil, etc.): Gasoline and Diesel
Discuss how this determination was made and circumstances of discovery.

Initially, a Phase II investigation was completed at the subject site in 1992. Monitoring wells and soil borings were conducted and subsequent groundwater and soil contamination identified. In July 1998, the UST system was CIP. During the process of closure, soil samples were collected from the piping trenches and adjacent to each fuel dispenser. Groundwater samples were collected from the perimeter of each UST (UST #25 & #26). Analytical results confirmed the release of diesel and gasoline contamination in the groundwater and soil. The analytical results indicate soil constituents which exceed their respective Soil Threshold Levels (STLs) (i.e., Table A, Column 2) or GA EPD-approved Alternate Threshold Levels (ATLs), and groundwater constituents which exceed their respective Maximum Concentration Levels (MCLs).

2. Source(s) of Contamination: Leaking fuel distribution lines
Discuss how this determination was made.

During operation of the UST system, the system failed to hold pressure on several occasions. During repair operations, it was noted that the piping appeared deteriorated due to corrosion and some of the pipe fittings were defective.

3. Local Water Resources

(Figure 3: Quadrangle Map - Public and Private drinking water and surface water)

(Appendix III: Water resources survey documentation, including, but not limited to: USGS database search, interview forms, and documentation of field survey)

a. Site located in high/average X OR low _____ groundwater pollution susceptibility area? _____

b. Water Supplies within applicable radii? YES X NO _____

If yes,

i. Nearest public water supply located within: 2750 feet

ii. Nearest down-gradient public water supply located within: 7500 feet

iii. Nearest non-public water supply located within: N/A feet

iv. Nearest down-gradient non-public water supply located within: N/A feet

c. Surface Water Bodies and sewers:

i. Nearest surface water located within: 75 feet

ii. Nearest down-gradient surface water located within: 75 feet

iii. Nearest storm or sanitary sewer located within 25 feet

iv. Depth to bottom of sewer at a point nearest the plume: N/A feet

4. Impacted Environmental Media

a. Soil Impacted

(Table 2: Soil Analysis Results)

(Figure 4: Soil Quality Map)

(Appendix IV: Soil Boring Logs)

(Appendix V: Soil Laboratory Reports)

(Appendix VI: ATL Calculations, if applicable)

Provide a brief discussion of soil sampling.

Continuous direct-push soil cores were collected, utilizing a Geoprobe™, from the piping trenches and adjacent to each fuel dispenser at 2 ½ feet below ground surface (bgs). During closure of the tanks, one soil sample was collected from each borehole and chemically analyzed for TPH (Method SW-846 8015, GRO or DRO range), BTEX (Method SW-846 5030/8260), and PAH (Method SW-846 8310). Analytical results are provided in Table 5, Appendix II.

i. Soil contamination above applicable threshold levels?

YES X NO

If yes, indicate highest concentrations in soil along with locations and depths detected.

Soil Sample #HAAF-260-Pipe-D2, 2.5' bgs, TPH (DRO) = 6,000 mg/kg,
toluene = 140 mg/kg
ethylbenzene = 91 mg/kg
Soil Sample #HAAF-260-Dis-2-G-S, 2.5' bgs, TPH (DRO) = 2,100 mg/kg,
TPH (GRO) = 800 mg/kg.

ii. ATLs calculated?

YES X NO

If yes, present ATL's.

Georgia EPD approved a soil ATL of 500 ppm TPH and 100 ppm Benzene for the site. EPD letter dated July 31, 1998 by Mr. William Logan, Environmental Specialist, Underground Storage Tank Management Program.

iii. If ATL's calculated, is soil contamination above ATL's?

YES X NO N/A

b. Groundwater Impacted

(Table 3: Groundwater analysis results)

(Figure 5: Groundwater Quality Map)

(Appendix VII: Monitoring Well Details)

Appendix VII: Groundwater Laboratory Results)

Provide a brief discussion of groundwater sampling.

Groundwater samples were collected from the perimeter of each UST as well as up-gradient and down-gradient from the USTs. UST groundwater samples were collected at a depth corresponding to the bottom of each UST. The samples were collected using a Geoprobe™ with a 4 foot stainless steel water sampler with 0.1-millimeter slotted screen and a peristaltic pump. Chemical parameters for the groundwater samples submitted for analysis included VOC 8260A and SVOC 8270B. In addition, one temporary piezometer was located up-gradient and three temporary piezometers were located down-gradient from the UST system and were sampled.

i. Groundwater contamination above MCLs?

YES X NO

ii. Groundwater contamination above In-Stream Water Quality Standards?

YES X NO

If yes, indicate highest concentrations in groundwater along with the locations.

Water Sample# HAAF-260-PZ-4GW, Benzene = 250 µg/L.

Water Sample# HAAF-260-UST-1-G-GW, Benzene = 3,000 µg/L.

Water Sample# HAAF-260-UST-2-G-GW, Benzene = 1,600 µg/L.

- c. *Surface Water Impacted?* YES _____ NO X
If Yes, indicate concentration(s) of surface water sample(s) taken from the surface water body/bodies impacted.

Surface water samples were collected from a drainage gully down-gradient from the UST system. The water samples were collected during a Phase II Site Assessment (1992) and were below detection limits (BDL) for BTEX and PAH.

- d. *Point of Withdrawal Impacted?* YES _____ NO X
If Yes, indicate concentration(s) of surface water sample(s) taken from the surface water body/bodies impacted.

5. Other Geologic/Hydrogeologic Data

- a. *Depth to Groundwater:* 2.65' - 5.00' (Table 4: Groundwater Elevations)
- b. *Groundwater Flow Direction* south-southeast (Figure 6: Potentiometric Surface Map)
- c. *Hydraulic Gradient:* 0.020 feet/feet
- d. *Geophysical Province:* Coastal Plain
- e. *Unique geologic/hydrogeological conditions:* N/A

6. Corrective Action Completed or In-Progress (if applicable)

(Table 5: UST System Closure Sampling)
(Figure 7: UST System Closure Sampling)
(Appendix IX: Contaminated Soil Disposal Manifests)

- a. *Underground Storage Tank (UST) System Closure:* N/A
If applicable, summarize UST system closure activities conducted.

Earth Tech, Inc. closed in place USTs #25 and #26 located within the 260th Quartermaster Motorpool, in July 1998. All product was removed from both USTs. The tanks were cleaned and filled with a slurry cement mixture. In addition, all product was removed from the associated piping and the piping was cleaned and closed in place (i.e., ends were capped/sealed).

- b. Excavation and Treatment/Disposal of Backfill Materials and Native Soils
Check one: No UST removal performed X
Returned to UST excavation _____
Excavated soils treated or disposed off site _____
If soils were excavated, summarize excavation and treatment/disposal activities:

7. Site Ranking:
Environmental Site Sensitivity Score: 5750
(Appendix X: Site Ranking Form)

8. Conclusions and Recommendations

Complete applicable section below, one section only

a. No Further Action Required (if applicable) N/A X
(provide justification)

b. Monitoring Only (if applicable) N/A X
(provide justification)

c. CAP-B (if applicable) N/A _____
(provide justification)

A CAP-B is applicable for this site as provided in 391-3-15-.09(3), as the results indicate that:

- Analytical data obtained from groundwater sampling at the site indicates benzene concentrations exceed the federal and state MCLs of 5 µg/L.
- Concentrations of toluene and ethylbenzene in soil exceed the applicable Soil Threshold Levels (Table A, Column 2). In addition, TPH (GRO) and TPH (DRO) concentrations exceed the GA EPD approved Alternate Concentration Level of 500 mg/kg.
- The site has an environmental sensitivity score of >1000.

III. MONITORING ONLY PLAN (if applicable)

N/A X

A. Monitoring points

B. Period/Frequency of monitoring and reporting

C. Monitoring Parameters

D. Milestone Schedule

E. Scenarios for site closure or CAP-Part B

IV. SITE INVESTIGATION PLAN (if applicable)

N/A

(Figure 8: Proposed additional boring/monitoring well location)

A. Proposed Investigation of Horizontal and Vertical Extent of Contamination In:

1. Soil

N/A

Twelve samples will be collected using DPT, as indicated in Figure 8A. One soil sample will be collected from each DPT location and analyzed for BTEX, PAH, TPH-diesel range organics (DRO), and TPH-gasoline range organics (GRO). Additional DPT locations will be selected, as necessary, until the horizontal extent of contamination is delineated.

Two vertical profiles will be installed to determine the vertical extent of contamination (Figure 8A). A soil sample will be collected every five feet to the Hawthorne clay layer (estimated at 45 feet bgs) and analyzed for BTEX, PAH, TPH-diesel range organics (DRO) and TPH-gasoline range organics (GRO). Additional vertical profiles will be installed, as necessary, until the vertical extent of contamination is delineated.

2. Groundwater
a. Free Product

N/A X

- b. Dissolved phase

N/A

Additional groundwater samples will be collected from a combination of monitoring wells and DPT sampling points. The horizontal extent of groundwater contamination will be determined by collecting groundwater samples from temporary wells installed at the site (Figure 8B). Each of the temporary wells will be sampled for BTEX and submitted to the laboratory for 24-48 hour turn-around. Based on the information obtained from the BTEX analytical data, additional temporary wells will be installed, if necessary, until the groundwater hydrocarbon plume is fully delineated. At that time, the Installation will instruct the contractor to complete specific temporary wells as permanent monitoring wells. The wells will be screened across the water table with 3 feet of screen above the water table in order to detect the presence of free product. All monitoring wells will be completed flush with the ground surface. Each permanent well will be developed, and one groundwater sample collected from each well and analyzed for BTEX and PAHs.

It should also be noted that three permanent monitoring wells (MW-3, MW-4, and MW-5) currently exist at the site (Figure 8) and will be redeveloped during the CAP Part B investigation. If redevelopment activities are successful (i.e., the wells are not silted), then one groundwater sample will be collected from each well and analyzed for BTEX and PAHs.

3. Surface Water

N/A

Surface water will be sampled at selected points upstream, downstream, and at a selected midpoint in the drainage ditch located 100 feet southeast of the site. Sampling locations will be selected based on the area of the hydrocarbon plume and the groundwater flow direction to ensure that the potential for the plume to intercept the drainage ditch is accurately evaluated.

B. Proposed Investigation of Vadose Zone And Aquifer Characteristics:

Undisturbed soil samples were collected during the previous investigation. Permeability, porosity, moisture content, and bulk density analysis results are provided in the attached report which also includes particle size distribution curves.

Additional testing to determine saturated horizontal hydraulic conductivity, using slug tests, will be performed on a minimum of three monitoring wells (new and/or existing).

Soil samples collected at the site also will be analyzed for total organic carbon (TOC) and groundwater samples will be analyzed for dissolved iron. This information will be utilized in the fate and transport modeling or remediation system design.

V. PUBLIC NOTICE

(Figure 9. Tax Map)

(Appendix XI: Copies of public notification letters & certified return receipts or newspaper notice if approved)

USTs #25 and #26, Building 1343, are located within the confines of HAAF, which is a sub-installation of Fort Stewart, a federally owned facility. All of the property contiguous to the site is owned by the U.S. Government. The Fort Stewart Directorate of Public Works will comply with the public notice requirements defined by Georgia Department of Natural Resources (GA DNR) guidance by publishing an announcement in the local newspaper over a period of 2 weeks. Publication of this announcement will occur on April 4 and 11, 1999.

VI. CLAIM FOR REIMBURSEMENT (for GUST Trust Fund sites only)

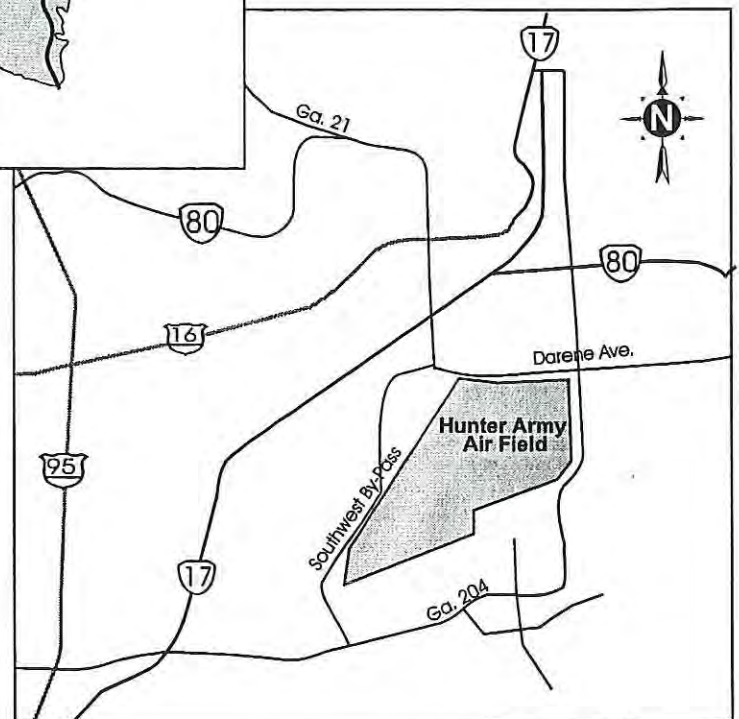
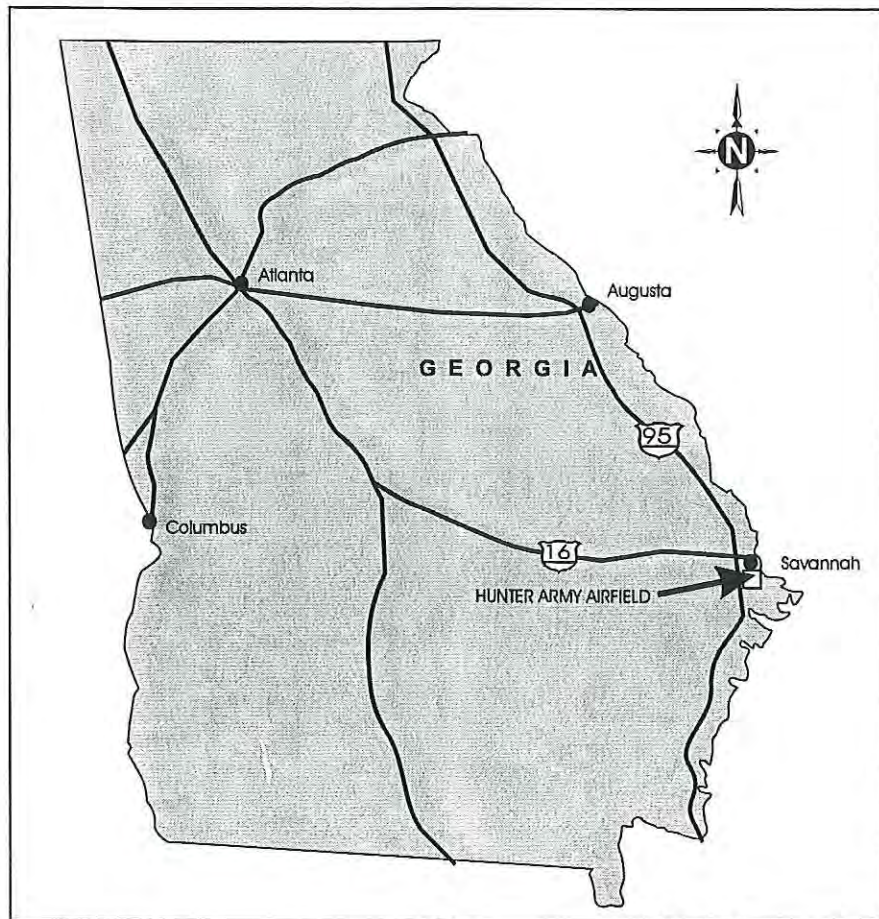
N/A X

(Appendix XII: GUST Trust Fund Reimbursement Application and Claim for reimbursement)

Hunter Army Airfield is a federally owned facility and has funded this investigation for the USTs #25 and #26 site, Building 1343, Facility ID #9-025008, using Operation and Maintenance Account funds. Application for Georgia Underground Storage Tank Trust Fund reimbursement is not being pursued at this time.

APPENDIX I

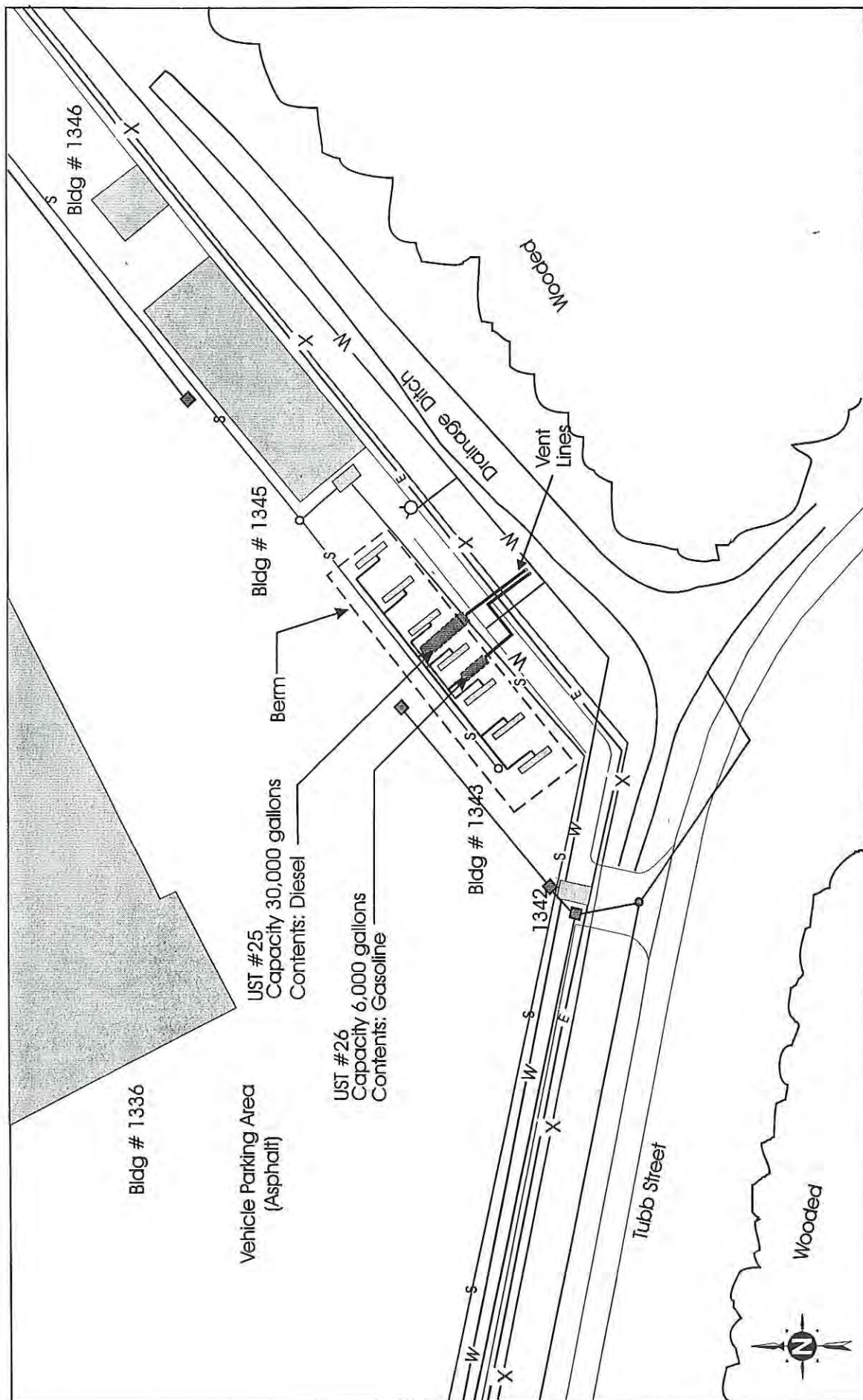
REPORT FIGURES



NOT TO SCALE

**Location Map
of USTs #25 & #26
Facility ID# 9-025008
Building 1342, 260th QM
Motor Pool Site at
Hunter Army Airfield
Chatham County, Georgia**

Figure 1



Site Plan for the USTs
 #25 & #26, Bldg 1343
 260th QM Motor Pool
 Facility ID# 9-025008
 Site Investigation

Figure 2

- EXPLANATION**
- Sanitary Sewer Line
 - Water Lines
 - Electric Utility Lines
 - Storm Sewer Line
 - Fire Hydrant
 - Fence

- Dispersers
- Gasoline UST #26
- Diesel UST #25
- Diesel Piping
- Gasoline Piping

Location of UST

1 INCH = 100 FEET



foceqp 5/98

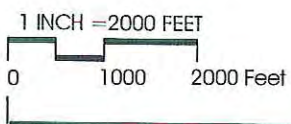


EXPLANATION



Public water source

No private water wells were identified

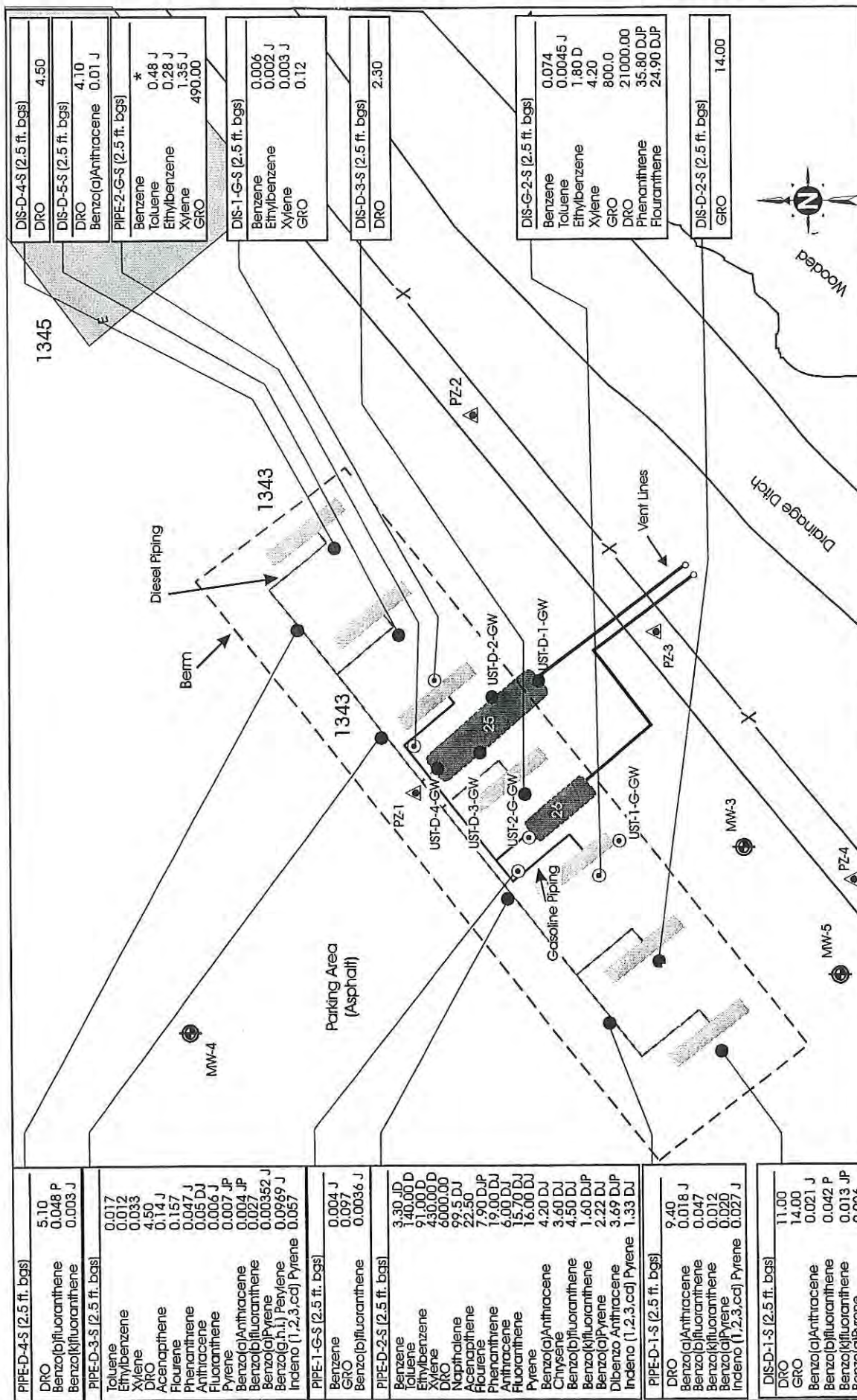


1 MILE

**Map Showing Public Drinking
Water Sources and Surface
Water Bodies Near
USTs # 25 & 26
Facility ID # 9-025008
at Building 1343,
Hunter Army Airfield,
Chatham County, Georgia**

Figure 3

Adapted from USGS 7.5' topographic quadrangle maps



Soil Quality Map of the USTs #25 and #26, Facility ID #9-025008, Building 1343, 260th QM Motorpool Site

Figure 4

EXPLANATION

- Existing Groundwater Monitoring Well
- Soil Sample Locations
- 30,000 Gallon UST
- 6,000 Gallon UST
- Downgradient Sample and Temporary Piezometer Location
- Gasoline Piping
- Diesel Piping
- Fence

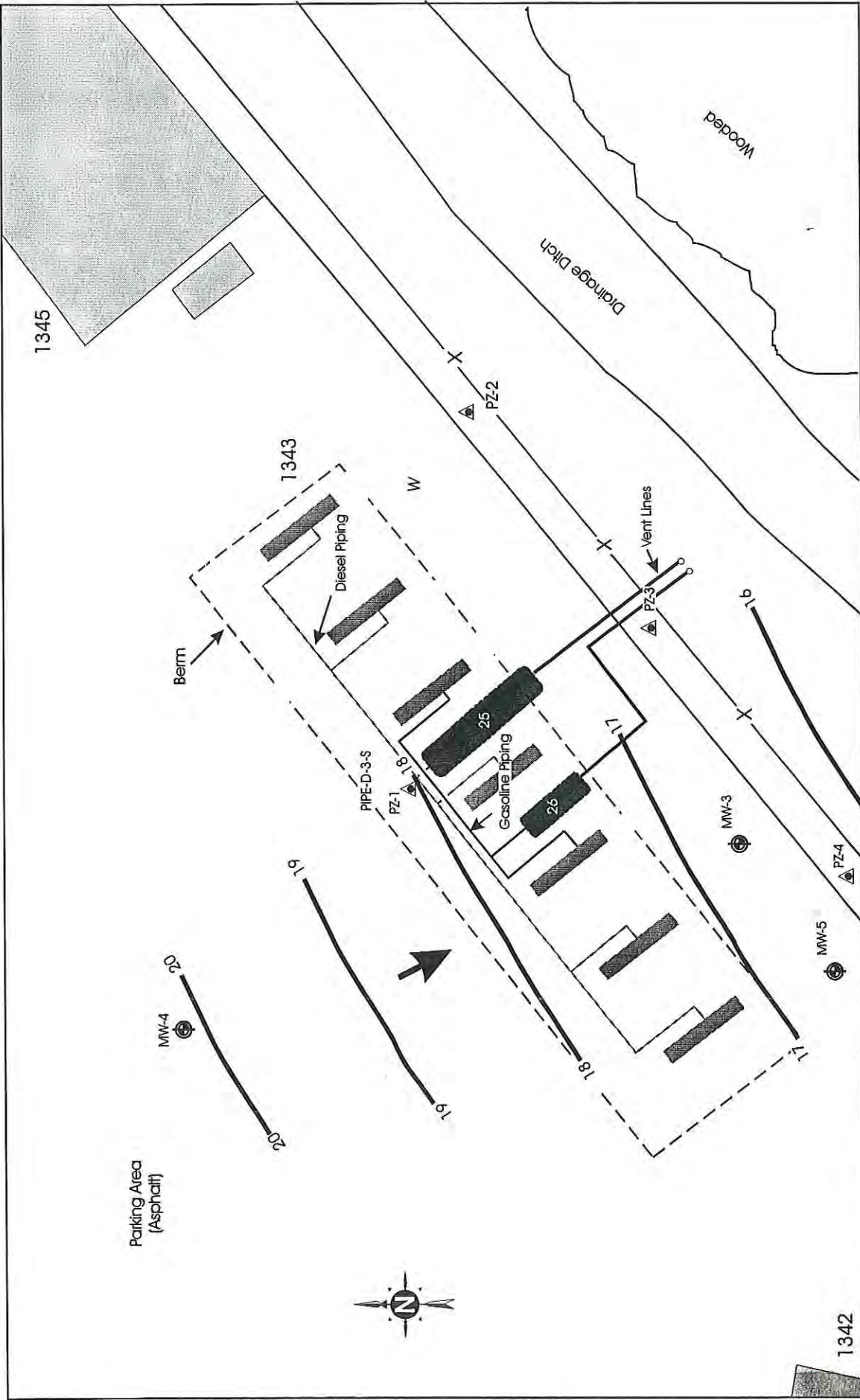
Notes:

- J = Estimated value
- D = Sample was diluted
- P = Compound exceeded 40% Deviation between UV and fluorescent detectors
- bgs = below ground surface
- All reported concentrations are in mg/kg
- Underground utilities were not depicted to enhance clarity of this figure
- Sample analysis summary tables do not present non-detected analytes
- * In Sample PIPE-2-G-S (2.5 ft. bgs) benzene was not detected at a detection limit of 0.67

1 INCH = 40 FEET

0 20 40 Feet

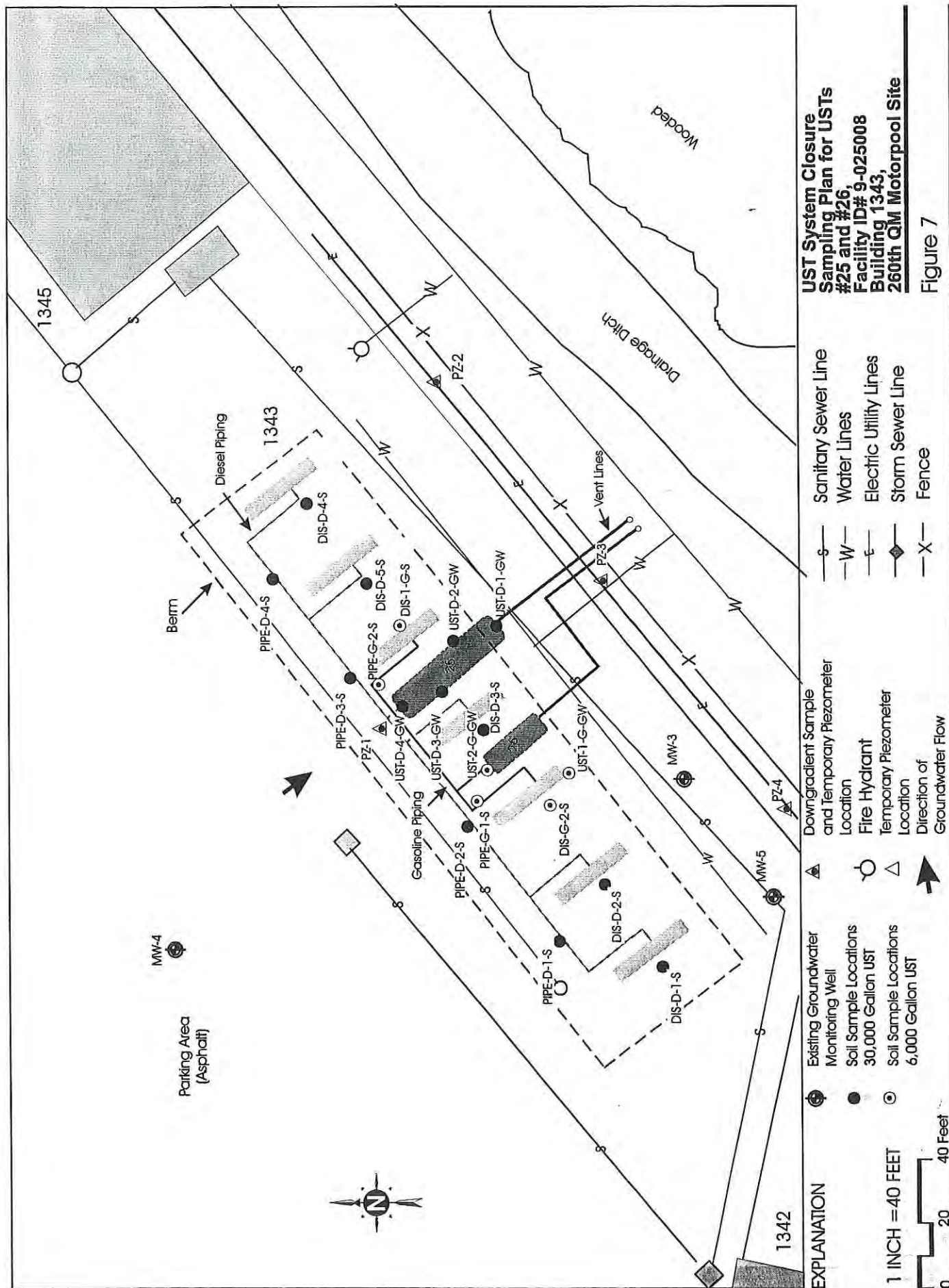
260soil.cdr 1/98

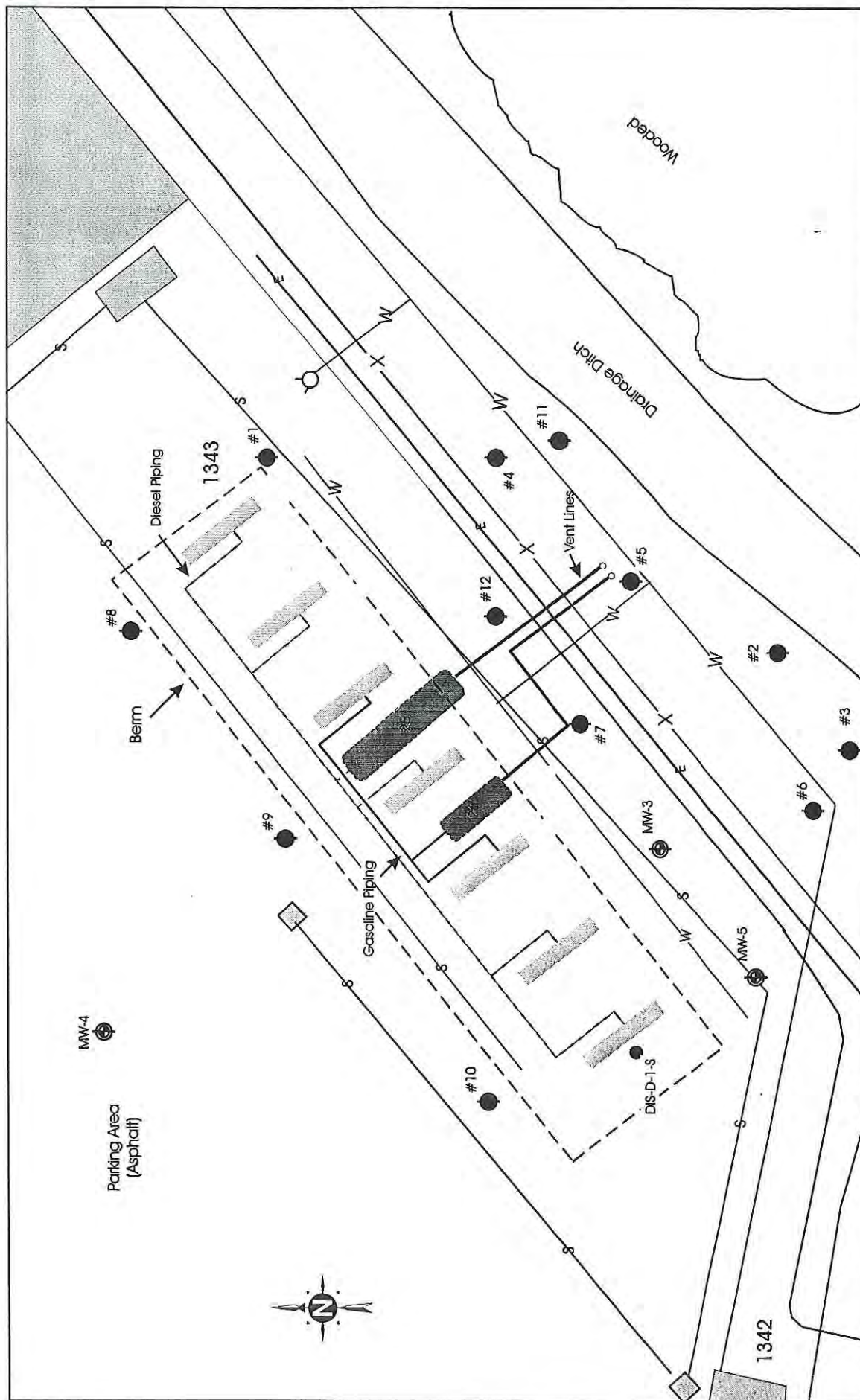


**Potentiometric Surface
Map of the USTs #25 & #26,
Facility ID# 9-025008
Building 1343, 260th
QM Motorpool Site**

Figure 6

EXPLANATION	Existing Groundwater Monitoring Well	Downgradient Sample and Temporary Piezometer Location	Direction of Groundwater Flow
1 INCH = 40 FEET	●	16	▲
0 20 40 Feet	○	—X—	—X—
260pat.cdr 12/98	○	Fence	Fence
	Soil Sample Locations 30,000 Gallon UST 6,000 Gallon UST	Potentiometric Contour	Direction of Groundwater Flow





Proposed Additional Boring
and Soil Sampling locations
for USTs #25 and #26,
Facility ID # 9-025008
Building 1343,
260th QM Motorpool Site

Figure 8A

Sanitary Sewer Line
Water Lines
Electric Utility Lines
Storm Sewer Line
Fence

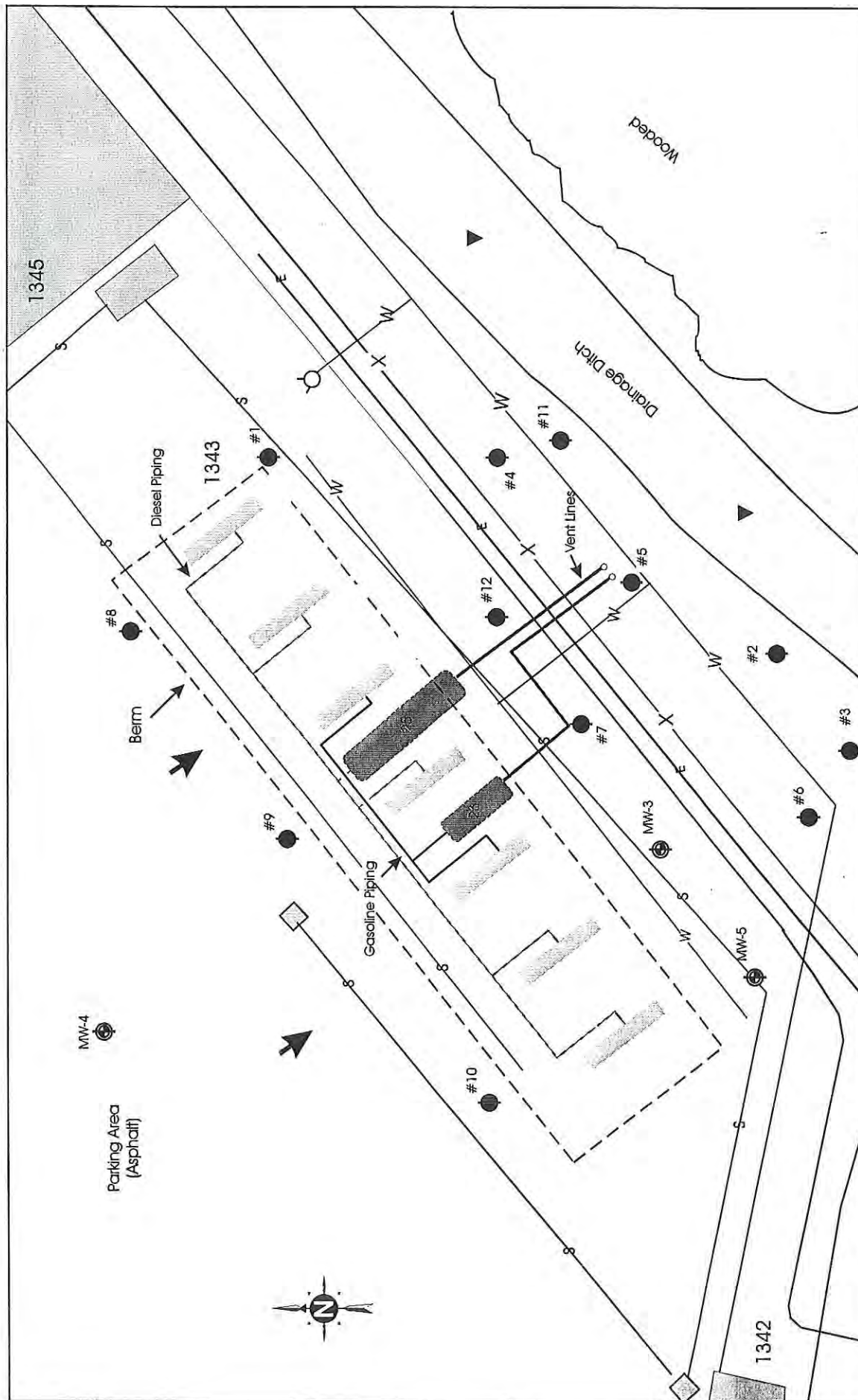
Existing Groundwater
Monitoring Well
Fire Hydrant
DPT/Temporary Monitoring Well
Locations (Soil Samples)

EXPLANATION

1 INCH = 40 FEET

0 20 40 Feet

260cam8.cdr 12/98



APPENDIX II

REPORT TABLES

USTs #25 and #26, Building 1343
 Hunter Army Airfield
 Chatham County, Facility ID #9-025008

TABLE 1: FREE PRODUCT REMOVAL

Monitoring Well Number: N/A				
Date of Measurement	Groundwater Elev. (ft)	Product Thickness (ft)	Corrected Water Elev. (ft)	Product Removed (gal)
N/A	N/A	N/A	N/A	N/A
TOTAL				

Monitoring Well Number: N/A				
Date of Measurement	Groundwater Elev. (ft)	Product Thickness (ft)	Corrected Water Elev. (ft)	Product Removed (gal)
TOTAL				

Prepared by: _____ Date: _____

Reviewed by: _____ Date: _____

USTs #25 and #26, Building 1343
Hunter Army Airfield
Chatham County, Facility ID #9-025008

TABLE 2a: SOIL ANALYTICAL RESULTS
(VOLATILE ORGANIC COMPOUNDS)

Sample Location	Depth (ft)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH (mg/kg)
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Applicable Standards								

TABLE 2b: SOIL ANALYTICAL RESULTS
(POLYNUCLEAR AROMATIC HYDROCARBONS)

Sample Location	Depth (ft)	Date Sampled	Detected PAH Compounds (mg/kg)						Total PAHs (mg/kg)
Applicable Standards									

NOTE:

Prepared by: _____ Date: _____

Reviewed by: _____ Date: _____

USTs #25 and #26, Building 1343
Hunter Army Airfield
Chatham County, Facility ID #9-025008

TABLE 3a: GROUNDWATER ANALYTICAL RESULTS
(VOLATILE ORGANIC COMPOUNDS)

Sample Location	Depth (ft) bgs	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethyl- benzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)
HAAF-260-PZ-1-GW	6'	07/23/98	54		53	22	129
HAAF-260-PZ-2-GW	6'	07/23/98					
HAAF-260-PZ-3-GW	6'	07/22/98	26		2 J	2 J	30
HAAF-260-PZ-4-GW	6'	07/22/98	250 D	3 J	130	20	403
Applicable Standards ⁽¹⁾			5	700	1000	10000	NA

NOTE:

Laboratory Qualifiers:

U = not detected. These are indicated as blank cells in the table.

J = estimated value

⁽¹⁾ Safe Drinking Water Act, Maximum Contaminant Level

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene, and xylene. Total BTEX was calculated as the sum of the four compounds.

Non-detect concentrations are assumed to be zero, for purposes of calculating total BTEX.

ft = feet

NA = not applicable

µg/L = micrograms per liter

USTs #25 and #26, Building 1343
Hunter Army Airfield
Chatham County, Facility ID #9-0725008

TABLE 3b: GROUNDWATER ANALYTICAL RESULTS
(POLYNUCLEAR AROMATIC HYDROCARBONS)

Sample Location	Sample ID	Depth (ft) bgs	Date Sampled	Detected PAH Compounds (µg/L)							
				Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene
HAAP-260-PZ-1-GW	HAAP-260-PZ-1-GW	6'	7/23/98	290 E		40	82	180	25		28
HAAP-260-PZ-2-GW	HAAP-260-PZ-2-GW	6'	7/24/98	1 J							
HAAP-260-PZ-3-GW	HAAP-260-PZ-3-GW	6'	7/22/98	13							
HAAP-260-PZ-4-GW	HAAP-260-PZ-4-GW	6'	7/23/98	90							
Applicable Standards ⁽¹⁾				NA	NA	NA	14,000	NA	110,000	370	11,000

Sample Location	Sample ID	Depth (ft) bgs	Date Sampled	Detected PAH Compounds (µg/L)								Total PAHs (mg/kg)
				Benzo (a) Anthracene	Chrysene	Benzo (b) Fluoranthene	Benzo (k) Fluoranthene	Benzo (a) Pyrene	Dibenzo (a,h) Anthracene	Benzo (g,h,i) Perylene	Indeno (1,2,3-cd) Pyrene	
HAAP-260-PZ-1-GW	HAAP-260-PZ-1-GW	6'	7/23/98		2 J							647
HAAP-260-PZ-2-GW	HAAP-260-PZ-2-GW	6'	7/24/98									1 J
HAAP-260-PZ-3-GW	HAAP-260-PZ-3-GW	6'	7/22/98									13
HAAP-260-PZ-4-GW	HAAP-260-PZ-4-GW	6'	7/23/98									90
Applicable Standards ⁽¹⁾				0.0311 ⁽¹⁾	0.0311 ⁽¹⁾	NA	0.0311 ⁽¹⁾	0.2 ⁽²⁾	0.0311 ⁽¹⁾	NA	0.0311 ⁽¹⁾	NA

NOTE:

Laboratory Qualifiers:

U = not detected. These are indicated as blank cells in the table.

J = estimated value

E = Concentration exceeded calibration range

⁽¹⁾ In Stream Water Quality Standards, GA DNR, Rules and Regulations for Water Quality Control, Chapter 391-3-6, May 1998.

⁽²⁾ Safe Drinking Water Act, Maximum Contaminant Level

bgs = below ground surface

ft = feet

NA = not applicable

PAH = polynuclear aromatic hydrocarbons. Total PAH are the sum of all compounds. The concentration of the nondetected compounds is assumed to be zero, for purposes of calculating total PAH.

µg/L = micrograms per liter

USTs #25 and #26, Building 1343
 Hunter Army Airfield
 Chatham County, Facility ID #9-025008

TABLE 4: GROUNDWATER ELEVATIONS

Well Number	Date Measured	Groundwater Surface Elev. (ft) MSL	Top of Casing Elev. (ft) MSL	Depth of Screened Interval (ft) bgs	Depth of Free Product (ft) BTOC	Water Depth (ft) BTOC	Product Thickness (ft)	Spec. Grav. Adjustment	Corrected Groundwater Elev. (ft) MSL
MW-3	11/19/98	16.72	21.44'	3' - 7'	N/A	4.72'	N/A	N/A	16.72'
MW-4	11/19/98	20.15	22.80'	2.5' - 6.5'	N/A	2.65'	N/A	N/A	20.15'
MW-5	11/19/98	16.51	21.51'	3.5' - 7.5'	N/A	5.00'	N/A	N/A	16.51'

NOTE:

bgs = below ground surface
 BTOC = below top of casing
 ft = feet
 MSL = mean sea level
 N/A = Not Applicable

USTs #25 and #26, Building 1343
Hunter Army Airfield
Chatham County, Facility ID #9-025008

TABLE 5a: UST SYSTEM CLOSURE - SOIL ANALYTICAL RESULTS
(VOLATILE ORGANIC COMPOUNDS)

Sample Location	Depth (ft) bgs	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl- benzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH GRO (mg/kg)	TPH DRO (mg/kg)
UST #25									
HAAF-260-PIPE-D-1-S	2.5'	7/22/1998						NA	9.4
HAAF-260-PIPE-D-2-S	2.5'	7/22/1998	3.3 JD	140 D	91 D	430 D	664.3	NA	6000.0
HAAF-260-PIPE-D-3-S	2.5'	7/22/1998		0.017	0.012	0.033	0.062	NA	4.5
HAAF-260-PIPE-D-4-S	2.5'	7/22/1998						NA	5.1
HAAF-260-DIS-D-1-S	2.5'	7/22/1998						14*	11.0
HAAF-260-DIS-D-2-S	2.5'	7/22/1998						14	
HAAF-260-DIS-D-3-S	2.5'	7/23/1998						NA	2.3
HAAF-260-DIS-D-4-S	2.5'	7/23/1998						NA	4.5
HAAF-260-DIS-D-5-S	2.5'	7/23/1998						NA	4.1
UST #26									
HAAF-260-PIPE-1-G-S	2.5'	7/23/1998	0.004 J					0.097	N/A
HAAF-260-PIPE-2-G-S	2.5'	7/23/1998		0.48 J	.28 J	1.35 J	2.11	490	N/A
HAAF-260-DIS-1-G-S	2.5'	7/23/1998	0.006		0.002 J	0.003 J	0.011	0.12	N/A
HAAF-260-DIS-2-G-S	2.5'	7/23/1998	0.074	0.004 J	1.8 D	4.2 D	6.078 D	800	21000
Applicable Standards ⁽¹⁾			100 ⁽²⁾	6,000	10,000	700,000	NA	500 ⁽²⁾	500 ⁽²⁾

NOTE:

Laboratory Qualifiers:

U = not detected. These are indicated as blank cells in the table.

J = estimated value

D = sample was diluted

- ⁽¹⁾ Georgia Department of Natural Resources Applicable Soil Threshold Levels, Table A, Column 2
⁽²⁾ Georgia Department of Natural Resources Approved Alternate Threshold Levels (ATL) for Hunter Army Airfield, Facility ID #9-025008, correspondence July 31, 1998, Logan to Director of Engineering and Housing.

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene, and xylene. Total BTEX was calculated as the sum of the four compounds.

Non-detect concentrations are assumed to be zero, for purposes of calculating total BTEX.

DRO = diesel range organics

GRO = gasoline range organics

NA = not applicable

TPH = total petroleum hydrocarbons

ft = feet

mg/kg = milligrams per kilogram

* GRO analysis was inadvertently run on this sample

USTs #25 and #26, Building 1343
Hunter Army Airfield
Chatham County, Facility ID #9-025008

TABLE 5b: UST SYSTEM CLOSURE - SOIL ANALYTICAL RESULTS
(POLYNUCLEAR AROMATIC HYDROCARBONS)

Sample Location	Depth (ft) bgs	Date Sampled	Detected PAH Compounds (mg/kg)																Total PAHs (mg/kg)	
			Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) Anthracene	Chrysene	Benzo (b) Fluoranthene	Benzo (k) Fluoranthene	Benzo (a) Pyrene	Dibenzo (ah) Anthracene	Benzo (ghi) Perylene	Indeno (1,2,3-cd) Pyrene		
UST #25																				
HAAP-260-PPE-D-1-S	2.5'	7/22/98	99.5 DJ			22.5	7.9 DIP	19 DJ	6.0 DJ	15.7 DJ	16 DJ	4.2 DJ	3.6 DJ	0.047	0.012	0.02	3.69 DIP		0.027 J	0.124
HAAP-260-PPE-D-2-S	2.5'	7/22/98				0.14 J	0.157	0.047 J	0.05 DJ	0.006 J	0.007 JP	0.004 JP		0.027	0.003 J	0.00352 J		0.0969 J	1.33 DJ	207.74
HAAP-260-PPE-D-3-S	2.5'	7/22/98																		0.59542
HAAP-260-PPE-D-4-S	2.5'	7/22/98										0.021 J		0.042 P	0.0132 P	0.026				0.051
HAAP-260-DIS-D-1-S	2.5'	7/22/98																		0.1022
HAAP-260-DIS-D-2-S	2.5'	7/22/98																		
HAAP-260-DIS-D-3-S	2.5'	7/23/98																		
HAAP-260-DIS-D-4-S	2.5'	7/23/98																		
HAAP-260-DIS-D-5-S	2.5'	7/23/98										0.01 J								0.01
UST #26																				
HAAP-260-PPE-1-G-S	2.5'	7/23/98												0.0036 J						0.0036
HAAP-260-PPE-2-G-S	2.5'	7/23/98																		
HAAP-260-DIS-1-G-S	2.5'	7/23/98																		
HAAP-260-DIS-2-G-S	2.5'	7/23/98						35.8 DIP		24.9 DIP										60.7
Applicable Standards (U)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTE:

Laboratory Qualifier:

U = not detected. These are indicated as blank cells in the table.

J = estimated value

D = sample was diluted

± = compound exceeded 40% deviation between the UV and fluorescent detectors

Georgia Department of Natural Resources Applicable Soil Threshold Levels, Table A, Column 2

bgs = below ground surface

ft = feet

PAH = polynuclear aromatic hydrocarbons. Total PAHs are the sum of all compounds. The concentration of the nondetected compounds is assumed to be zero, for purposes of calculating total PAH.

mg/kg = milligrams per kilogram

NA = not applicable

USTs #25 and #26, Building 1343
 Hunter Army Airfield
 Chatham County, Facility ID #9-025008

TABLE 6a: UST SYSTEM CLOSURE - GROUNDWATER ANALYTICAL RESULTS
 (VOLATILE ORGANIC COMPOUNDS)

Sample Location	Depth (ft) bgs	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethyl- benzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)
UST #25							
HAAF-260-UST-D-1-GW	12'	07/24/98	18		2 J	2 J	22 J
HAAF-260-UST-D-2-GW	12'	07/24/98	1 J				1 J
HAAF-260-UST-D-3-GW	12'	07/24/98	34	1 J		3 J	38 J
HAAF-260-UST-D-4-GW	12'	07/24/98	4 J				4.0 J
UST #26							
HAAF-260-UST-1-G-GW	6'	07/23/98	3000 D	8	300 D	17	3325
HAAF-260-UST-2-G-GW	6'	07/23/98	1600 D	13	310 D	39	1962
Applicable Standards ⁽¹⁾			5	700	1000	10000	NA

NOTE:

Laboratory Qualifiers:

U = not detected. These are indicated as blank cells in the table.

J = estimated value

D = sample was diluted

⁽¹⁾ Safe Drinking Water Act, Maximum Contaminant Level

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene, and xylene. Total BTEX was calculated as the sum of the four compounds.

Non-detect concentrations are assumed to be zero, for purposes of calculating total BTEX.

ft = feet

NA = not applicable

µg/L = micrograms per liter

USTs #25 and #26, Building 1343

Hunter Army Airfield

Chatham County, Facility ID #9-025008

TABLE 6b: UST SYSTEM CLOSURE - GROUNDWATER ANALYTICAL RESULTS
(POLYNUCLEAR AROMATIC HYDROCARBONS)

Sample Location	Depth (ft) bgs	Date Sampled	Detected PAH Compounds (µg/L)										Total PAHs (µg/L)
			Naph- thalene	Acen- aphylene	Acen- anthene	Fluorene	Phen- anthrene	Anthracene	Fluor- anthene	Pyrene	Benzo (a) Anthracene	Chrysene	
UST #25													
HAAF-260-UST-D-1-GW	12'	07/24/98	22 J		6 J	11	21	3 J		4 J			67 J
HAAF-260-UST-D-2-GW	12'	07/24/98	4 J										4 J
HAAF-260-UST-D-3-GW	12'	07/24/98	6 J				1 J						7 J
HAAF-260-UST-D-4-GW	12'	07/24/98	12 J		2 J	4 J	5 J						23 J
UST #26													
HAAF-260-UST-1-G-GW	6'	07/23/98	77										77
HAAF-260-UST-2-G-GW	6'	07/23/98	67										67
Applicable Standards ⁽¹⁾			NA	NA	NA	14,000	NA	110,000	370	11,000	0.0311	0.0311	NA

NOTE:

Laboratory Qualifiers:

U = not detected. These are indicated as blank cells in the table.

J = estimated value

⁽¹⁾ In Stream Water Quality Standards, GA DNR, Rules and Regulations for Water Quality Control, Chapter 391-3-6, May 1998.

⁽²⁾ Safe Drinking Water Act, Maximum Contaminant Level

bgs = below ground surface

ft = feet

NA = not applicable

PAH = polynuclear aromatic hydrocarbons. Total PAH are the sum of all compounds. The concentration of the nondetected compounds is assumed to be zero, for purposes of calculating total PAH.

µg/L = micrograms per liter

APPENDIX III

WATER RESOURCES SURVEY DOCUMENTATION

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LIST OF ACRONYMS

GA DNR	Georgia Department of Natural Resources
CAP	Corrective Action Plan
HAAF	Hunter Army Airfield
FS DPW	Fort Stewart Directorate of Public Works
USGS	United States Geological Survey
gpm	gallons per minute

WATER RESOURCES SURVEY DOCUMENTATION

1.0 LOCAL WATER RESOURCES

As required by the Georgia Department of Natural Resources (GA DNR) Underground Storage Tank Corrective Action Plan (CAP)-Part A Guidance (GA DNR 1998b), a water resource survey documenting information for public and non-public water supply wells, surface water bodies, underground utilities, and potential receptors was conducted for the Building 1343, 260th Quartermaster (QM) Motorpool site. The information presented in this section provides the supporting documentation for Section II.D.3 of the CAP-Part A form.

1.1 WATER SUPPLY WELL SURVEY

The water supply well survey was conducted using the following GA DNR guidelines/requirements:

- Hunter Army Airfield (HAAF) is located in an area of average or higher groundwater pollution susceptibility (GA DNR 1976).
- Locate all public supply wells, as defined by the GA DNR, that exist within two miles of the investigation sites.
- Locate all non-public supply wells that exist within 0.5 miles of the investigation sites.
- Locate all supply wells nearest the investigation sites.
- Locate all wells downgradient of the investigation sites.

The required survey was accomplished by obtaining information for the Fort Stewart Directorate of Public Works (FS DPW) and the City of Savannah Bureau of Water Operations, performing a field survey, obtaining an Environmental Protection Agency (EPA) site map displaying Public Water Supply for HAAF, and conducting a United States Geological Survey (USGS) database search. A summary of the information obtained from the survey is provided in the following sections.

1.1.1 Fort Stewart Directorate of Public Works Survey Summary

According to the FS DPW, nine water supply wells are located within the confines of the HAAF area. These wells have the potential to provide up to 3890 gallons per minute (gpm) of water to occupants of the HAAF installation. The FS DPW was unable to provide documentation listing the companies responsible for well installation and drillers' logs showing as-built information and subsurface geologic data. The FS DPW provided well locations, pump rates, treatment methods, casing depths, and total depths for three of the nine wells located within three miles of the subject site (Table III-A). However, documentation of subsurface geology based on HAAF drill logs remains extremely limited. Therefore, other references containing deep-well information were used to document the subsurface geology and aquifer characteristics beneath the HAAF area. Refer to Section 2.0 of this appendix for further geologic discussion.

Wells 1, 2, and 3 are located within a two mile radius of the Building 1343, 260th QM Motorpool site. Wells 1 and 2 are both public water supply wells located in the cantonment area of HAAF, and constitute the main water supply system at the HAAF installation. Well 1, located at Building 711 on the corner of Moore Road and Douglas Street, is a 12-inch-diameter well with a 100-hp turbine pump serving a 100,000-gallon elevated storage tank (Tank 1) through 10-inch lines. Water from Well 1 is injected with hydrofluosilic acid and chlorine gas solution at the well house. Well 2, located at Building 1205 on the corner of Neal Street and Strachan Road, is a 12-inch-diameter well with a 100-hp turbine pump serving a 200,000-gallon elevated tank (Tank 2) through 10-inch lines. Water from Well 2 is also injected with hydrofluosilic acid and chlorine gas solution at the well house. Wells 1 and 2 provide water to a 500,000-gallon elevated storage tank (Tank 3) located on Middleground Road behind Noncommissioned Officer family housing. This tank provides potable water to 694 service connections, which are used by an average of at least 5000 individuals year-round.

Well 3, is a public supply well located outside the cantonment area of HAAF. Well 3, located at Building 8455, is a 4.0-inch-diameter well with a 1.0-hp electric submersible pump serving a 1000-gallon hydropneumatic storage tank through 1.5-inch galvanized steel lines. Water from Well 3 is treated with calcium hypochlorite solution and is consumed by approximately 25 people during daytime hours, year-round.

Pump rates, casing depths, bore depths, treatment methods, and storage tank information for Wells 1, 2, and 3 are provided in Table III-A.

1.1.2 City of Savannah Bureau of Water Operations Survey Summary

The locations of supply wells found outside the boundary of HAAF that are within two miles of the Building 1343, 260th QM Motorpool site are shown on Figure 3, Appendix I. Data concerning casing depths, borehole depths, casing sizes, and capacities are listed in Table III-B. The City of Savannah Bureau of Water Operations was unable to provide drill logs or as-built well information.

1.2 SURFACE WATER BODIES

Surface water(s) in the state of Georgia, as defined by *Rules and Regulations for Water Quality Control, Chapter 391-3-6* (GA DNR 1998a), shall mean any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs producing 100,000 gallons per day, and all other bodies of surface water, natural or artificial, lying within or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation. The surface water body survey was conducted using the following GA DNR guidelines/requirements:

- surface water bodies that exist within one mile of the investigation sites,
- all surface water bodies nearest the investigation sites if these bodies lie outside the one-mile radius of concern,
- all surface water bodies downgradient of the investigation sites, and
- the storm and sanitary sewers adjacent to investigation sites.

The locations of surface water bodies at HAAF were obtained from USGS topographic maps, and from maps provided by the FS DPW. Storm and sanitary sewer location maps, storm sewer invert elevations, and storm sewer and culvert construction details were provided by the FS DPW.

1.3 POTENTIAL RECEPTOR SURVEY SUMMARY OF THE BUILDING 1343, 260th QM MOTORPOOL SITE

A field potential receptor survey was conducted for the Building 1343, 260th QM Motorpool site on November 19, 1998. The site and adjacent areas were surveyed for locations of surface water bodies, utility lines, and basements. Basements do not exist in the buildings adjacent to the site. Additional information, provided by the FS DPW, was used to determine the location of the nearest public supply wells and downgradient surface water bodies not located during the field survey.

1.3.1 Water Supply Wells Near Building 1343, 260th QM Motorpool Site

The following information is presented to provide supplemental information to Section II.D.3 of the CAP-Part A form and provides detailed information relating to Public and Non-Public Water Supply Wells located two (2) miles and one half (1/2) mile respectively from the Building 1343, 260th QM Motorpool site.

- Well 1, located on the corner of Moore Road and Douglas Street, at Building 711 is located approximately 6,200 feet north-northwest (upgradient) of the Building 1343, 260th QM Motorpool site.
- Well 2, located at Building 1205 on the corner of Neal Street and Strachan Road is located approximately 2,750 feet northwest (upgradient) of the Building 1343, 260th QM Motorpool site.
- Well 3, located at Building 8455, is approximately 11,000 feet southwest (cross-gradient) of the Building 1343, 260th QM Motorpool site.

Therefore, the Building 1343, 260th QM Motorpool site is classified as being located greater than 500 feet to these withdrawal points. Based on the estimated nature and extent of petroleum-related groundwater contamination at the site, there is no indication that Wells 1, 2, or 3 have been impacted (Figure 3, Appendix I). Therefore, collection and analysis of groundwater samples from Wells 1, 2, or 3 is not recommended.

1.3.2 Surface Water Bodies Near the Building 1343, 260th QM Motorpool Site

A small drainage ditch is located approximately 100 feet southeast of the Building 1343, 260th QM Motorpool site ultimately flows southeast and off-site towards the Vernon River. The Springfield Canal lies 7,000 feet to the west-northwest of the Building 1343, 260th QM Motorpool site and flows into the Little Ogeechee River. Because of the ditch 100 feet southeast of the Building 1343, 260th QM Motorpool site, the site is classified as being closer than 500 feet to a downgradient surface water body.

Based on the estimated nature and extent of petroleum-related groundwater contamination at the site, there is no indication that nearby surface water bodies (Figure 3, Appendix I) have been impacted or that sewer lines, culverts, or any other utility lines could serve as preferential pathways for contaminants to surrounding surface water bodies or water supply wells. Therefore, collection and analysis of surface water samples were not conducted as part of the site investigation.

2.0 OTHER GEOLOGIC AND HYDROGEOLOGIC DATA

The following information is presented to provide supplemental information to Section II.D.5 of the CAP-Part A form and provides detailed information relating to the geologic and hydrogeologic conditions at HAAF to support determinations of groundwater flow pathway(s) or direction(s) and contaminant transport.

2.1 REGIONAL GEOLOGY

Southeast Georgia is located within the Coastal Plain Physiographic Province of the Southeast United States (Clark and Zisa 1976). In this region, the thickness of southeastward dipping, subsurface strata ranges from 0 feet at the fall line, located approximately 350 miles inland from the Atlantic coast, to approximately 4200 feet below land 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 feet west and 0.3 miles 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 (Figure III-A).

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

2.2 LOCAL GEOLOGY

HAAF is located within the Barrier Island Sequence District of the Coastal Plain Physiographic Province of the Southeast United States (Clark and Zisa 1976). The Barrier Island Sequence District in Chatham and Bryan Counties is characterized by the existence of several marine terraces (step-like topographic surfaces that decrease in elevation toward the coast). These marine terraces, and their associated deposits, are the 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 (Wilkes et al. 1974; GA DNR 1976; Huddlestun 1988).

HAAF, as well as most of Chatham County, is underlain by the Pleistocene Pamlico Terrace. The Pleistocene Satilla Formation (formerly known as the Pamlico Formation) consists of deposits of the Pamlico Terrace complex and other terrace complexes in the region (Huddlestun 1988). The Satilla Formation is a lithologically heterogeneous unit that consists of variably bedded to non-bedded sand and variably bedded silty to sandy clay. During the Pleistocene Epoch, these sand and clay deposits were formed in offshore and inner continental shelf, barrier island, and marsh/lagoon/altype environments (Huddlestun 1988). According to the Geologic Map of Georgia (GA DNR 1976), clay beds of marsh origin, which were deposited on the northwest 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.

2.3 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 (Floridan) Aquifer and the Surficial Aquifer (Miller 1990). The Principal 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 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). 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 feet 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 southeast Georgia, more than any other region.

The confining layer for the Principal (Floridan) Artesian 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 feet 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 feet below ground level (Miller 1990). Groundwater in the Surficial Aquifer system is under unconfined, or water table, conditions. However, locally, thin clay beds create confined or semiconfined conditions, as is the case at HAAF where thin, surficial clay beds are present in the west quadrant (GA DNR 1976).

Groundwater encountered at all UST investigation sites is part of the Surficial Aquifer system. Based on the fact that all public and non-public water supply wells draw water from the Principal (Floridan) Aquifer, and that the Hawthorn confining unit separates the Principal Aquifer from the Surficial Aquifer, it is concluded that there is no hydraulic interconnection between the UST site (and associated plume, if applicable) and water supply withdrawal points (Figure III-A). Groundwater gradient calculations are provided on Figure III-B.

COMMUNICATIONS LOG

Communications Log- All information about Public Water Supply Wells (PWS) with the exception of PWS 4a was taken from the "Corrective Action Plan, Part A" for Underground Storage Tank X at Building 8593-1, Hunter Army Airfield, Georgia. This report was published by Science Applications International Corporation in July, 1998. The information for PWS 4a was received from Pam Babb at the Post, as documented in the attached Communications Record.

REPORT OF TELEPHONE CONVERSATION

File _____

Charge No. 27318.03.01

Date 1-19-99 Time 1020 AM PM

BY: DJR

☒ I called

☐ They called

☐ Collect

PERSON: Pam Babh

ORGANIZATION: FTS DPW

ADDRESS: _____

TELEPHONE NO.: 912-767-7921

EXTENSION NO. _____

SUBJECTS DISCUSSED:

There used to be a well called "4".

This well was closed, + another one
opened + called "4A". This well
is at Building 8581. The info.

On the well is: pump capacity: 80 gpm
tank capacity: 1000 gallons

year drilled: 1976

electrical motor: 5 hp

of service connections: ~10

depth: 300 ft

population served: ~10-20/day

case: 92 ft

case diameter: 4 in.

ACTION TO BE TAKEN:

COPIES TO:

**UNITED STATES GEOLOGICAL SURVEY
DATABASE SEARCH**



Surf Your Watershed

COUNTY INFORMATION

News Flashes



Chatham, GA

Click on the map to zoom in on your watershed



Watershed health (Index of Watershed Indicators) information about this county.

This county crosses 3 watersheds.

Environmental Profile
(provided by EPA's Center for Environmental Information and Statistics (CEIS))

Where does my drinking water come from?

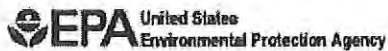
Find environmental information for each of these watersheds:

- o 03060109 Lower Savannah;states: GA SC
- o 03060202 Lower Ogeechee;states: GA

o 03060204 Ogeechee Coastal;states: GA

[EPA HOME](#) | [CONTACTS](#) | [DISCLAIMER](#) | [ABOUT](#) | [HELP](#) | [COMMENTS](#)
[TEXT VERSION](#) | [SURF HOME](#)

URL: <http://www.epa.gov/surf2/counties/13051/>
Revised on 11-11-1998 at 14:51



Surf Your Watershed

Locate Your Watershed

JOIN DISCUSSIONS

ADD INFORMATION

SEARCH INFORMATION

MAP LIBRARY

News Flashes:

Ogeechee Coastal

USGS Cataloging Unit: 03060204



Places Involving this Watershed

States:

- [Georgia](#)

Counties:

- [Bryan](#)
- [Chatham](#)
- [Effingham](#)
- [Liberty](#)
- [Long](#)
- [McIntosh](#)

Metropolitan Areas:

- [Savannah](#)

Nominated American Heritage Rivers:

- None

Other Watersheds: upstream

Environmental Profile

Find general information integrated for this specific watershed

Assessments of Watershed Health

[Index of Watershed Indicators](#) (provided by EPA)

[Unified Watershed Assessments \(UWA\)](#) (provided by States and Tribes)

Environmental Information

[River Corridors and Wetlands Restoration Efforts](#)

[Environmental Web Sites:](#)

- [Real Time](#)

Facilities regulated by EPA (provided by Envirofacts)

- [Toxic releases](#) (Source: [TRI](#) - Toxic Release Inventory)
- [Hazardous Wastes](#) (Source: [RCRA](#) - Resource Conservation Recovery Act)
- [Superfund Sites](#) (Source: [CERCLA](#) - Comprehensive Environmental Response, Compensation, and Liability Act)

[EnviroMapper for Watersheds](#)- (interactive mapping tool)

Water

Find information focused on water for this specific watershed

Rivers and Streams in this Watershed: 18 (provided by EPA's first River Reach File)

Lakes in the Watershed (Coming soon)

- [Lower Ogeechee](#)
- [Altamaha](#)

downstream

- [Lower Savannah](#)

Large
Ecosystems:

- None

River and stream miles:

- o 1543.9 total river miles
- o 1466.9 perennial river miles
- o % of total rivers and streams have been surveyed
- o miles meet all designated uses

This huc's principal aquifer is Surficial aquifer system which is 1242 square miles and has a rock type of Unconsolidated sand and gravel aquifers

Nonpoint Source Projects in this watershed (Funded under Section 319(h) of the Clean Water Act)

Facilities regulated by EPA (provided by [Envirofacts](#))

- o Community Water Sources (Source: [SDWIS](#) Safe Drinking Water Information System)
- o Water Dischargers (Source: [PCS](#) - Permit Compliance System)

Information provided by the United States Geological Survey

(USGS): [EXIT EPA](#)

- o Stream Flow (Source: USGS)
- o Science in Your Watershed
- o Historical Water Data
- o Water use (1990): Information about the amount of water used and how it is used
- o Selected USGS Abstracts

Land

Find watershed information focused on land characteristics Land Characteristics:

Area: 1477.57 sq mi; perimeter: 231.2 mi

Landscape Indicators: 2% urban, 2% forest, 24% crop use (overlapping, sum could be more than 100%)

People

Find out about local actions in this watershed:

American Indian Tribes (Source: US Census): **None Known**

National Watershed Network (provided by Conservation

Technology Information Center) [EXIT EPA](#)

Citizen-based Groups at work in this Watershed (Provided by Adopt Your Watershed)

Join now

Air

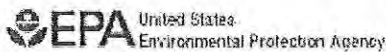
Find information focused on air for this watershed:

Facilities regulated by EPA (provided by [Envirofacts](#))

- o Air (Source: [AIRS](#))

<http://www.epa.gov/surf2/hucs/03060204/>

Revised: 1/4/1999



Watershed Health (IWI) | Watershed Information: 03060204
located in the state(s) of GA

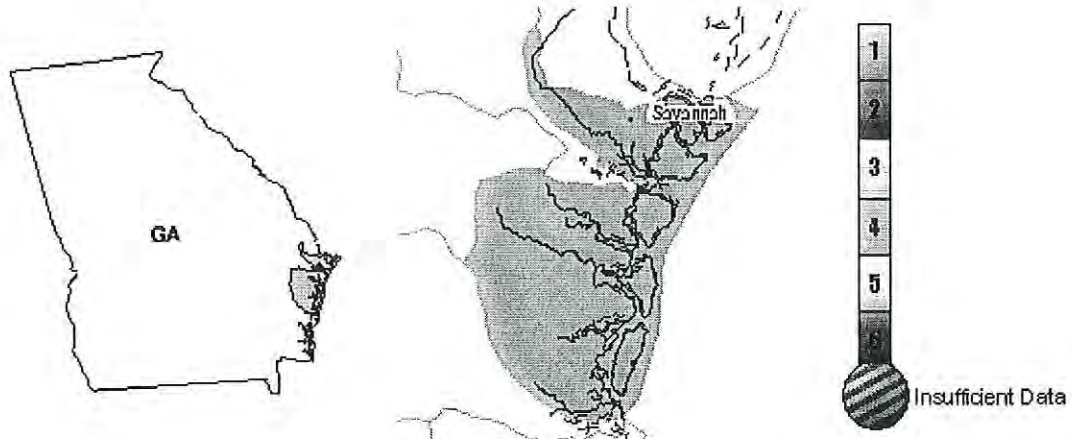
Ogeechee Coastal


[IWI Homepage](#)
[Updates](#)
[Surf Your Watershed](#)
[Comments](#)

Locate Your Watershed

[JOIN DISCUSSIONS](#)
[ADD INFORMATION](#)
[SEARCH INFORMATION](#)
[MAP LIBRARY](#)

The overall IWI score below describes the health of the aquatic resources for this watershed. The score below indicates insufficient data exists for the purpose of the Index of Watershed Indicators. Get a [description of the latest overall score \(October 1998, Version 1.2\)](#) and find out how your watershed scores are calculated. See the [Condition and Vulnerability Indicator Graphs](#) link below for the individual scores used in the overall score calculation.



This site not only categorizes watersheds based on their overall aquatic health, but also provides more detailed information on **indicators** used to calculate the score. These indicators are environmental factors that influence the health of the watershed. For instance: *Sources of Drinking Water* and *Agricultural Runoff* are examples of indicators. This IWI score is based on the Condition and Vulnerability Indicators:

Condition & Vulnerability Indicator Graphs - Designed to show existing watershed health across the country & indicate where pollution discharges and other activities put pressure on the watershed.

Enviromapper for Watersheds - This link takes you to Ogeechee Coastal watershed level. You can view STORET, fish advisories, and other IWI data as well as Envirofacts information on a watershed level. You can visit other geographical levels such as state and county.

Candidate Indicator Graphs - The Index of Watershed Indicators in an effort to present more comprehensive information on the health of your watershed is looking at new data layers of condition, vulnerability and resource characteristics (A description of how natural systems within the watersheds function and affect watershed health.) Next year the numbers from these indicators may be incorporated into the overall score.

Map Library - The map library contains graphical displays of environmental data. The map library contains the interactive mapping capability from Enviromapper for Watersheds, national map of aquifers, and other maps with displays of environmental data.

▼ <-- Clicking on these images below will collapse (hide) detailed information.

▶ <-- Clicking on these images below will expand (show) detailed information.

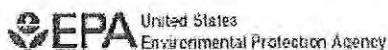
Expand All

- ▶ *About the Indicators- Click on name for description*
- ▶ *About the Candidate Indicators- Click on name for description*
- ▶ *View Previous Scores*
- ▶ *Maps Depicting the Health of Places Involving This Watershed*
- *Unified Watershed Assessment*
- *View state / tribal comments on IWI*

[EPA HOME](#) | [CONTACTS](#) | [DISCLAIMER](#) | [ABOUT](#) | [HELP](#) | [COMMENTS](#)
[TEXT VERSION](#) | [SURF HOME](#)

Last Revised: 1/4/1999

URL: <http://www.epa.gov/surf2/hucs/03060204/score.html>



Condition & Vulnerability | Watershed Health (IWI)
 Watershed: 03060204 located in the state of GA

Ogeechee Coastal

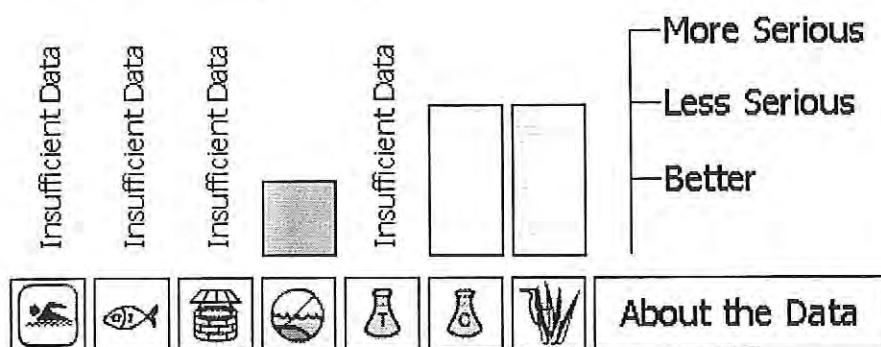


[IWI Homepage](#) [Updates](#) [Surf Your Watershed](#) [Comments](#)

Locate Your Watershed

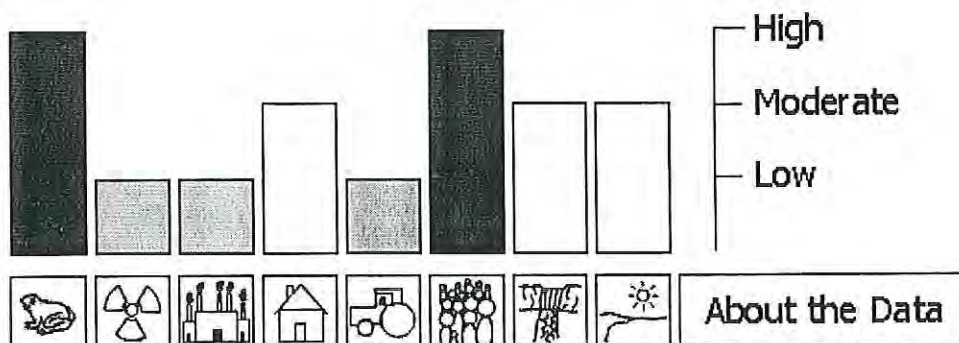
[JOIN DISCUSSIONS](#)
[ADD INFORMATION](#)
[SEARCH INFORMATION](#)
[MAP LIBRARY](#)

The overall IWI score for this watershed is based on the indicators of current condition and future vulnerability. **Instructions:** Move your mouse over the indicator icons below to get descriptions of the indicators and click on the icons to get the indicator score as well as associated data. Please close any other open browsers.



Condition Indicators

are designed to show existing watershed health across the country. These indicators include such things as waters meeting state or tribal designated uses, contaminated sediments, ambient water quality, and wetland loss.



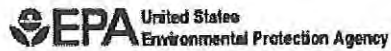
Vulnerability Indicators

are designed to indicate where pollution discharges and other activities put pressure on the watershed. These could cause future problems to occur. Activities in this category include such things as pollutant loads discharged in excess of permitted levels, pollution potential from urban and agricultural lands, and changes in human population levels.

[Legend to Indicator Icons](#)

Last Revised: 1/4/1999

URL:



Surf Your Watershed

Locate Your Watershed

JOIN DISCUSSIONS

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SEARCH INFORMATION

MAP LIBRARY

Rivers and Streams in HUC# 03060204

- o Cathead Creek
- o Doboy Sound
- o Jerico River
- o Jones Creek
- o Little Ogeechee River
- o Medway River
- o N Newport River
- o Ossabaw I
- o Ossabaw Sound
- o Sapelo I
- o Sapelo River
- o Sapelo Sound
- o St Catherines I
- o St Catherines Sound
- o Tybee I
- o Wassaw I
- o Wilmington I
- o Wilmington River

1990 Water Use for 03060204 - Ogeechee Coastal

Category	Units
Totals	
Ground-water withdrawals, fresh	Mgal/d
Ground-water withdrawals, saline	Mgal/d
Withdrawals, ground water	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, saline	Mgal/d
Surface-water withdrawals	Mgal/d
Fresh-water withdrawals	Mgal/d
Saline withdrawals	Mgal/d
Withdrawals	Mgal/d
Reclaimed wastewater	Mgal/d
Fresh consumptive use	Mgal/d
Saline consumptive use	Mgal/d
Consumptive use, total	Mgal/d
Conveyance losses	Mgal/d
Population	
Total population of the area	thousands
Public Supply	
Population served by ground water	thousands
Population served by surface water	thousands
Total Population served	Mgal/d
Ground-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Total withdrawals, fresh	Mgal/d
Ground-water withdrawals, saline	Mgal/d
Surface-water withdrawals, saline	Mgal/d
Total withdrawals, saline	Mgal/d
Total withdrawals, total	Mgal/d
Water deliveries, public use and losses	Mgal/d
Water deliveries, total deliveries	Mgal/d
Per-capita use	gal/d
Number of facilities	--
Commercial	
Ground-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Total withdrawals	Mgal/d
Deliveries from public suppliers	Mgal/d
Total withdrawals + deliveries	Mgal/d
Consumptive use, total	Mgal/d
Domestic	
Self-supplied population	Mgal/d
Self-supplied ground-water withdrawals, fresh	Mgal/d
Self-supplied surface-water withdrawals, fresh	Mgal/d
Total self-supplied withdrawals	Mgal/d
Per-capita use, self-supplied	Mgal/d
Public-supplied population	Mgal/d
Deliveries from public suppliers	Mgal/d
Per-capita use, public-supplied	gal/d
Total withdrawals plus deliveries	Mgal/d
Consumptive use, total	Mgal/d
Industrial	
Self-supplied ground-water withdrawals, fresh	Mgal/d
Self-supplied ground-water withdrawals, saline	Mgal/d

Total self-supplied withdrawals, ground water	Mgal/d
Self-supplied surface-water withdrawals, fresh	Mgal/d
Self-supplied surface-water withdrawals, saline	Mgal/d
Total self-supplied withdrawals, surface water	Mgal/d
Total self-supplied withdrawals, fresh	Mgal/d
Total self-supplied withdrawals, saline	Mgal/d
Total self-supplied withdrawals	Mgal/d
Reclaimed wastewater	Mgal/d
Deliveries from public suppliers	Mgal/d
Total withdrawals plus deliveries	Mgal/d
Consumptive use, fresh	Mgal/d
Consumptive use, saline	Mgal/d
Consumptive use, total	Mgal/d
Number of facilities	--
 Total thermoelectric power use	
Ground-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, saline	Mgal/d
Total withdrawals, surface water	Mgal/d
Total withdrawals, fresh	Mgal/d
Total withdrawals	Mgal/d
Deliveries from public suppliers	Mgal/d
Total withdrawals plus deliveries	Mgal/d
Consumptive use, fresh	Mgal/d
Consumptive use, saline	Mgal/d
Consumptive use, total	Mgal/d
Power generation	gigawatt hours/ye
Number of facilities	--
 Fossil-fuel thermoelectric power use	
Ground-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, saline	Mgal/d
Total withdrawals, surface water	Mgal/d
Total withdrawals, fresh	Mgal/d
Total withdrawals	Mgal/d
Deliveries from public suppliers	Mgal/d
Total withdrawals plus deliveries	Mgal/d
Consumptive use, fresh	Mgal/d
Consumptive use, saline	Mgal/d
Consumptive use, total	Mgal/d
Power generation	gigawatt hours/ye
Number of facilities	--
 Geothermal thermoelectric power use	
Ground-water withdrawals, fresh	Mgal/d
Ground-water withdrawals, saline	Mgal/d
Total withdrawals	Mgal/d
Consumptive use, fresh	Mgal/d
Consumptive use, saline	Mgal/d
Power generation	gigawatt hours/ye
Number of facilities	--
 Nuclear thermoelectric power use	
Ground-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, saline	Mgal/d
Total withdrawals, surface water	Mgal/d
Total withdrawals, fresh	Mgal/d
Total withdrawals	Mgal/d
Deliveries from public suppliers	Mgal/d
Total withdrawals plus deliveries	Mgal/d
Consumptive use, fresh	Mgal/d
Consumptive use, saline	Mgal/d
Consumptive use, total	Mgal/d
Power generation	gigawatt hours/ye
Number of facilities	--

Mining use

Ground-water withdrawals, fresh	Mgal/d
Ground-water withdrawals, saline	Mgal/d
Total withdrawals, ground water	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, saline	Mgal/d
Total withdrawals, surface water	Mgal/d
Total withdrawals, fresh	Mgal/d
Total withdrawals, saline	Mgal/d
Total withdrawals	Mgal/d
Consumptive use, fresh	Mgal/d
Consumptive use, saline	Mgal/d
Consumptive use, total	Mgal/d

Livestock (stock) use

Total withdrawals, ground water	Mgal/d
Total withdrawals, surface water	Mgal/d
Total withdrawals	Mgal/d
Consumptive use, total	Mgal/d

Livestock (animal specialties) use

Total withdrawals, ground water	Mgal/d
Total withdrawals, surface water	Mgal/d
Total withdrawals	Mgal/d
Consumptive use, total	Mgal/d

Total livestock use

Ground water	Mgal/d
Surface water	Mgal/d
Total withdrawals	Mgal/d
Consumptive use, total	Mgal/d

Irrigation use

Ground-water withdrawals, fresh	Mgal/d
Surface-water withdrawals, fresh	Mgal/d
Reclaimed wastewater	Mgal/d
Total withdrawals, fresh	Mgal/d
Irrigated land, sprayed	thousand acres
Irrigated land, flooded	thousand acres
Irrigated land, total	thousand acres
Conveyance loss	Mgal/d
Consumptive use, total	Mgal/d

Hydroelectric power use

Instream water use	Mgal/d
Power generation, total	gigawatt hours/ye
Number of facilities	--

Wastewater treatment

Number of public wastewater facilities	--
Number of other facilities	--
Number of wastewater facilities, total	--
Returns by public wastewater facilities	Mgal/d
Reclaimed wastewater released by public wastewater facilities	Mgal/d

Reservoir evaporation

Reservoir evaporation	thousand acre-fee
Reservoir surface area	thousand acres

Mgal/d = million gallons per day

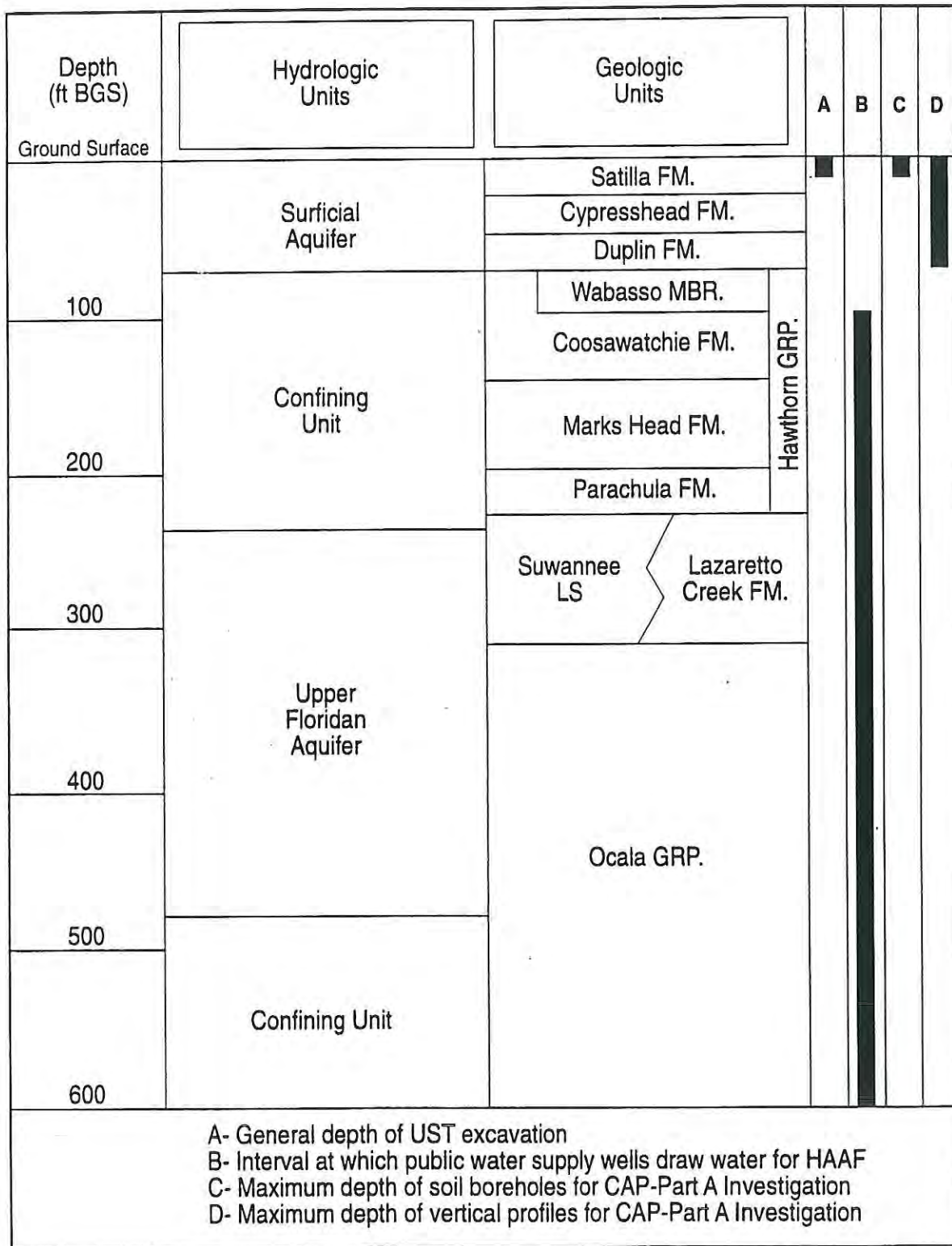
This is only a summary of the water-use data USGS has available!

The USGS Water-Use pages have graphics and reports.

You also can download data sets in spreadsheet format and analyze them yourself.

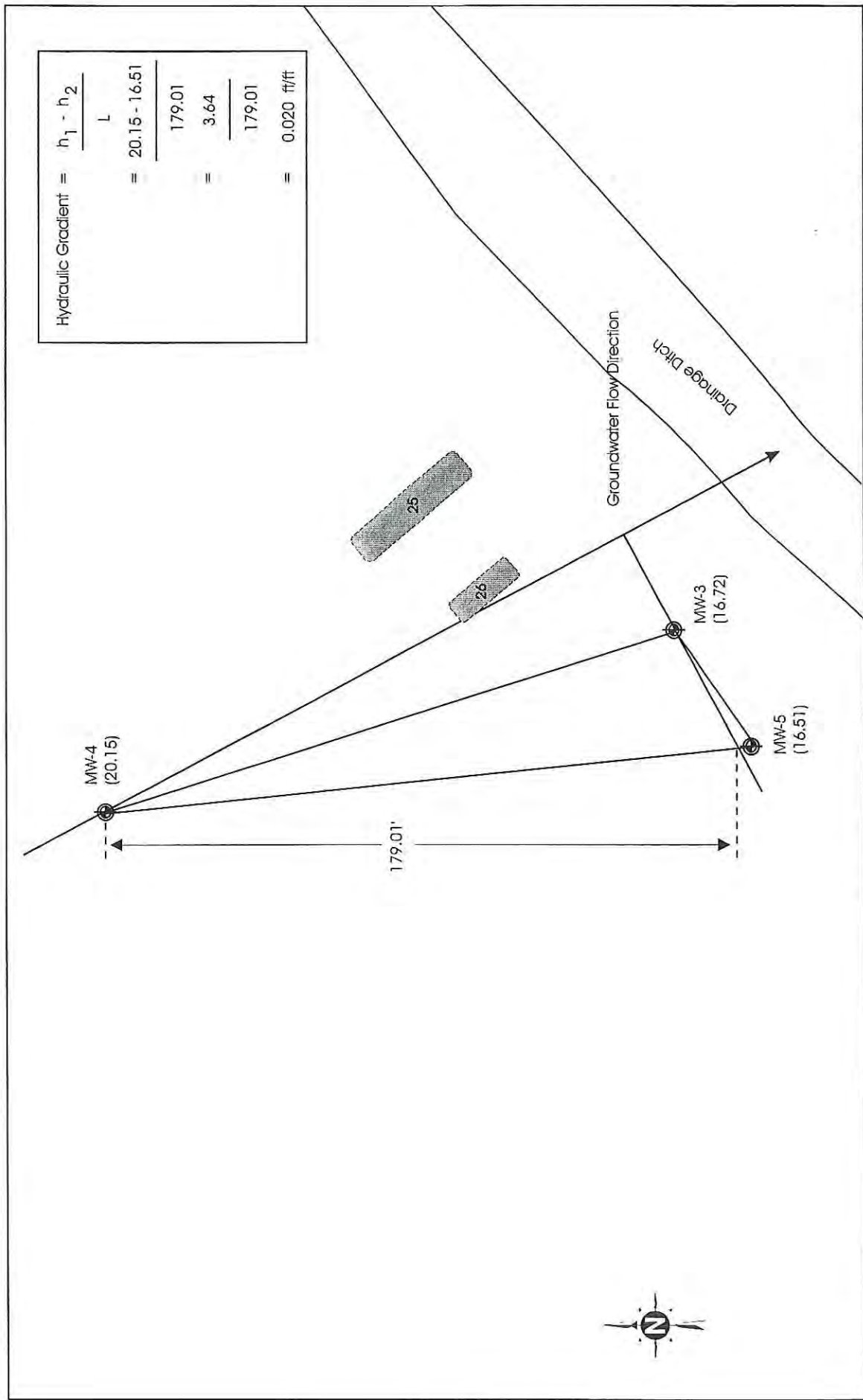
Water	Water Use	EPA's Surf 03060204
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FIGURES



31-102797-063

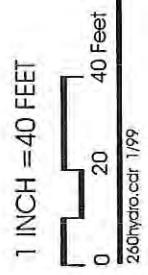
Figure III-A. Generalized Stratigraphy of Chatham County, Georgia



Hydraulic Gradient
for USTs #25 and #26,
Facility ID# 9-025008
Building 1343,
260th QM Motorpool Site

Figure III-B

EXPLANATION



TABLES

USTs #25 and #26, Building 1343
Hunter Army Airfield
Chatham County, Facility ID #9-025008

**Table III-A. WATER SUPPLY WELL INFORMATION PROVIDED
BY THE FORT STEWART DPW**

Building	Well ID	Year Drilled	Bore Depth	Casing Depth	Pump Rate (gpm)	Number of Service Connections	Population	Public or Non-Public Supply
711	1	1941	550	250	1300	525	7500	Public
1205	2	1941	600	250	1300	525	7500	Public
8455	3	1951	360	40	30	2	25	Public
8581	4a	1976	300	92	80	10	15	Public

NOTE: DPW - Directorate of Public Works.
gpm - Gallons per minute.

USTs #25 and #26, Building 1343
Hunter Army Airfield
Chatham County, Facility ID #9-025008

**Table III-B. WATER SUPPLY INFORMATION PROVIDED BY THE CITY OF
SAVANNAH BUREAU OF WATER OPERATIONS**

Well ID	Year Drilled	Bore Depth	Casing Depth	Pump Rate (gpm)	Number of Service Connections	Population	Public or Non-Public Supply
6	TBD	750	240	1500	TBD	TBD	Public
13	TBD	TBD	TBD	2200	TBD	TBD	Public
14	TBD	800	338	571	TBD	TBD	Public
15	TBD	414	252	1000	TBD	TBD	Public
23	TBD	639	320	1056	TBD	TBD	Public
25	TBD	540	287	1120	TBD	TBD	Public
27	TBD	550	321	1468	TBD	TBD	Public

NOTE: gpm - gallons per minute
TBD - To Be Determined

APPENDIX IV

SOIL BORING LOGS

LIST OF ABBREVIATIONS USED ON HTW BORING LOGS

ODOR

N - NONE
T - TRACE
SL - SLIGHT
M - MEDIUM
ST - STRONG
VS - VERY STRONG

MOISTURE CONTENT

V.D. - VERY DAMP
SAT - SATURATED

COLOR

BK - BLACK
BRN - BROWN
GRA - GRAY
ORG - ORANGE
YLW - YELLOW

DK - DARK
LT - LIGHT

MATERIAL

GVL - GRAVEL
ASP - ASPHALT
CON - CONCRETE

DRILLING LOG		SOUTH ATLANTIC		INSTALLATION HUNTER ARMY AIRFIELD		SHEET 1 OF 1 SHEETS	
1. PROJECT TAC SHOP REFUELING STATION PHASE II SITE INVESTIGATION				10. SIZE AND TYPE OF BIT 3/8" AUGER BUCKET			
2. LOCATION (Reference or Station)				11. DATUM FOR ELEVATION SHOWN (FEET or MSL)			
3. DRILLING AGENCY SAVANNAH DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL HAND AUGER			
4. HOLE NO. (See also core drilling log and file number) A-1				13. TOTAL NO. OF OVER- BURDEN SAMPLES TAKEN DISTURBED 1 UNDISTURBED 0			
5. NAME OF DRILLER HORACE FULCHER				14. TOTAL NUMBER CORE BOXES 0			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.				15. ELEVATION CHANGED WATER SEE BELOW			
7. THICKNESS OF OVERBURDEN 5.5'				16. DATE HOLE STARTED 3-8-91 COMPLETED 3-8-91			
8. DEPTH DRILLED INTO ROCK 0.0'				17. ELEVATION TOP OF HOLE 24.0' (FROM TOPO)			
9. TOTAL DEPTH OF HOLE 5.5'				18. TOTAL CORE RECOVERY FOR BORING N/A			
				19. SIGNATURE OF INSPECTOR TOM NICHOLSON, GEOLOGIST			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	WELL CONSTRUCTION	BOX OR SAMPLE NO.	REMARKS (Drilling fluid, water level, depth of weathering, etc., if significant)	
24.0'	0		Asphalt.			DEPTH TO WATER DURING DRILLING: 5.8'. NOTE: SEE HTW LOG FOR MORE INFORMATION. HOLE BACKFILLED AFTER COMPLETION.	
23.5'			Large gravel and sand.				
22.5'	2		SW Well graded SAND, fine to medium grained, yellow tan, damp, subangular.				
21.0'	4		SM Silty SAND, medium brown, very fine to fine, with small gravel.				
18.5'	6		BOTTOM OF HOLE AT 5.5'				
	8		NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.				
	10						
	12						

A-14

HTW BORING LOG

PROJECT: TACTICAL EQUIPMENT SHOP REFUELING STATION, BUILDING 1343 PHASE I SITE INVESTIGATION										BORING NO. A-1				
LOCATION: HUNTER ARMY AIRFIELD, SAVANNAH, GEORGIA										ELEVATION: 24.0' (FROM TOPO)				
WATER LEVEL DURING DRILLING: 5.0					24-HOUR WATER LEVEL READING: N/A									
WEATHER: CLOUDY, 85°								DRILLER: HORACE FULCHER						
REMARKS:								GEOLOGIST: TONI F. NICHOLSON						
SAMPLE NO.	ODOR	DEPTH (FT.)		DATE (1991)	BLOWS PER FOOT	MOISTURE CONTENT	CLASSIFICATION	COLOR	SAMPLES		AT TOP OF HOLE		OVA/HNU (ppm)	
									OVA (ppm)	HNU (ppm)	CGI			
		FIELD HEADSPACE ANALYSIS	FIELD HEADSPACE ANALYSIS						LEL %	O ₂ %				
	N	0.0	0.5	3/8	-		ASP							
	N	0.5	1.0	3/8	-		GVL				0	20.8		
	N	1.0	1.5	3/8	-	DAMP	GVL SAND	TAN						
	N	1.5	2.0	3/8	-	DAMP	SW	YLW TAN			0	20.8		
	N	2.0	2.5	3/8	-	DAMP	SW	YLW TAN						
	N	2.5	3.0	3/8	-	DAMP	SW	YLW TAN			0	20.8		
	N	3.0	3.5	3/8	-	DAMP	SM	BRN						
	SL	3.5	4.0	3/8	-	DAMP	SM	BRN			0	20.8		
	SL	4.0	4.5	3/8	-	DAMP	SM	BRN			0	20.8		
	M	4.5	5.0	3/8	-	WET	SM	BRN	1000+		0	20.8	3	
A-1-1	M	5.0	5.5	3/8	-	SAT.	SM	BRN	1000+		0	20.8	1	

DRILLING LOG			SOUTH ATLANTIC		INSTALLATION HUNTER ARMY FIELD		SHEET 1 OF 1 SHEETS	
1. PROJECT TAC SHOP REFUELING STATION PHASE II SITE INVESTIGATION			10. SIZE AND TYPE OF BIT 3 1/2" AUGER BUCKET		11. DIAMETER FOR ELEVATION SHOWN FROM MSL		MSL	
2. LOCATION (Address or Station)			BUILDING 1343, SEE PLAN		12. MANUFACTURER'S DESIGNATION OF DRILL		HAND AUGER	
3. DRILLING AGENCY SAVANNAH DISTRICT			4. HOLE NO. (As shown on drawing title and this number) A-2		13. TOTAL NO. OF OVER- BURDEN SAMPLES TAKEN		DISTURBED 2 UNDISTURBED 0	
5. NAME OF DRILLER HORACE FULCHER			6. DEPTH DRILLED INTO ROCK 0.0'		14. TOTAL NUMBER CORE BOXES 0		15. ELEVATION GROUND WATER SEE BELOW	
7. THICKNESS OF OVERBURDEN 6.0'			8. DEPTH DRILLED INTO ROCK 0.0'		16. DATE HOLE STARTED 3-11-91 COMPLETED 3-11-91		17. ELEVATION TOP OF HOLE 23.5' (FROM TOPO)	
9. TOTAL DEPTH OF HOLE 6.0'			18. SIGNATURE OF INSPECTOR TOM NICHOLSON, GEOLOGIST		19. TOTAL CORE RECOVERY FOR BORING N/A		20. REMARKS (Drilling time, water from depth of completion, etc., if significant)	

ELEVATION a	DEPTH b	LOGGING c	CLASSIFICATION OF MATERIALS (Description) d	WELL CONST- RUCTION e	SOIL OR SAMPLE NO. f	REMARKS (Drilling time, water from depth of completion, etc., if significant) g
23.5'	0		0.7' concrete underlain by asphalt, gravel and sand.			DEPTH TO WATER DURING DRILLING: 5.0'. NOTE: SEE HTV LOG FOR MORE INFORMATION. HOLE BACKFILLED AFTER COMPLETION.
22.0'	2		SM Silty SAND, very fine to fine, uniform brown. Gray. Brown.		A2-1	
	4					
	6				A2-2	
17.5'	6		BOTTOM OF HOLE AT 6.0'			
	8		NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.			
	10					
	12					

A-16

HTW BORING LOG

[illegible]

DRILLING LOG		AREA SOUTH ATLANTIC		INSTALLATION HUNTER ARMY AIRFIELD		SHEET 1 OF 1 SHEETS	
1. PROJECT TAC SHOP REFUELING STATION PHASE II SITE INVESTIGATION				10. SIZE AND TYPE OF BIT 3 1/2" AUGER BUCKET			
2. LOCATION COMPLETE OF SITE BUILDING 1343, SEE PLAN				11. DATUM FOR ELEVATION SHOWN (TOP OF BELL) MSL			
3. DRILLING AGENCY SAVANNAH DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL HAND AUGER			
4. HOLE NO. (AS SHOWN ON DRAWING AND FIELD NUMBER) A-3				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED 1 UNDISTURBED 0			
5. NAME OF DRILLER HORACE FULCHER				14. TOTAL NUMBER CORE BOXES 0			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER SEE BELOW			
7. THICKNESS OF OVERBURDEN 4.5'				16. DATE HOLE STARTED 3-11-91 COMPLETED 3-11-91			
8. DEPTH DRILLED INTO ROCK 0.0'				17. ELEVATION TOP OF HOLE 24.0' (FROM TOPO)			
9. TOTAL DEPTH OF HOLE 4.5'				18. TOTAL CORE RECOVERY FOR BORING N/A			
				19. SIGNATURE OF INSPECTOR TONI NICHOLSON, GEOLOGIST			

ELEVATION	DEPTH	LOGGING	CLASSIFICATION OF MATERIALS (Described)	WELL CONST- RUCTION	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
24.0'	0		Asphalt.			WATER LEVEL NOT ENCOUNTERED DURING DRILLING.
23.5'			Gravel and sand.			
22.0'	2		SM Silty SAND, dark tan, very fine to fine, uniform, damp to very damp.			
19.5'	4		Wet.		A3-1	
BOTTOM OF HOLE AT 4.5'						
	6		NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.			
	8					
	10					
	12					

A-18

NEW BURNING LOG

[illegible]

DRILLING LOG		SOUTH ATLANTIC		INSTALLATION HUNTER ARMY AIRFIELD		SHEET 1 OF 1 SHEETS	
1. PROJECT TAC SHOP REFUELING STATION PHASE I SITE INVESTIGATION				10. SIZE AND TYPE OF BIT 3/2" AUGER BUCKET			
2. LOCATION (ADDRESS or Station) BUILDING 1343, SEE PLAN				11. DATUM FOR ELEVATION SHOWN (ITEM or MSL) MSL			
3. DRILLING AGENCY SAVANNAH DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL HAND AUGER			
4. HOLE NO. (As shown on drawing title and file number) A-4				13. TOTAL NO. OF OVER- BURDEN SAMPLES TAKEN		DISTURBED 2 UNDISTURBED 0	
5. NAME OF DRILLER HORACE FULCHER				14. TOTAL NUMBER CORE BOXES 0		15. ELEVATION GROUND WATER SEE BELOW	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.				16. DATE HOLE STARTED 3-8-91		COMPLETED 3-8-91	
7. THICKNESS OF OVERBURDEN 4.5'				17. ELEVATION TOP OF HOLE 24.0' (FROM TOPO)		18. TOTAL CORE RECOVERY FOR BORING N/A	
8. DEPTH DRILLED INTO ROCK 0.0'				19. SIGNATURE OF INSPECTOR TONI NICHOLSON, GEOLOGIST			
9. TOTAL DEPTH OF HOLE 4.8'							

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	BOX OR SAMPLE NO.	REMARKS (Drilling rate, water loss, depth of watering, etc., if significant)
24.0'	0		Asphalt.		DEPTH TO WATER DURING DRILLING: 4.5'. NOTE: SEE HTW LOG FOR MORE INFORMATION. HOLE BACKFILLED AFTER COMPLETION.
23.5'			Large gravel with silty SAND (SM) increasing with depth.		
22.0'	2		SM Silty SAND, brown, fine grained, uniform, damp, diesel odor.	A4-1	
19.5'	4			A4-2	
BOTTOM OF HOLE AT 4.5' AUGER REFUSAL AT 4.8'					
	6		NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.		
	8				
	10				
	12				

A-20

HTW BORING LOG

[illegible]

DRILLING LOG		OVERSOUTH ATLANTIC		INSTALLATION HUNTER ARMY AIRFIELD		SHEET 1 OF 1 SHEETS	
1. PROJECT TAG SHOP REFUELING STATION PHASE II SITE INVESTIGATION				10. SIZE AND TYPE OF BIT 3 1/2" AUGER BUCKET			
2. LOCATION (Address or Street) BUILDING 1343. SEE PLAN				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL			
3. DRILLING AGENCY SAVANNAH DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL HAND AUGER			
4. HOLE NO. (Indicate if existing and (If No Number) A-5				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 1 UNDISTURBED 0			
5. NAME OF DRILLER HORACE FULCHER				14. TOTAL NUMBER CORE BOXES 0			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER SEE BELOW			
7. THICKNESS OF OVERBURDEN 5.5'				16. DATE HOLE STARTED 3-11-91 COMPLETED 3-11-91			
8. DEPTH DRILLED INTO ROCK 0.0'				17. ELEVATION TOP OF HOLE 24.0' (FROM TOPO)			
9. TOTAL DEPTH OF HOLE 5.5'				18. TOTAL CORE RECOVERY FOR BORING N/A			
				19. SIGNATURE OF INSPECTOR TONI NICHOLSON, GEOLOGIST			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	WELL CONST- RUCTION	BOX OR SAMPLE NO.	REMARKS (Drilling into water, test, depth of watering, etc., if significant)	
24.0'	0		Asphalt.			DEPTH TO WATER DURING DRILLING: 4.5'. NOTE: SEE HTW LOG FOR MORE INFORMATION. HOLE BACKFILLED AFTER COMPLETION.	
23.5'			Gravel.				
23.0'			Gravel and silty sand (SM).				
22.0'	2		SM Silty SAND, dark tan, fine, damp.				
21.5'			SP Poorly graded SAND, light tan, fine to medium, subangular.				
20.0'	4		SM Silty SAND, fine, tan to brown, wet to saturated.		A5-1		
18.5'	6		BOTTOM OF HOLE AT 5.5'				
	8		NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.				
	10						
	12						

A-22

DRILLING LOG		OVER SOUTH ATLANTIC		INSTALLATION HUNTER ARMY AIRFIELD		SHEET 1 OF 1 SHEETS	
1. PROJECT TAC SHOP REFUELING STATION PHASE I SITE INVESTIGATION				12. SIZE AND TYPE OF BIT 3/2" AUGER BUCKET			
2. LOCATION (Address or Station) BUILDING 1343, SEE PLAN				13. DATUM FOR ELEVATION SHOWN (TOPO or MSL) MSL			
3. DRILLING AGENCY SAVANNAH DISTRICT				14. MANUFACTURER'S DESIGNATION OF DRILL HAND AUGER			
4. HOLE NO. (As shown on drilling plan and this report) A-7				15. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 1 UNDISTURBED 0			
5. NAME OF DRILLER HORACE FULCHER				16. TOTAL NUMBER CORE BOXES 0			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.				17. ELEVATION GROUND WATER SEE BELOW			
7. THICKNESS OF OVERBURDEN 5.5'				18. DATE HOLE STARTED 3-12-91 COMPLETED 3-12-91			
8. DEPTH DRILLED INTO ROCK 0.0'				19. ELEVATION TOP OF HOLE 23.5' (FROM TOPO)			
9. TOTAL DEPTH OF HOLE 5.5'				20. TOTAL CORE RECOVERY FOR BORING N/A			
				21. SIGNATURE OF INSPECTOR TONI NICHOLSON, GEOLOGIST			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	WELL CONST. FRUCTION	BOX OF SAMPLE NO.	REMARKS (Drilling time, water level, depth of weathering, etc., if significant)	
23.5'	0		0.7' concrete underlain by asphalt, gravel, and sand.			DEPTH TO WATER DURING DRILLING: 4.8'. NOTE: SEE HTW LOG FOR MORE INFORMATION. HOLE BACKFILLED AFTER COMPLETION.	
21.5'	2		SM Silty SAND, very fine to fine, brown, uniform.				
	4		Wet.		A7-1		
19.0'	6		Saturated.				
	6		BOTTOM OF HOLE AT 5.5'				
	8		NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM				
	10						
	12						

A-24

HTW BORING LOG

[illegible]

APPENDIX V

SOIL LABORATORY RESULTS

SAMPLE NUMBERING SCHEME

Sample numbers were assigned to reflect the area from which they were collected. Examples of the sample numbering scheme are presented below. For all sample numbers include the HAAF-260 prefix.

Sample ID Number	Description
PIPE-1-D-S	Soil sample collected from the piping trench and tested for diesel range products.
PIPE-1-G-S	Soil sample collected from the piping trench and tested for gasoline range products.
DIS-D-1-S or DIS-1-D-S	Soil sample collected from the dispenser area and tested for diesel range products.
DIS-G-1-S OR DIS-1-G-S	Soil sample collected from the dispenser area and tested for gasoline range products.
UST-D-1-GW	Groundwater sample collected from the UST area and tested for diesel range products.
UST-G-1-GW	Groundwater sample collected from the UST area and tested for gasoline range products.

Summary of Methods

Soil

BTEX by SW846 5031/8260
PAHs by SW846 8310

Groundwater

VOCs by Sw846 5031/8260
SVOCs by SW846 8270

Summary of Qualifiers

U = not detected

J = estimated value

B = analyte found in sample and associate blank

P = greater than 25% difference detected concentration between the two GC columns.

D = compound required dilution.

Special Notes:

Many of the soil PAH analyses required re-analysis because method criteria were exceeded. The re-analyses are included in the data package. They are identified by "RE" after the sample ID. Where appropriate, based on validation of the data, the data from the re-analyses has been included in the data table

DIESEL - PIPE

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

HAARF-260-PIPE-D-1-S
PIPEDIS

HAARF-260-PIPE-D

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

SDG No.: 34949

Lab Code: SWOX

Case No.: EARTH-V SAS No.:

Matrix: soil(water) SOIL

Lab Sample ID: 34949.07

Sample wt vol: 5.0 g/mL

Lab File ID: C26642.0

Level: low/med) LOW

Date Received: 07/23/98

% Moisture: not dec. 13

Date Analyzed: 07/28/98

Column: pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.	COMPOUND		
71-43-2-----	BENZENE	6	U
108-88-3-----	TOLUENE	6	U
100-41-4-----	ETHYL BENZENE	6	U
13-302-07-----	m,p-XYLENES	6	U
95-47-6-----	o-XYLENE	6	U

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-PIPE-^D~~E~~

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.07

Sample wt/vol: 21.4 (g/mL) G Lab File ID: _____

% Moisture: 13 decanted: (Y/N) N Date Received: 07/23/98

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 07/24/98

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/06/98

Injection Volume: 5.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: MG/KG Q

-----DRH	9.4	
Surrogate amount spiked	13.43	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE D
18-5

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.07

Sample wt/vol: 26.2g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 12.92 pH: 7.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
91-20-3	NAPHTHALENE-----	366		U
208-96-8	ACENAPHTHYLENE-----	366		U
83-32-9	ACENAPHTHENE-----	458		U
86-73-7	FLUORENE-----	137		U
85-01-8	PHENANTHRENE-----	183		U
120-12-7	ANTHRACENE-----	11.4		U
206-44-0	FLUORANTHENE-----	96.2		U
129-00-0	PYRENE-----	206		U
56-55-3	BENZO (a) ANTHRACENE-----	18.0		J
218-01-9	CHRYSENE-----	114		U
205-99-2	BENZO (b) FLUORANTHENE-----	47.2		
207-08-9	BENZO (k) FLUORANTHENE-----	12.3		
50-32-8	BENZO (a) PYRENE-----	19.8		
53-70-3	DIBENZO (a, h) ANTHRACENE-----	149		U
191-24-2	BENZO (g, h, i) PERYLENE-----	160		U
193-39-5	INDENO (1, 2, 3-cd) PYRENE-----	26.6		J

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 574
2-F BIPHENYL & TERPHENYL

12 VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PIPED2S D-7 <

Lab Name: SWL-TULSA

Contract: HUNTER ARMY H4AF-260-PIPE-1

Lab Code: SWOX

Case No.: EARTH-V SAS No.:

SDG No.: 34949

Matrix: soil/water/ SOIL

Lab Sample ID: 34949.08

Sample wt/vol: 1.0 g/mL G

Lab File ID: 026669.D

Level: (low/med) LOW

Date Received: 07/23/98

% Moisture: not dec. 9

Date Analyzed: 07/29/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.

COMPOUND

71-43-2-----	BENZENE	2900	E
108-88-3-----	TOLUENE	8400	E
100-41-4-----	ETHYL BENZENE	7200	E
13-302-07-----	m,p-XYLENES	19000	E
95-47-6-----	o-XYLENE	9700	E

1A VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

PIPED2SDL

HAAF-260-PIPE-D-2-S-DL

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34949

Matrix: soil/water: SOIL

Lab Sample ID: 34949.08DL

Sample wt./vol: 4.0 g/mL/ g

Lab File ID: UL5834.D

Level: low/med) MED

Date Received: 07/23/98

% Moisture: not dec. 3

Date Analyzed: 08/04/98

Column: pack/cap) CAP

Dilution Factor: 25.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.	CCOMPOUND		
71-43-2-----	BENZENE	3300	JD
108-88-3-----	TOLUENE	140000	D
100-41-4-----	ETHYL BENZENE	91000	D
13-302-07-----	m,p-XYLENES	230000	D
95-47-6-----	o-XYLENE	150000	D

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-PIPE-D2

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.08

Sample wt/vol: 21.3 (g/mL) G Lab File ID: _____

% Moisture: 9 decanted: (Y/N) N Date Received: 07/23/98

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 07/24/98

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/06/98

Injection Volume: 5.0 (uL) Dilution Factor: 20.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: MG/KG Q

-----DRH	6000	
Surrogate amount spiked	258.32	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE-D
2S

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.08

Sample wt/vol: 27.3g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 9.35 pH: 6.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg)	ug/kg	Q
91-20-3	NAPHTHALENE-----	65500	EP	
208-96-8	ACENAPHTHYLENE-----	352	U	
83-32-9	ACENAPHTHENE-----	22500		
86-73-7	FLUORENE-----	7060	EP	
85-01-8	PHENANTHRENE-----	2210	EP	
120-12-7	ANTHRACENE-----	393	EP	
206-44-0	FLUORANTHENE-----	1520	EP	
129-00-0	PYRENE-----	805	EP	
56-55-3	BENZO (a) ANTHRACENE-----	590	EP	
218-01-9	CHRYSENE-----	1320	EP	
205-99-2	BENZO (b) FLUORANTHENE-----	362	EP	
207-08-9	BENZO (k) FLUORANTHENE-----	94.9	EP	
50-32-8	BENZO (a) PYRENE-----	258	EP	
53-70-3	DIBENZO (a, h) ANTHRACENE-----	907	E	
191-24-2	BENZO (g, h, i) PERYLENE-----	437	EP	
193-39-5	INDENO (1, 2, 3-cd) PYRENE-----	342	EP	

SURROGATE AMOUNT SPIKED (ug/kg dry wt.)
2-F BIPHENYL & TERPHENYL

552

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE-D
1000

25

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.08DL

Sample wt/vol: 27.3g Lab File ID: 2AH0831A

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 9.35 pH: 6.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/31/98

GPC Cleanup: (Y/N) N Dilution Factor: 2000.00

CAS NO.		COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg)	ug/kg	Q
91-20-3		NAPHTHALENE-----	99500		DJ
208-96-8		ACENAPHTHYLENE-----	352000		U
83-32-9		ACENAPHTHENE-----	9150		DJ
86-73-7		FLUORENE-----	7920		DJP
85-01-8		PHENANTHRENE-----	19000		DJ
120-12-7		ANTHRACENE-----	6060		DJ
206-44-0		FLUORANTHENE-----	15700		DJ
129-00-0		PYRENE-----	16000		DJ
56-55-3		BENZO (a) ANTHRACENE-----	4240		DJ
218-01-9		CHRYSENE-----	3600		DJ
205-99-2		BENZO (b) FLUORANTHENE-----	4560		DJ
207-08-9		BENZO (k) FLUORANTHENE-----	1620		DJP
50-32-8		BENZO (a) PYRENE-----	2220		DJ
53-70-3		DIBENZO (a, h) ANTHRACENE-----	3690		DJP
191-24-2		BENZO (g, h, i) PERYLENE-----	154000		U
193-39-5		INDENO (1, 2, 3-cd) PYRENE-----	1330		DJ

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 552
2-F BIPHENYL & TERPHENYL

12
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. _____

Lab Name: SWL-TULSA

Contract: HUNTER ARMY HAAP-260-Pipe-0-3-5

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34949

Matrix: soil/water: SOIL

Lab Sample ID: 34949.09

Sample wt./vol: 5.0 g/mL 3

Lab File ID: 026670.D

Level: low/med) LOW

Date Received: 07/23/98

% Moisture: not dec. 14

Date Analyzed: 07/29/98

Column: pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.	COMPOUND		
71-43-2-----	BENZENE	6	U
108-88-3-----	TOLUENE	17	
100-41-4-----	ETHYL BENZENE	12	
13-302-07-----	m,p-XYLENES	9	
95-47-6-----	o-XYLENE	24	

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

Lab Name: SWL-TULSA

HAAF-260-PIPE-D

D-3-5

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.09

Sample wt/vol: 22.0 (g/mL) G Lab File ID: _____

% Moisture: 14 decanted: (Y/N) N Date Received: 07/23/98

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 07/24/98

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/06/98

Injection Volume: 5.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: MG/KG Q

-----DRH	4.5	
Surrogate amount spiked	13.21	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE-D
38

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.09

Sample wt/vol: 26.2g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 14.26 pH: 6.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.		COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg)	ug/kg	Q
91-20-3		NAPHTHALENE-----	366		U
208-96-8		ACENAPHTHYLENE-----	366		U
83-32-9		ACENAPHTHENE-----	141		J
86-73-7		FLUORENE-----	157		
85-01-8		PHENANTHRENE-----	47.4		J
120-12-7		ANTHRACENE-----	23.1		E
206-44-0		FLUORANTHENE-----	6.34		J
129-00-0		PYRENE-----	7.02		JP
56-55-3		BENZO(a)ANTHRACENE-----	4.22		JP
218-01-9		CHRYSENE-----	114		U
205-99-2		BENZO(b)FLUORANTHENE-----	27.1		
207-08-9		BENZO(k)FLUORANTHENE-----	10.3		U
50-32-8		BENZO(a)PYRENE-----	3.52		J
53-70-3		DIBENZO(a,h)ANTHRACENE-----	149		U
191-24-2		BENZO(g,h,i)PERYLENE-----	96.9		J
193-39-5		INDENO(1,2,3-cd)PYRENE-----	57.1		P

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 583
2-F BIPHENYL & TERPHENYL

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE-D
3S 10%
sim
9/24

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.09DL

Sample wt/vol: 26.2g Lab File ID: 2AH0829A

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 14.26 pH: 6.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/30/98

GPC Cleanup: (Y/N) N Dilution Factor: 20.00

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
91-20-3	NAPHTHALENE-----	3660		U
208-96-8	ACENAPHTHYLENE-----	3660		U
83-32-9	ACENAPHTHENE-----	4580		U
86-73-7	FLUORENE-----	1370		U
85-01-8	PHENANTHRENE-----	59.8		DJP
120-12-7	ANTHRACENE-----	50.4		DJ
206-44-0	FLUORANTHENE-----	962		U
129-00-0	PYRENE-----	2060		U
56-55-3	BENZO (a) ANTHRACENE-----	4.24		DJ
218-01-9	CHRYSENE-----	1140		U
205-99-2	BENZO (b) FLUORANTHENE-----	73.1		DJP
207-08-9	BENZO (k) FLUORANTHENE-----	103		U
50-32-8	BENZO (a) PYRENE-----	172		U
53-70-3	DIBENZO (a, h) ANTHRACENE-----	1490		U
191-24-2	BENZO (g, h, i) PERYLENE-----	1600		U
193-39-5	INDENO (1, 2, 3-cd) PYRENE-----	389		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.)
2-F BIPHENYL & TERPHENYL

583

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY HAAP-260-Pipe-D-4-
PIPED4S

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34949

Matrix: soil/water: SOIL

Lab Sample ID: 34949.10

Sample wt vol: 5.0 g/mL 3

Lab File ID: C26644.D

Level: low/med) LOW

Date Received: 07/23/98

% Moisture: not dec. 9

Date Analyzed: 07/28/98

Column: pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.

COMPOUND

71-43-2-----	BENZENE	5	U
108-88-3-----	TOLUENE	5	U
100-41-4-----	ETHYL BENZENE	5	U
13-302-07-----	m,p-XYLENES	5	U
95-47-6-----	o-XYLENE	5	U

12
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY WAAF 260-PIPE-D-4

PIPED4SDUP

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34949

Matrix: soil, water) SOIL

Lab Sample ID: 34949.11

Sample wt. vol: 5.0 g/mL: 5

Lab File ID: C26671.3

Level: low/med) LCW

Date Received: 07/23/98

% Moisture: not dec. 2

Date Analyzed: 07/29/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

71-43-2-----	BENZENE	5	U
108-88-3-----	TOLUENE	5	U
100-41-4-----	ETHYL BENZENE	5	U
13-302-07-----	m,p-XYLENES	3	U
95-47-6-----	o-XYLENE	5	U

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-PIPE-D4

D-4-S

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34949

Matrix: (soil/water) SOIL

Lab Sample ID: 34949.10

Sample wt/vol: 21.2 (g/mL) G

Lab File ID: _____

% Moisture: 9 decanted: (Y/N) N

Date Received: 07/23/98

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 07/24/98

Concentrated Extract Volume: 5000 (uL)

Date Analyzed: 08/06/98

Injection Volume: 5.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: MG/KG Q

-----DRH	5.1	
Surrogate amount spiked	12.93	

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

Lab Name: SWL-TULSA

HAAF-260-PIPE-D-
D-45

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34949

Pipe D-4-S-D

Matrix: (soil/water) SOIL

Lab Sample ID: 34949.11

Sample wt/vol: 21.7 (g/mL) G

Lab File ID: _____

% Moisture: 2 decanted: (Y/N) N

Date Received: 07/23/98

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 07/24/98

Concentrated Extract Volume: 5000 (uL)

Date Analyzed: 08/06/98

Injection Volume: 5.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: MG/KG Q

-----DRH	8.3	
Surrogate amount spiked	11.75	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE-D
4S

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.10

Sample wt/vol: 27.5g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 8.71 pH: 6.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
91-20-3	NAPHTHALENE-----	349		U
208-96-8	ACENAPHTHYLENE-----	349		U
83-32-9	ACENAPHTHENE-----	436		U
86-73-7	FLUORENE-----	131		U
85-01-8	PHENANTHRENE-----	174		U
120-12-7	ANTHRACENE-----	10.9		U
206-44-0	FLUORANTHENE-----	91.6		U
129-00-0	PYRENE-----	196		U
56-55-3	BENZO (a) ANTHRACENE-----	34.9		U
218-01-9	CHRYSENE-----	109		U
205-99-2	BENZO (b) FLUORANTHENE-----	47.5		P
207-08-9	BENZO (k) FLUORANTHENE-----	3.46		J
50-32-8	BENZO (a) PYRENE-----	16.4		U
53-70-3	DIBENZO (a, h) ANTHRACENE-----	142		U
191-24-2	BENZO (g, h, i) PERYLENE-----	153		U
193-39-5	INDENO (1, 2, 3-cd) PYRENE-----	37.1		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.)
2-F BIPHENYL & TERPHENYL

548

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE-D
4S RE

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.11RE

Sample wt/vol: 29.4g Lab File ID: 2AH0829A

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 2.00 pH: 8.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/30/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
91-20-3	NAPHTHALENE-----	326		U
208-96-8	ACENAPHTHYLENE-----	326		U
83-32-9	ACENAPHTHENE-----	408		U
86-73-7	FLUORENE-----	122		U
85-01-8	PHENANTHRENE-----	163		U
120-12-7	ANTHRACENE-----	10.2		U
206-44-0	FLUORANTHENE-----	85.7		U
129-00-0	PYRENE-----	184		U
56-55-3	BENZO (a) ANTHRACENE-----	11.0		J
218-01-9	CHRYSENE-----	102		U
205-99-2	BENZO (b) FLUORANTHENE-----	15.7		
207-08-9	BENZO (k) FLUORANTHENE-----	9.18		U
50-32-8	BENZO (a) PYRENE-----	15.3		U
53-70-3	DIBENZO (a, h) ANTHRACENE-----	133		U
191-24-2	BENZO (g, h, i) PERYLENE-----	143		U
193-39-5	INDENO (1, 2, 3-cd) PYRENE-----	34.7		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 510
2-F BIPHENYL & TERPHENYL

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-PIPE-D
4S

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.11

Sample wt/vol: 29.7g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 2.07 pH: 8.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
91-20-3	NAPHTHALENE-----	323		U
208-96-8	ACENAPHTHYLENE-----	323		U
83-32-9	ACENAPHTHENE-----	404		U
86-73-7	FLUORENE-----	121		U
85-01-8	PHENANTHRENE-----	162		U
120-12-7	ANTHRACENE-----	10.1		U
206-44-0	FLUORANTHENE-----	84.8		U
129-00-0	PYRENE-----	182		U
56-55-3	BENZO(a)ANTHRACENE-----	32.3		U
218-01-9	CHRYSENE-----	101		U
205-99-2	BENZO(b)FLUORANTHENE-----	12.1		U
207-08-9	BENZO(k)FLUORANTHENE-----	9.09		U
50-32-8	BENZO(a)PYRENE-----	15.2		U
53-70-3	DIBENZO(a,h)ANTHRACENE-----	131		U
191-24-2	BENZO(g,h,i)PERYLENE-----	141		U
193-39-5	INDENO(1,2,3-cd)PYRENE-----	34.3		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 510
2-F BIPHENYL & TERPHENYL

DIESEL - DIS

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

DISD1
-AAF-260-015-01

Lab Code: SWOK

Case No.: EARTH-W SAS No.:

SDG No.: 34949

Matrix: soil/water: SOIL

Lab Sample ID: 34949.12

Sample wt vol: 5.0 g/mL 3

Lab File ID: C26672.0

Level: low/med) LOW

Date Received: 07/23/98

% Moisture: not dec. 16

Date Analyzed: 07/29/98

Column: pack/cap) CAP

Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Q	
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71-43-2-----	BENZENE	6	U
108-88-3-----	TOLUENE	6	U
100-41-4-----	ETHYL BENZENE	6	U
13-302-07-----	m, p-XYLENES	6	U
95-47-6-----	o-XYLENE	6	U

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

D-1 L5
HAAF-260-DIS-D1

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.12

Sample wt/vol: 25.4g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 15.96 pH: 7.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

		CONCENTRATION UNITS:		
CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
91-20-3	NAPHTHALENE-----	378		U
208-96-8	ACENAPHTHYLENE-----	378		U
83-32-9	ACENAPHTHENE-----	472		U
86-73-7	FLUORENE-----	142		U
85-01-8	PHENANTHRENE-----	189		U
120-12-7	ANTHRACENE-----	11.8		U
206-44-0	FLUORANTHENE-----	99.2		U
129-00-0	PYRENE-----	212		U
56-55-3	BENZO (a) ANTHRACENE-----	37.8		U
218-01-9	CHRYSENE-----	118		U
205-99-2	BENZO (b) FLUORANTHENE-----	14.2		U
207-08-9	BENZO (k) FLUORANTHENE-----	10.6		U
50-32-8	BENZO (a) PYRENE-----	17.7		U
53-70-3	DIBENZO (a,h) ANTHRACENE-----	154		U
191-24-2	BENZO (g,h,i) PERYLENE-----	165		U
193-39-5	INDENO (1,2,3-cd) PYRENE-----	40.2		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 595
2-F BIPHENYL & TERPHENYL

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-DIS-D1
RE

Lab Code: SWOK Case No: EARTH-VA SDG No: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.12RE

Sample wt/vol: 25.3g Lab File ID: 2AH0829A

Level: (low/med) LOW Date Received: 07/23/98

% Moisture: 15.84 pH: 7.00 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/30/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.		COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg)	ug/kg	Q
91-20-3		NAPHTHALENE-----	379		U
208-96-8		ACENAPHTHYLENE-----	379		U
83-32-9		ACENAPHTHENE-----	474		U
86-73-7		FLUORENE-----	142		U
85-01-8		PHENANTHRENE-----	190		U
120-12-7		ANTHRACENE-----	11.8		U
206-44-0		FLUORANTHENE-----	99.6		U
129-00-0		PYRENE-----	213		U
56-55-3		BENZO (a) ANTHRACENE-----	21.5		J
218-01-9		CHRYSENE-----	118		U
205-99-2		BENZO (b) FLUORANTHENE-----	41.9		P
207-08-9		BENZO (k) FLUORANTHENE-----	13.2		P
50-32-8		BENZO (a) PYRENE-----	26.1		
53-70-3		DIBENZO (a,h) ANTHRACENE-----	154		U
191-24-2		BENZO (g,h,i) PERYLENE-----	166		U
193-39-5		INDENO (1,2,3-cd) PYRENE-----	40.3		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 594
2-F BIPHENYL & TERPHENYL

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-DIS-DX.

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34949

Matrix: (soil/water) SOIL Lab Sample ID: 34949.12

Sample wt/vol: 20.7 (g/mL) G Lab File ID: _____

% Moisture: 16 decanted: (Y/N) N Date Received: 07/23/98

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 07/24/98

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/06/98

Injection Volume: 5.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: MG/KG Q

-----DRH	11	
Surrogate amount spiked	14.40	

1
GASOLINE ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-DIS-DX-15

Lab Name: SWL-TULSA

Contract:

Lab Code: SWOK

Case No.: EARTH-VA

SDG No.: 34949B

Matrix: (soil/water) SOIL

Lab Sample ID: 34949.12

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: G1254.D

Level: (low/med) LOW

Date Received: 07/23/98

% Moisture: not dec. 16

Date Analyzed: 07/27/98

GC Column: DB624 ID: 0.54 (mm)

Dilution Factor: 1

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
---------	----------	---	---

Gasoline	14	
Surrogate amount spiked	24	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

D-2-5
260-DIS-2
HAAF-

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 34990.13

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: C26730.D

Level: (low/med) LOW

Date Received: 07/25/98

% Moisture: not dec. 12

Date Analyzed: 07/31/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Q
---------	----------	---

71-43-2-----	BENZENE	6	U
108-88-3-----	TOLUENE	6	U
100-41-4-----	ETHYL BENZENE	6	U
13-302-07-----	m,p-XYLENES	6	U
95-47-6-----	o-XYLENE	6	U

1
GASOLINE ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-DIS-2-5
-5-

Lab Name: SWL-TULSA

Contract:

Lab Code: SWOK

Case No.: EARTH-VA

SDG No.: 34977A

Matrix: (soil/water) SOIL

Lab Sample ID: 34990.13

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: G1262.D

Level: (low/med) LOW

Date Received: 07/24/98

% Moisture: not dec. 12

Date Analyzed: 07/28/98

GC Column: DB624 ID: 0.54 (mm)

Dilution Factor: 1

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
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Gasoline	14	
Surrogate amount spiked	23	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-DIS-2-
S

Lab Code: SWOK

Case No: EARTH-VA

SDG No:

34977A

Matrix: (soil/water)

SOIL

Lab Sample ID: 34990.13

Sample wt/vol: 27.1g

Lab File ID: 5AH0730B

Level: (low/med) LOW

Date Received: 07/25/98

% Moisture: 12.09 pH: 7.28

Date Extracted: 07/28/98

Extraction Method: CONT/S

Date Analyzed: 08/02/98

GPC Cleanup: (Y/N) N

Dilution Factor: 2.00

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg Q
91-20-3	NAPHTHALENE-----	354	U
208-96-8	ACENAPHTHYLENE-----	354	U
83-32-9	ACENAPHTHENE-----	443	U
86-73-7	FLUORENE-----	133	U
85-01-8	PHENANTHRENE-----	177	U
120-12-7	ANTHRACENE-----	11.1	U
206-44-0	FLUORANTHENE-----	93.0	U
129-00-0	PYRENE-----	199	U
56-55-3	BENZO (a) ANTHRACENE-----	35.4	U
218-01-9	CHRYSENE-----	111	U
205-99-2	BENZO (b) FLUORANTHENE-----	13.3	U
207-08-9	BENZO (k) FLUORANTHENE-----	9.96	U
50-32-8	BENZO (a) PYRENE-----	16.6	U
53-70-3	DIBENZO (a, h) ANTHRACENE-----	144	U
191-24-2	BENZO (g, h, i) PERYLENE-----	155	U
193-39-5	INDENO (1, 2, 3-cd) PYRENE-----	37.6	U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.)
2-F BIPHENYL & TERPHENYL

554

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

-3-0-5
260-DIS3-D
HAAF-

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.30

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: I28255.D

Level: (low/med) LOW

Date Received: 07/24/98

% Moisture: not dec. 15

Date Analyzed: 08/05/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

71-43-2-----	BENZENE	6	U
108-88-3-----	TOLUENE	6	U
100-41-4-----	ETHYL BENZENE	6	U
13-302-07-----	m,p-XYLENES	6	U
95-47-6-----	o-XYLENE	6	U

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

-3-D-5
HAAF-260-DIS~~3-D~~

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34977

Matrix: (soil/water) SOIL Lab Sample ID: 35977.30

Sample wt/vol: 22.0 (g/mL) G Lab File ID: _____

% Moisture: 15 decanted: (Y/N) N Date Received: 07/24/98

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 07/30/98

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/13/98

Injection Volume: 5.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS: MG/KG Q

-----DRH	2.3	
Surrogate amount spiked	13.36	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

b-3-15
HAAF-260-DIS3-D

Lab Name: SWL-TULSA Contract:
Lab Code: SWOK Case No: EARTH-VA SDG No: 34977B

Matrix: (soil/water) SOIL Lab Sample ID: 34977.30

Sample wt/vol: 25.5g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/24/98

% Moisture: 15.29 pH: 6.26 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

		CONCENTRATION UNITS:		
CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
91-20-3	NAPHTHALENE-----	376		U
208-96-8	ACENAPHTHYLENE-----	376		U
83-32-9	ACENAPHTHENE-----	470		U
86-73-7	FLUORENE-----	141		U
85-01-8	PHENANTHRENE-----	188		U
120-12-7	ANTHRACENE-----	11.8		U
206-44-0	FLUORANTHENE-----	98.8		U
129-00-0	PYRENE-----	212		U
56-55-3	BENZO(a) ANTHRACENE-----	37.6		U
218-01-9	CHRYSENE-----	118		U
205-99-2	BENZO(b) FLUORANTHENE-----	14.1		U
207-08-9	BENZO(k) FLUORANTHENE-----	10.6		U
50-32-8	BENZO(a) PYRENE-----	17.6		U
53-70-3	DIBENZO(a,h) ANTHRACENE-----	153		U
191-24-2	BENZO(g,h,i) PERYLENE-----	165		U
193-39-5	INDENO(1,2,3-cd) PYRENE-----	40.0		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.)
2-F BIPHENYL & TERPHENYL

590

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

-4-D-5
NAAF-260DIS4-D
~~Hunter~~

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.31

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: I28251.D

Level: (low/med) LOW

Date Received: 07/24/98

% Moisture: not dec. 6

Date Analyzed: 08/05/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

71-43-2-----	BENZENE	5	U
108-88-3-----	TOLUENE	5	U
100-41-4-----	ETHYL BENZENE	5	U
13-302-07-----	m,p-XYLENES	5	U
95-47-6-----	o-XYLENE	5	U

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

-4-D-5
HAAF-260-DIS4-B

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 35977.31

Sample wt/vol: 21.3 (g/mL) G

Lab File ID: _____

% Moisture: 6 decanted: (Y/N) N

Date Received: 07/24/98

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 07/30/98

Concentrated Extract Volume: 5000 (uL)

Date Analyzed: 08/13/98

Injection Volume: 5.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: MG/KG	Q
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-----DRH	4.5	
Surrogate amount spiked	12.50	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

D-415
HAAF-260-DIS4-D

Lab Code: SWOK Case No: EARTH-VA SDG No: 34977B

Matrix: (soil/water) SOIL Lab Sample ID: 34977.31

Sample wt/vol: 28.1g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/24/98

% Moisture: 6.58 pH: 6.65 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

		CONCENTRATION UNITS:		
CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
91-20-3	NAPHTHALENE-----	342		U
208-96-8	ACENAPHTHYLENE-----	342		U
83-32-9	ACENAPHTHENE-----	427		U
86-73-7	FLUORENE-----	128		U
85-01-8	PHENANTHRENE-----	171		U
120-12-7	ANTHRACENE-----	10.7		U
206-44-0	FLUORANTHENE-----	89.7		U
129-00-0	PYRENE-----	192		U
56-55-3	BENZO (a) ANTHRACENE-----	34.2		U
218-01-9	CHRYSENE-----	107		U
205-99-2	BENZO (b) FLUORANTHENE-----	12.8		U
207-08-9	BENZO (k) FLUORANTHENE-----	9.61		U
50-32-8	BENZO (a) PYRENE-----	16.0		U
53-70-3	DIBENZO (a,h) ANTHRACENE-----	139		U
191-24-2	BENZO (g,h,i) PERYLENE-----	149		U
193-39-5	INDENO (1,2,3-cd) PYRENE-----	36.3		U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.) 535
2-F BIPHENYL & TERPHENYL

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

260-DIS-D-55

HAAF-

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.26

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: I28254.D

Level: (low/med) LOW

Date Received: 07/24/98

% Moisture: not dec. 12

Date Analyzed: 08/05/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

71-43-2-----	BENZENE	6	U
108-88-3-----	TOLUENE	6	U
100-41-4-----	ETHYL BENZENE	6	U
13-302-07-----	m,p-XYLENES	6	U
95-47-6-----	o-XYLENE	6	U

1D
TPH ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-DIS-D-5

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: EARTH-VA SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 35977.26

Sample wt/vol: 20.4 (g/mL) G

Lab File ID: _____

% Moisture: 12 decanted: (Y/N) N

Date Received: 07/24/98

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 07/30/98

Concentrated Extract Volume: 5000 (uL)

Date Analyzed: 08/13/98

Injection Volume: 5.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION	UNITS: MG/KG	Q
-----DRH		4.1		
Surrogate amount spiked		13.92		

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: SWL-TULSA Contract:

HAAF-260-DIS-D-
5-5

Lab Code: SWOK Case No: EARTH-VA SDG No: 34977B

Matrix: (soil/water) SOIL Lab Sample ID: 34977.26

Sample wt/vol: 26.4g Lab File ID: 5AH0730B

Level: (low/med) LOW Date Received: 07/24/98

% Moisture: 12.08 pH: 7.72 Date Extracted: 07/25/98

Extraction Method: CONT/S Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg)	ug/kg	Q
91-20-3	NAPHTHALENE-----	364	U	
208-96-8	ACENAPHTHYLENE-----	364	U	
83-32-9	ACENAPHTHENE-----	454	U	
86-73-7	FLUORENE-----	136	U	
85-01-8	PHENANTHRENE-----	182	U	
120-12-7	ANTHRACENE-----	11.4	U	
206-44-0	FLUORANTHENE-----	95.4	U	
129-00-0	PYRENE-----	204	U	
56-55-3	BENZO(a) ANTHRACENE-----	10.3	J	
218-01-9	CHRYSENE-----	114	U	
205-99-2	BENZO(b) FLUORANTHENE-----	13.6	U	
207-08-9	BENZO(k) FLUORANTHENE-----	10.2	U	
50-32-8	BENZO(a) PYRENE-----	17.0	U	
53-70-3	DIBENZO(a,h) ANTHRACENE-----	148	U	
191-24-2	BENZO(g,h,i) PERYLENE-----	159	U	
193-39-5	INDENO(1,2,3-cd) PYRENE-----	38.6	U	

SURROGATE AMOUNT SPIKED (ug/kg dry wt.)
2-F BIPHENYL & TERPHENYL

569

GAS - PIPE

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

~~260-PIPE1-G~~
~~HAAF-26-PIPE-1~~
-G-5

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.25

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: C26723.D

Level: (low/med) LOW

Date Received: 07/24/98

% Moisture: not dec. 10

Date Analyzed: 07/31/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

71-43-2-----	BENZENE	4	J
108-88-3-----	TOLUENE	6	U
100-41-4-----	ETHYL BENZENE	6	U
13-302-07-----	m,p-XYLENES	6	U
95-47-6-----	o-XYLENE	6	U

1
GASOLINE ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

HAAF-260-PIPE1

PIPE-1-G-5

Lab Name: SWL-TULSA

Contract:

Lab Code: SWOK

Case No.: EARTH-VA

SDG No.: 34977A

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.25

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: G1253.D

Level: (low/med) LOW

Date Received: 07/24/98

% Moisture: not dec. 10

Date Analyzed: 07/27/98

GC Column: DB624 ID: 0.54(mm)

Dilution Factor: 1

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Q

Gasoline	97	
Surrogate amount spiked	22	

1D
PAH ANALYSIS DATA SHEET

EPA SAMPLE NO:

b Name: SWL-TULSA Contract:

HAAF-260-PIPE1-

G

HAAF-260-PIPE1-G-S

Lab Code: SWOK

Case No: EARTH-VA

SDG No:

34977B

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.25

Sample wt/vol: 27.3g

Lab File ID: 5AH0730B

Level: (low/med) LOW

Date Received: 07/24/98

% Moisture: 9.95 pH: 7.03

Date Extracted: 07/25/98

Extraction Method: CONT/S

Date Analyzed: 08/01/98

GPC Cleanup: (Y/N) N

Dilution Factor:

2.00

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/kg)

ug/kg

Q

91-20-3	NAPHTHALENE-----	352	U
208-96-8	ACENAPHTHYLENE-----	352	U
83-32-9	ACENAPHTHENE-----	440	U
86-73-7	FLUORENE-----	132	U
85-01-8	PHENANTHRENE-----	176	U
120-12-7	ANTHRACENE-----	11.0	U
206-44-0	FLUORANTHENE-----	92.3	U
129-00-0	PYRENE-----	198	U
56-55-3	BENZO (a) ANTHRACENE-----	35.2	U
218-01-9	CHRYSENE-----	110	U
205-99-2	BENZO (b) FLUORANTHENE-----	3.66	J
207-08-9	BENZO (k) FLUORANTHENE-----	9.89	U
50-32-8	BENZO (a) PYRENE-----	16.5	U
53-70-3	DIBENZO (a, h) ANTHRACENE-----	143	U
191-24-2	BENZO (g, h, i) PERYLENE-----	154	U
193-39-5	INDENO (1, 2, 3-cd) PYRENE-----	37.4	U

SURROGATE AMOUNT SPIKED (ug/kg dry wt.)
2-F BIPHENYL & TERPHENYL

555

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SWL-TULSA

Contract: HUNTER ARMY

260-PIPE2-7
HAAF-260-PL
2-G-5

Lab Code: SWOK

Case No.: EARTH-V SAS No.:

SDG No.: 34977

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.24

Sample wt/vol: 4.0 (g/mL) G

Lab File ID: UL5829.D

Level: (low/med) MED

Date Received: 07/24/98

% Moisture: not dec. 7

Date Analyzed: 08/04/98

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

71-43-2-----	BENZENE	670	U
108-88-3-----	TOLUENE	480	J
100-41-4-----	ETHYL BENZENE	280	J
13-302-07-----	m,p-XYLENES	950	
95-47-6-----	o-XYLENE	400	J

1
GASOLINE ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

-Z-a-s
HAAF-260-PIPE2-G

Lab Name: SWL-TULSA

Contract:

Lab Code: SWOK

Case No.: EARTH-VA

SDG No.: 34977A

Matrix: (soil/water) SOIL

Lab Sample ID: 34977.24

Sample wt/vol: 4.0 (g/mL) G

Lab File ID: G1289.D

Level: (low/med) MED

Date Received: 07/24/98

% Moisture: not dec. 7

Date Analyzed: 07/31/98

GC Column: DB624 ID: 0.54(mm)

Dilution Factor: 1

Soil Extract Volume: 10000 (uL)

Soil Aliquot Volume: 1 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
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Gasoline	490000	
Surrogate amount spiked	270000	