FINAL

CORRECTIVE ACTION PLAN - PART A REPORT
FOR
UNDERGROUND STORAGE TANK 71A
FACILITY ID #9-089023
BUILDING 1260
FORT STEWART, GEORGIA

Prepared for:

U.S. Army Corps of Engineers - Savannah District
and
Fort Stewart Directorate of Public Works
Under Contract Number DACA21-95-D-0022
Delivery Order 0024

Prepared by:

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800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831

December 1998

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List of Abbreviations and Acronyms

ACE	Anderson Columbia Environmental, Inc.
ACL	alternate concentration limit
AMSL	above mean sea level
ASTM	American Society for Testing and Materials
ATL	alternate threshold level
BGS	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
BTOC	below top of casing
CAP	Corrective Action Plan
DPW	Directorate of Public Works
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
GA EPD	Georgia Environmental Protection Division
GRO	gasoline-range organics
ID	inside diameter
IDW	investigation-derived waste
MCLs	maximum contaminant levels
MSL	mean sea level
ND	not detected
NRC	no regulatory criteria

OVA	organic vapor analyzer
OVM	organic vapor meter
PAH	polynuclear aromatic hydrocarbon
PVC	polyvinyl chloride
SAIC	Science Applications International Corporation
TPH	total petroleum hydrocarbon
USGS	U.S. Geological Survey
UST	underground storage tank
USTMP	Underground Storage Tank Management Program

CORRECTIVE ACTION PLAN PART A

Facility Name: UST 71A, Building 1260 Street Address: McFarland Avenue north of W. 6th Street

Facility ID: 9-089023 City: Fort Stewart County: Liberty Zip Code: 31314

Latitude: 31°52′05″ Longitude: 81°37′13″

Submitted by UST Owner/Operator:
Name: Thomas C. Fry/ Environmental Branch
Company: U.S. Army/HQ 3d, Inf. Div (Mech)
Address: DPW ENRD ENV. Br. (Fry)
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Prepared by Consultant/Contractor:
Name: Patricia A. Stoll
Company: SAIC
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City: Oak Ridge State: TN
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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: THOMAS C. FRY
Signature: Thomas C. Fry Date: 03/19/99

B. Registered Professional Engineer or Professional Geologist Certification

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

Name: Patricia A. Stoll
Signature: Patricia A. Stoll
Date: 12/7/98

Georgia Stamp or Seal

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 UST 71A site. Therefore, contaminant migration and release prevention, fire and vapor migration, or emergency free product removal was not performed prior to, or during, the removal of UST 71A.

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)

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

FORMER UST SYSTEMS (if applicable)

Tank ID Number	Capacity (gal)	Substance Stored	Date Removed
71A	1000	waste oil	7/16/96

D. Initial Site Characterization

(Figure 1: Vicinity/Location Map)
(Figure 2: Site Plan)

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

Characterization of petroleum-related contamination at the site was initiated during UST system closure activities on July 16, 1996, by Anderson Columbia Environmental, Inc (ACE). After removal of the tank, one groundwater sample was collected from the tank pit (Figure 7). Groundwater sample TK71A-GW contained 116 µg/L of benzene, 1070 µg/L of xylenes, and 2140 µg/L of polynuclear aromatic hydrocarbons (PAHs). The detection limit for toluene and ethylbenzene was 110 µg/L. No soil samples were collected during closure activities.

2. Source(s) of Contamination: Unknown; piping leakage or tank overflow suspected .
Discuss how this determination was made.

A detailed schematic diagram illustrating the former UST 71A and ancillary piping as configured during operation is not available. However, during removal activities by ACE, no holes in the tank were reported. Therefore, the source of contamination is believed to have been piping leakage and/or tank overflow.

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:* 2650 *feet*
ii. *Nearest down-gradient public water supply located within:* 3950 *feet*
iii. *Nearest non-public water supply located within:* >2,640 *feet*
iv. *Nearest down-gradient non-public water supply located within:* >5,280 *feet*

c. *Surface Water Bodies and sewers:*
i. *Nearest surface water located within* 2500 *feet*
ii. *Nearest down-gradient surface water located within* 7250 *feet*
iii. *Nearest storm or sanitary sewer located within:* 30 *feet*
iv. *Depth to bottom of sewer at a point nearest the plume* est. 4-6 *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 soil cores were collected at 2.0-foot intervals during the installation of four boreholes. Field headspace gas analyses were performed on each sample to determine the organic vapor concentration. Two soil samples were selected from each borehole for laboratory chemical analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX); total petroleum hydrocarbons (TPH); and PAH. In boreholes where organic vapors were detected, one sample was collected from the 2.0-foot interval where the highest vapor concentration was recorded, and the other from the deepest 2.0-foot interval with the lowest concentration. If organic vapors were not detected, one sample was collected from the 2.0-foot interval nearest the midpoint of the boring, and the other from the 2.0-foot interval located immediately above the water table. Refer to Attachment A for complete documentation of the technical approach implemented during this investigation.

i. Soil contamination above applicable threshold levels?

YES _____ NO X

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

ii. ATLs calculated? YES _____ NO X

If yes, present ATLs.

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

YES _____ NO _____ N/A X

b. *Groundwater Impacted*
(Table 3: Groundwater Analysis Results)
(Figure 5: Groundwater Quality Map)
(Appendix VII: Monitoring Well Details)
(Appendix VIII: Groundwater Laboratory Results)

Provide a brief discussion of groundwater sampling.

At each borehole location, except the vertical profile boring, one groundwater sample was collected from the water table to approximately 5.0 feet below the water table using a direct-push sampling device. At the vertical profile location (81-05), groundwater samples were collected every 5 feet below the water table until several groundwater sample intervals indicated a headspace gas measurement of zero. Chemical parameters for groundwater samples submitted for laboratory analysis included BTEX and PAH. Refer to Attachment A for complete documentation of the technical approach used to collect groundwater samples.

i. Groundwater contamination above MCLs? YES _____ NO X

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

YES _____ NO X

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

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.

d. *Point of Withdrawal Impacted?* YES _____ NO _____ N/A X
If Yes, indicate concentration(s) of water sample(s) taken from withdrawal point(s).

5. Other Geologic/Hydrogeologic Data

a. *Depth to Groundwater (ft BTOC):* 5.51 – 6.51 *(Table 4: Groundwater Elevations)*
b. *Groundwater Flow Direction:* northwest *(Figure 6: Potentiometric Surface Map)*
c. *Hydraulic Gradient* 0.0080 ft/ft
d. *Geophysical Province:* coastal plain
e. *Unique geologic/hydrological conditions:* The Hawthorn Formation acts as a confining unit between the surficial and Floridan aquifers

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.

ACE removed UST 71A on July 16, 1996. The UST piping was drained into the tank, and all waste oil was subsequently removed using a vacuum truck and/or compressor-driven barrel vacuum device. A backhoe was used to excavate down to the tank top. All lines were capped except the fill and vent. After the tank atmosphere was tested with a combustible gas indicator, all accessible tank openings were capped and the tanks was lifted from the excavation pit. The ancillary piping was closed in-place due to the fact that it was covered with 12 inches of high strength concrete. In-place closure consisted of purging the line and grouting the end at the tank.

b. Excavation and Treatment/Disposal of Backfill Materials and Native Soils

Check one: *No UST removal performed* ____
Returned to UST excavation ____
Excavated soils treated or disposal off site X

If soils were excavated, summarize excavation and treatment/disposal activities:

It should be noted that all contaminated soil removed during the entire project (i.e., all USTs removed under contract with ACE, to include clean and non-clean closures) was tested in accordance with the disposal facility requirements and transported to Kedesh, Inc., Highway 84, Ludowici, GA, 31316. The Installation has records of all manifests and weight tickets for this project and provided copies to GA EPD in September 1998. Approximately 42.66 tons of contaminated soil were excavated from the site.

7. Site Ranking:

Environmental Site Sensitivity Score: 0
(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 ____
(provide justification)
Concentrations of contaminants in soil and groundwater do not exceed respective soil threshold levels (Table A, Column 2) and/or maximum contaminant levels (MCLs).

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

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

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

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

1. Soil N/A X

2. Groundwater

a. Free Product N/A X

b. Dissolved phase NA X

3. Surface Water N/A X

B. Proposed Investigation of Vadose Zone And Aquifer Characteristics:

Additional vadose zone and aquifer characterization is not required.

V. PUBLIC NOTICE

(Figure 9. Tax Map)
(Appendix XI: Copies of public notification letters & certified return receipts or newspaper notice if approved)

UST 71A, Building 1260 is located within the confines of Fort Stewart Military Reservation, a federal facility. The U.S. Government owns all of the property contiguous to the site. The Fort Stewart Directorate of Public Works (DPW) has complied with the public notice requirements defined by Georgia Environmental Protection Division (GA EPD) guidance by publishing an announcement in the *Savannah Morning News* on October 18 and 25, 1998.

VI. CLAIM FOR REIMBURSEMENT (for GUST Trust Fund sites only): N/A X

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

Fort Stewart is a federally owned facility and has funded the investigation for the UST 71A site, Building 1260, Facility ID #9-089023, using Environmental Restoration Account Funds. Application for Georgia Underground Storage Tank Trust Fund reimbursement is not being pursued at this time.

APPENDIX I

REPORT FIGURES

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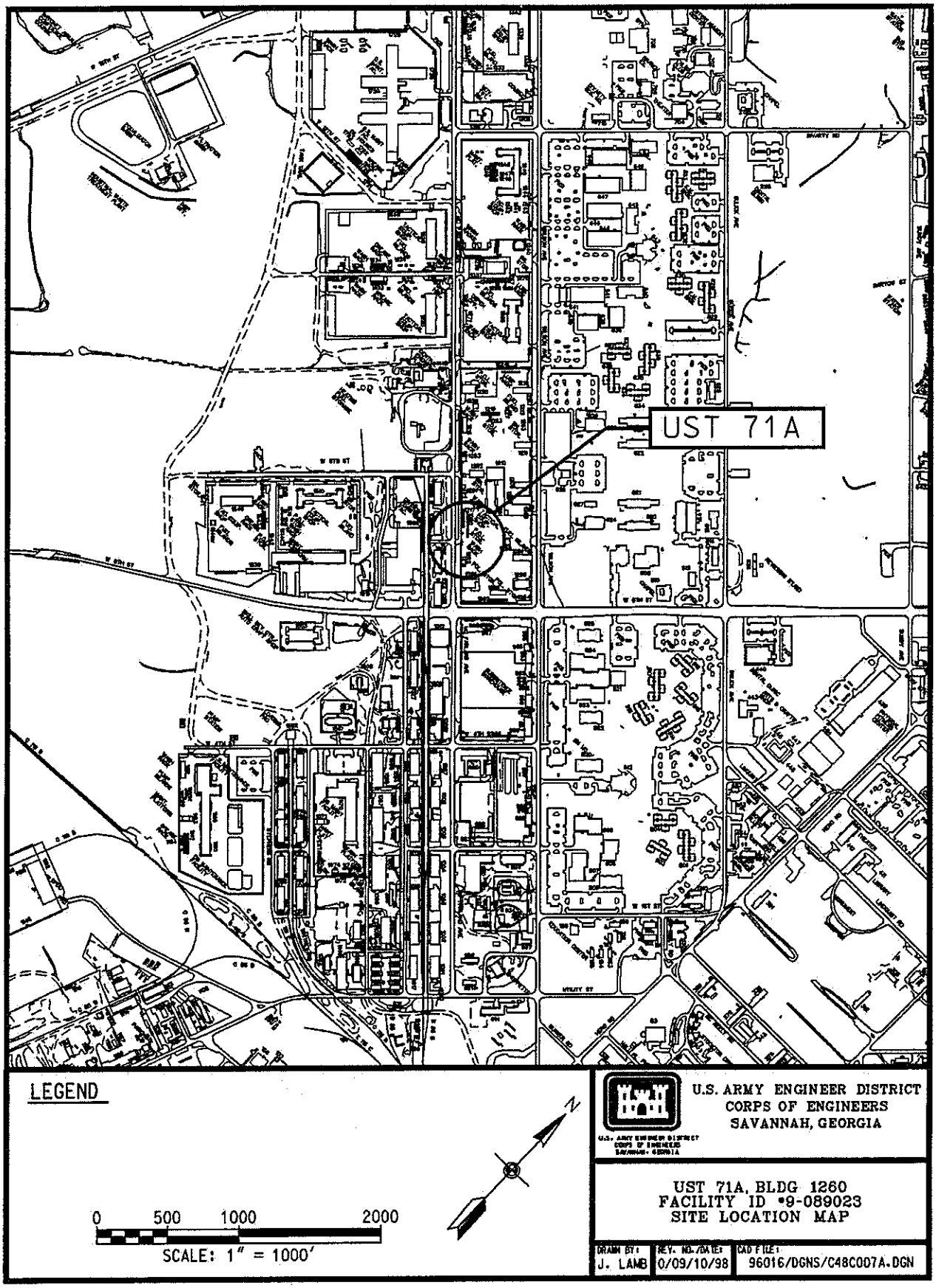


Figure 1. Location Map of Fort Stewart, Liberty County, Georgia

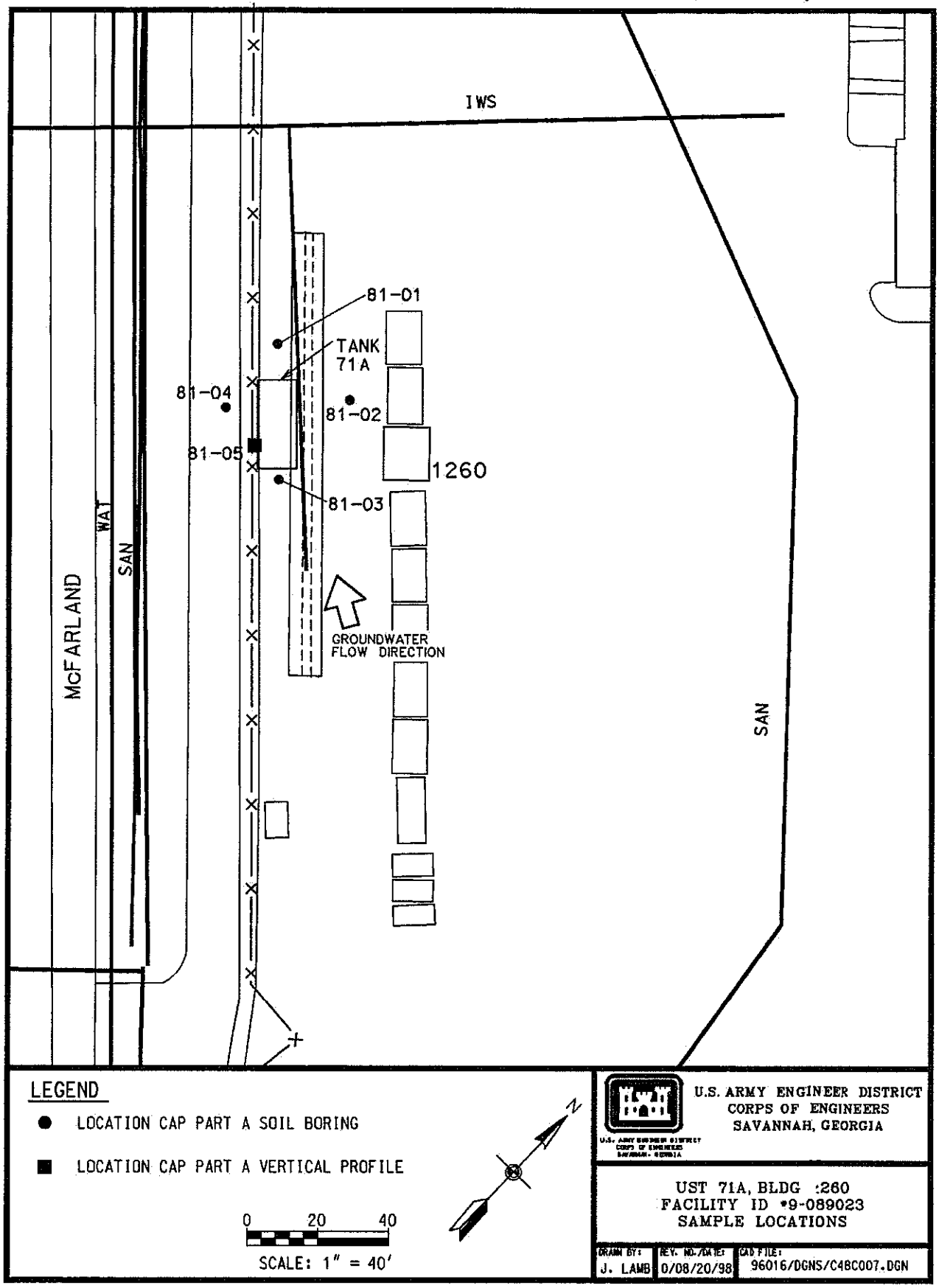
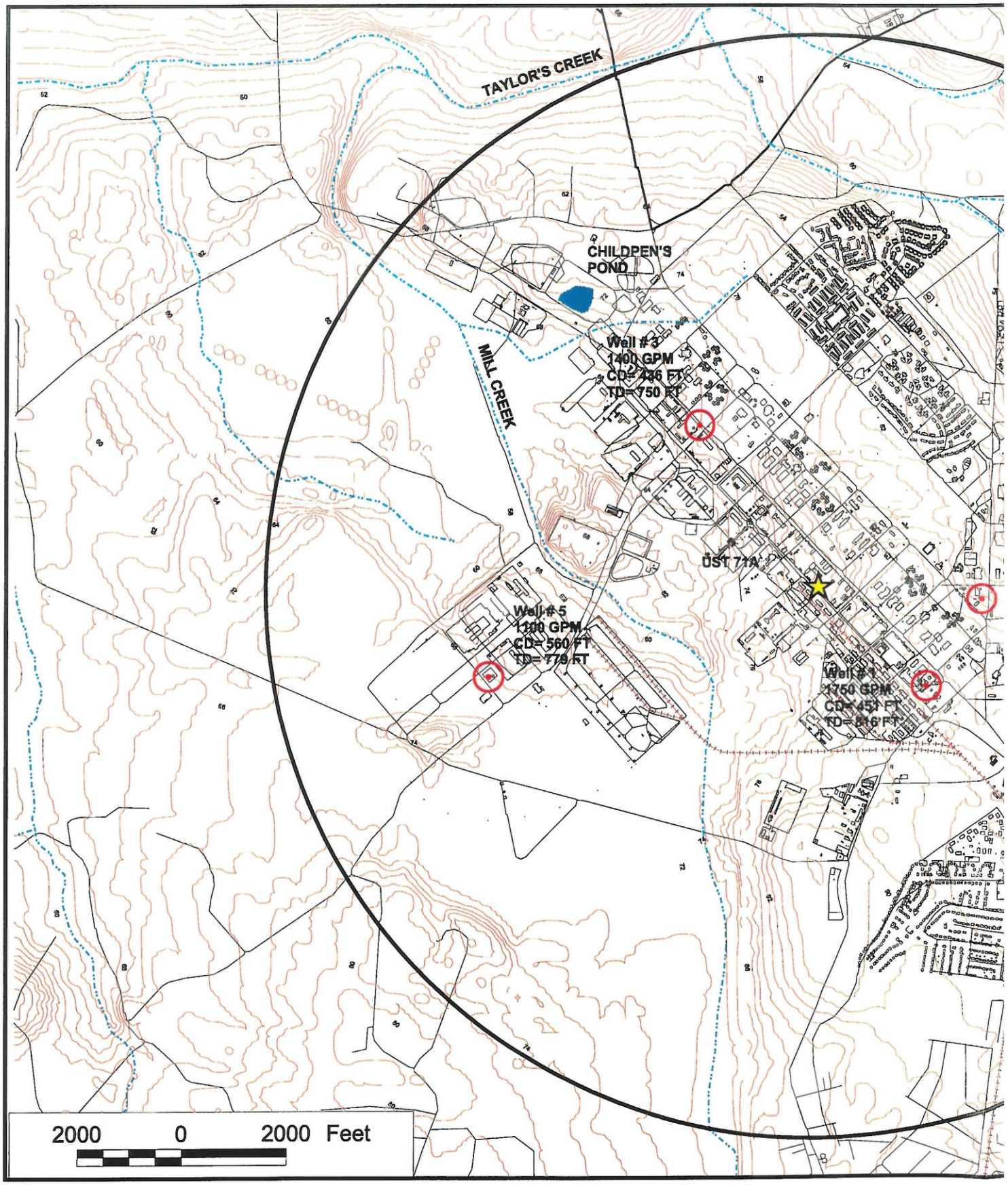


Figure 2. Site Plan for the UST 71A, Building 1260 Site Investigation


TAYLOR'S CREEK
CHILDPEN'S POND
Well # 3
1400 GPM
CD= 436 FT
TD= 750 FT
MILL CREEK
UST 71A
Well # 5
1100 GPM
CD= 560 FT
TD= 779 FT
Well # 4
1750 GPM
CD= 451 FT
TD= 816 FT
2000 0 2000 Feet

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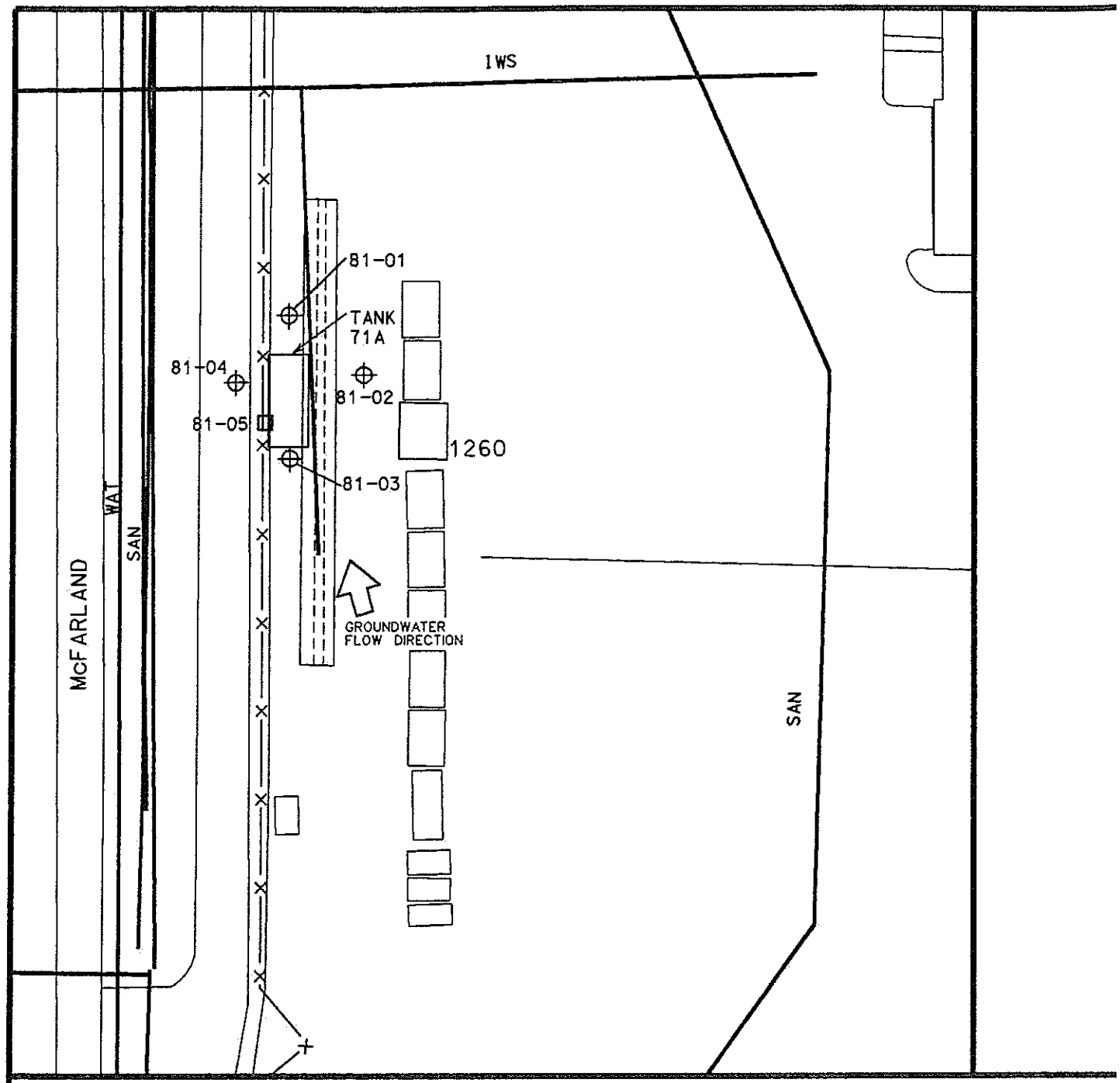

LEGEND

- CAP-PART A INVESTIGATION BOREHOLE
- SOIL SAMPLE LOCATION EXCEEDING THRESHOLD LEVELS
- TANK REMOVAL SAMPLE LOCATION
- TANK REMOVAL SAMPLE LOCATION EXCEEDING THRESHOLD LEVELS
- CAP PART A VERTICAL PROFILE
- SOIL SAMPLE INTERVAL AND SAMPLE ID
- SOIL SAMPLE INTERVAL EXCEEDING THRESHOLD LEVELS
- ESTIMATED LIMIT OF SOIL CONTAMINATION

		THRESHOLD LEVELS
B	BENZENE	B = 0.008 mg/kg
T	TOLUENE	T = 6.0 mg/kg
E	ETHYLBENZENE	E = 10.0 mg/kg
X	XYLENES, TOTAL	X = 700 mg/kg
BTL	BELOW THRESHOLD LEVELS	
	APPROXIMATE WATER LEVEL	

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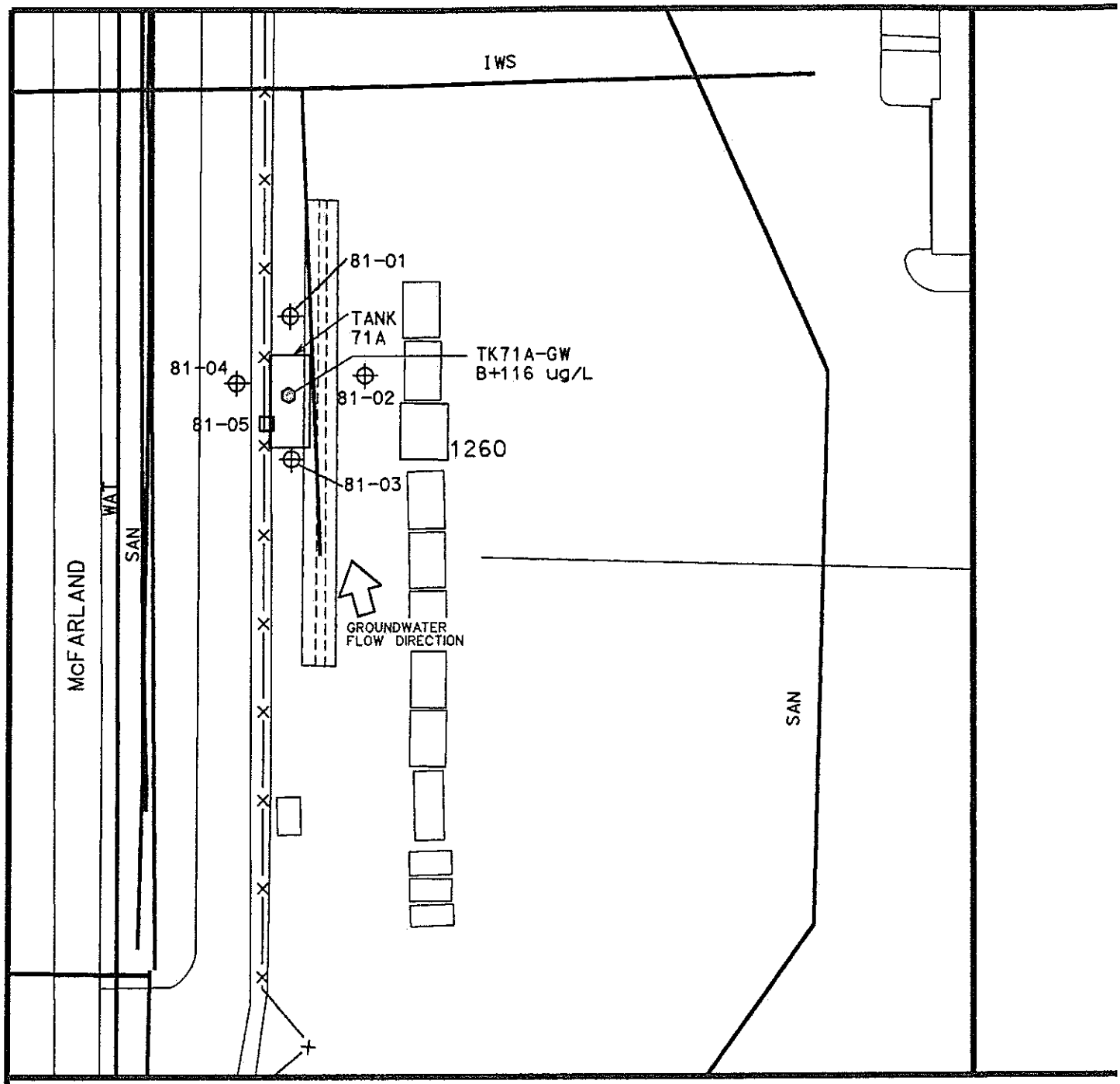

LEGEND

- CAP-PART A INVESTIGATION BOREHOLE
- GROUNDWATER SAMPLE LOCATION EXCEEDING MCLs
- TANK REMOVAL SAMPLE LOCATION EXCEEDING MCLs
- CAP PART A VERTICAL PROFILE
- SCREENED GROUNDWATER SAMPLE INTERVAL AND SAMPLE ID
- GROUNDWATER SAMPLE INTERVAL EXCEEDING MCLs

B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	XYLENES, TOTAL
BMCL	BELOW MCLs
▽	APPROXIMATE WATER LEVEL

MAXIMUM CONTAMINANT LEVELS (MCLs)

B = 5 ug/L

T = 1000 ug/L

E = 700 ug/L

X = 10,000 ug/L

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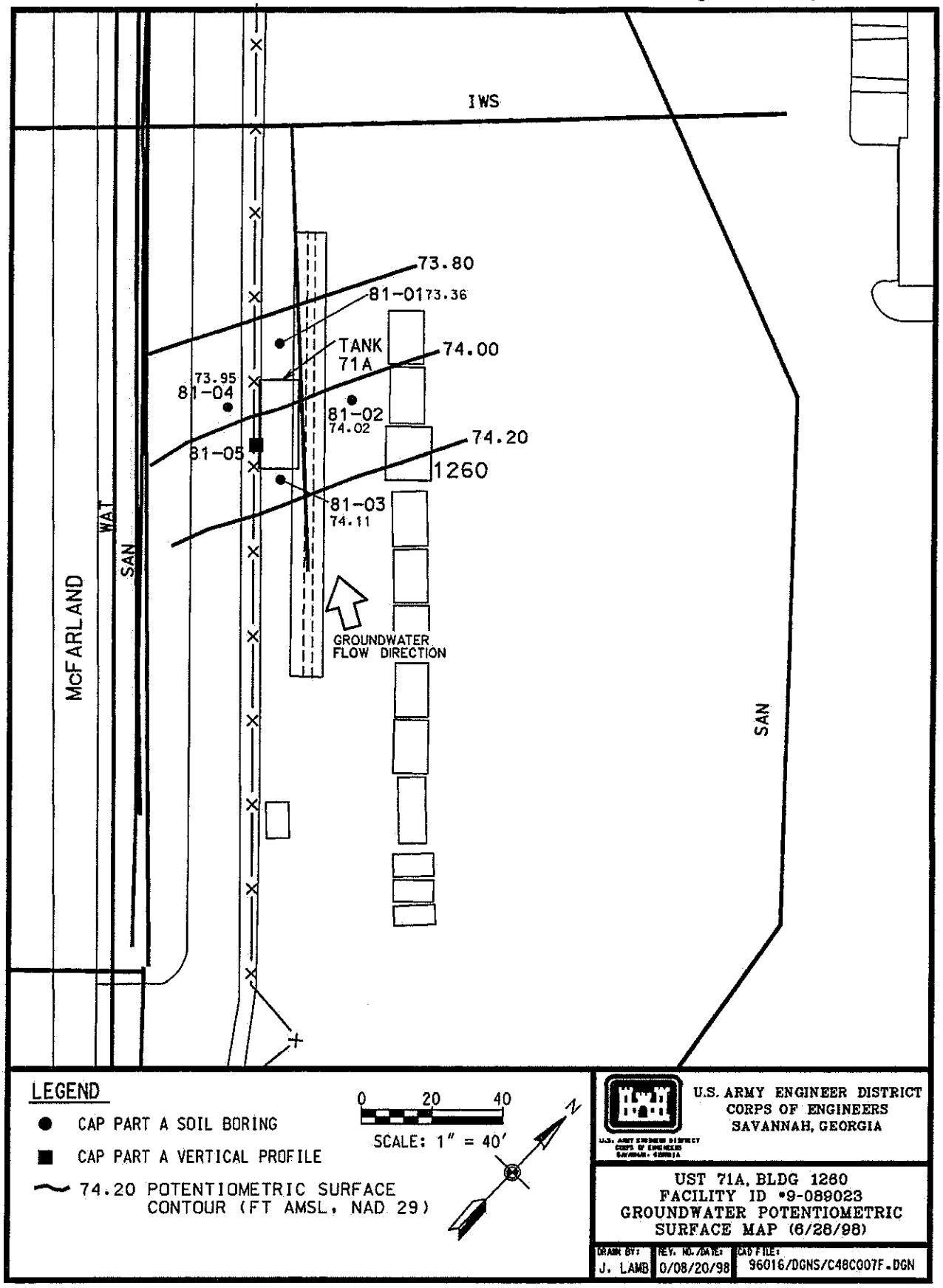

Figure 6. Potentiometric Surface Map of the UST 71A, Building 1260 Site

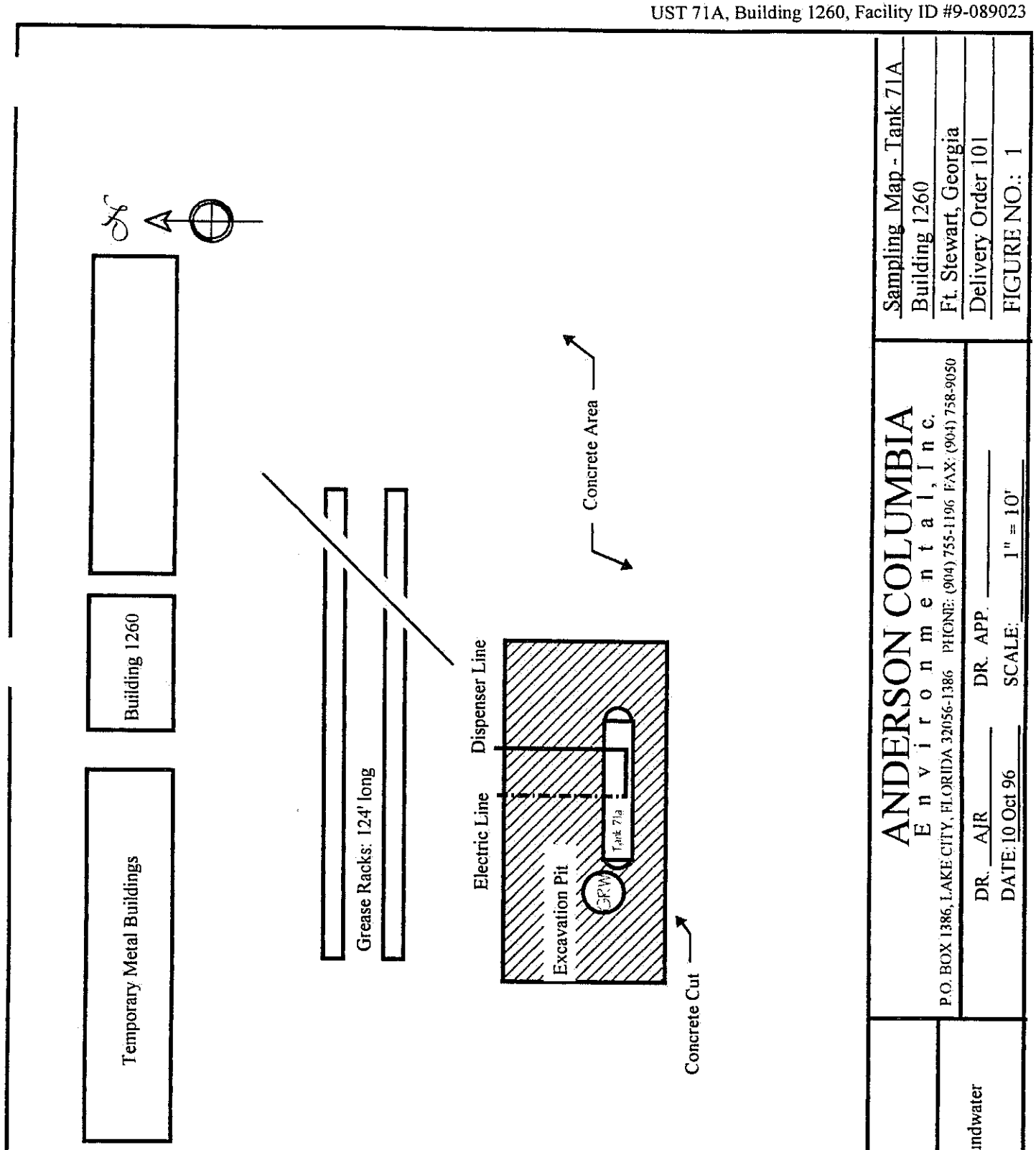

Figure 7. UST System Closure Sampling Locations at the UST 71A, Building 1260 Site

No additional borings or monitoring well locations are proposed for this site

Figure 8. Proposed Additional Boring/Monitoring Well Locations

No tax map is available for Fort Stewart Military Reservation, which is a government owned facility

Figure 9. Tax Map

APPENDIX II

REPORT TABLES

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TABLE 1: FREE PRODUCT REMOVAL

Monitoring Well Number: N/A				
Date of Measurement	Groundwater Elev. (ft AMSL)	Product Thickness (ft)	Corrected Water Elev. (ft AMSL)	Product Removed (gal)
No Free Product Detected				
			TOTAL	NONE

Monitoring Well Number: N/A				
Date of Measurement	Groundwater Elev. (ft AMSL)	Product Thickness (ft)	Corrected Water Elev. (ft AMSL)	Product Removed (gal)
No Free Product Detected				
			TOTAL	NONE

NOTE:
AMSL Above mean sea level.

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

Sample Location	Sample ID	Depth (ft BGS)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH (mg/kg)
81-01	810111	0.0 - 2.0	6/25/98	0.0022 U	0.0516 =	0.0022 U	0.0065 U	0.0516	13.3 =
81-01	810121	2.0 - 4.0	6/25/98	0.0022 U	0.06 =	0.0022 U	0.0065 U	0.06	60.3 =
81-02	810211	2.0 - 4.0	6/25/98	0.0023 U	0.0255 =	0.0023 U	0.0069 U	0.0025	19.6 =
81-02	810221	4.0 - 6.0	6/25/98	0.0022 U	0.0289 =	0.0022 U	0.0064 U	0.0289	53 =
81-03	810321	0.0 - 2.0	6/26/98	0.0022 U	0.0437 =	0.0022 UJ	0.0065 UJ	0.0437	176 =
81-04	810411	0.0 - 2.0	6/27/98	0.0021 U	0.0118 =	0.0021 U	0.0064 U	0.0118	8.31 J
81-04	810421	4.0 - 6.0	6/27/98	0.0022 U	0.0098 J	0.0022 U	0.0064 U	0.0098	6.31 =
Applicable Standards[1]				0.008	6.0	10	700	NRC	NRC

NOTES:

Contract for field work was issued prior to the new CAP-A guidance published in May 1998, thus the new analytical methods were not used.

1	Georgia Department of Natural Resources Applicable Soil Threshold Levels (Table A, Column 2)
BGS	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylene
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
NRC	No regulatory criteria
TPH	Total petroleum hydrocarbon

Laboratory Qualifiers

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

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

Sample Location	Sample ID	Depth (ft BGS)	Date Sampled	Detected PAH Compounds (mg/kg)						Total PAHs (mg/kg)
				Benzo(a)anthracene	Benzo(a) pyrene	Benzo(b)fluoranthene	Chrysene	Fluroanthene	Pyrene	
81-01	810111	0.0 - 2.0	6/25/98							ND
81-01	810121	2.0 - 4.0	6/25/98							ND
81-02	810211	2.0 - 4.0	6/25/98							ND
81-02	810221	4.0 - 6.0	6/25/98							ND
81-03	810321	0.0 - 2.0	6/26/98							ND
81-04	810411	0.0 - 2.0	6/27/98							ND
81-04	810421	4.0 - 6.0	6/27/98	0.0551 J	0.0463 J	0.0827 J	0.0519 J	0.0397 J	0.058 J	0.3337
Applicable Standards[1]				NRC	NRC	NRC	NRC	NRC	NRC	NRC

NOTES:

Contract for field work was issued prior to the new CAP-A guidance published in May 1998, thus the new analytical methods were not used.

[1] Georgia Department of Natural Resources Applicable Soil Threshold Levels (Table A, Column 2)
ND Not detected; refer to Appendix V, Table V-A, for complete list of PAH results
BGS Below ground surface
N/A Not applicable
PAH Polynuclear aromatic hydrocarbon

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

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

Sample Location	Sample ID	Depth (ft BGS)	Date Sampled	Benzene (ug/l)	Toluene (ug/l)	Ethyl - benzene (ug/l)	Xylenes (ug/l)	Total BTEX (ug/l)
81-01	810112	0 – 10	6/25/98	4.9 J	2 U	2 U	6 U	ND
81-02	810212	0 – 10	6/25/98	2 U	2 U	2 U	6 U	ND
81-03	810312	0 – 10	6/26/98	2 UJ	2 UJ	2 UJ	6 UJ	ND
81-04	810412	0 – 10	6/27/98	2 UJ	2 UJ	2 UJ	6 UJ	ND
81-05	810512	8 – 10	6/25/98	2 U	2 U	2 U	6 U	ND
81-05	810522	13 – 15	6/25/98	2 U	2 U	2 U	6 U	ND
Applicable Standards[1]				5	700	1000	10000	NRC

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

Sample Location	Sample ID	Depth (ft BGS)	Date Sampled	Detected PAH Compounds (ug/l)				Total PAH (mg/l)
81-01	810112	4.3	6/25/98					ND
81-02	810212	5.1	6/25/98					ND
81-03	810312	4.3	6/26/98					ND
81-04	810412	5.1	6/27/98					ND
81-05	810512	10.0	6/25/98					ND
81-05	810522	15.0	6/25/98					ND
Applicable Standards[1]				NRC	NRC	NRC	NRC	NRC

NOTE:

Contract for field work was issued prior to the new CAP-A guidance published in May 1998, thus the new analytical methods were not used.

1 U.S. Environmental Protection Agency maximum contaminant level
ND Not detected; refer to Appendix VIII, Table VIII-A, for complete list of PAH results
BTEX Benzene, toluene, ethylbenzene, and xylene
BGS Below ground surface
N/A Not applicable
NRC No regulatory criteria
PAH Polynuclear aromatic hydrocarbon

Laboratory Qualifiers

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

TABLE 4: GROUNDWATER ELEVATIONS

Well Number	Date Measured	Ground 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)	Specific Gravity Adjustment	Corrected Groundwater Elev. (ft MSL)
81-01	6/28/98	79.49	80.37	0.0 - 10.0	N/A	6.51	N/A	N/A	73.86
81-02	6/28/98	79.55	79.53	0.0 - 10.0	N/A	5.51	N/A	N/A	74.02
81-03	6/28/98	79.78	80.28	0.0 - 10.0	N/A	6.17	N/A	N/A	74.11
81-04	6/28/98	79.55	79.87	0.0 - 10.0	N/A	5.92	N/A	N/A	73.95

NOTE:

MSL	Mean sea level
BGS	Below ground surface
BTOC	Below top of casing
N/A	Not applicable

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

Sample Location	Depth (ft BGS)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH (mg/kg)
NO SOIL WAS COLLECTED								
Applicable Standards[2]			0.008	6	10	700	NRC	NRC

TABLE 5b: UST SYSTEM CLOSURE[1] - SOIL ANALYTICAL RESULTS
(POLYNUCLEAR AROMATIC HYDROCARBONS)

Sample Location	Depth (ft BGS)	Date Sampled	Detected PAH Compounds (mg/kg)				Total PAHs (mg/kg)
NO SOIL WAS COLLECTED							
Applicable Standards[2]			NRC	NRC	NRC	NRC	NRC

NOTE:

1	Underground storage tank system closure performed by Anderson Columbia Environmental, Inc. (1996)
2	Georgia Department of Natural Resources Applicable Soil Threshold Levels (Table A, Column 2)
BDL	Below detection limit
BGS	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylene
NRC	No regulatory criteria.
PAH	Polynuclear aromatic hydrocarbon.

Laboratory Qualifiers

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

TABLE 6a: UST SYSTEM CLOSURE[1] - GROUNDWATER ANALYTICAL RESULTS
(VOLATILE ORGANIC COMPOUNDS)

Sample Location	Depth (ft BGS)	Date Sampled	Benzene (ug/L)	Toluene (ug/L)	Ethyl - benzene (ug/L)	Xylenes (ug/L)	Total BTEX (ug/L)
TK71A-GW	N/A	7/16/96	116 =	100 U	100 U	1070 =	1186
Applicable Standards[2]			5	700	1,000	10,000	NRC

TABLE 6b: UST SYSTEM CLOSURE[1] - GROUNDWATER ANALYTICAL RESULTS
(POLYNUCLEAR ANALYTICAL RESULTS)

Sample Location	Depth (ft BGS)	Date Sampled	Detected PAH Compounds (ug/L)				Total PAHs (µg/L)
			2-Methyl-naphthalene				
TK71A-GW	N/A	7/16/96	2140 =				2140
Applicable Standards[2]			NRC	NRC	NRC	NRC	NRC

NOTE:

1	Underground storage tank system closure performed by Anderson Columbia Environmental, Inc. (1996)
2	U.S. Environmental Protection Agency maximum contaminant levels
BGS	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylene
N/A	Not applicable
ND	Not detected
NR	Not required; PAH analysis was not requested for these samples
NRC	No regulatory criteria.

Laboratory Qualifiers

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

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APPENDIX III

WATER RESOURCES SURVEY DOCUMENTATION

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WATER RESOURCES SURVEY DOCUMENTATION

1.0 LOCAL WATER RESOURCES

As required by the GA EPD UST CAP-Part A guidance, 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 Fort Stewart UST investigation sites. The information presented in this appendix 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 EPD guidelines/requirements:

- Fort Stewart is located in an area of average or higher groundwater pollution susceptibility.
- Locate all public supply wells as defined by GA EPD that exist within 2 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.

A total of seven groundwater supply wells are located within a 2-mile radius of the Fort Stewart garrison area. Six of these wells are located within the confines of the garrison area. The other well is located at Wright Army Airfield, approximately 1.2 miles northeast of the garrison area. All of the groundwater supply wells are classified as public wells that supply water to Fort Stewart for drinking and nondrinking purposes. These wells are approximately 450 feet deep and draw groundwater from the Principal Artesian (also known as the Floridan) aquifer. Chlorine and fluoride are added into the groundwater at the well heads prior to being pumped into storage tanks and/or water towers, according to Fort Stewart DPW personnel. The location of these wells, along with a 500-foot radius drawn around each well, is shown in Figure 3.

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, 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 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 EPD guidelines/requirements:

- surface water bodies that exist within 1 mile of the investigation sites,
- all surface water bodies nearest the investigation sites if these bodies lie outside the 1-mile radius of concern,

- all surface water bodies downgradient of the investigation sites, and
- the storm and sanitary sewers adjacent to the investigation sites.

Several surface water bodies are located within a 1-mile radius of the Fort Stewart garrison area. These are shown in Figure 3 and include Mill Creek, Taylors Creek, Peacock Creek, Childpen's Pond, and two unnamed ponds. Mill Creek extends along the western side of the garrison area and flows into Taylors Creek located approximately 0.75 miles northwest of the garrison area. Taylors Creek then flows northward approximately 3.5 miles to its confluence with Canoochee Creek. Peacock Creek originates near the east corner of the garrison area and flows southward from the garrison. Mill Creek, Taylors Creek, and Peacock Creek all have natural streambeds and exhibit perennial flow.

Childpen's Pond is located at the northwest end of the garrison area. The two unnamed ponds are located at the northwest end of the facility golf course in the vicinity of Childpen's Pond. All of the ponds are isolated water bodies that are relatively small in size, measuring less than 500 feet in diameter.

Typically, surface water run-off from the UST site moves over the existing concrete and asphalt cover to the Fort Stewart storm water drainage system. Since petroleum contamination at the sites primarily impacts surficial groundwater, the surface water run-off pathway is not a viable contaminant transport mechanism because of the concrete acting as a barrier and the location of the nearest surface water body.

2.0 POTENTIAL RECEPTOR SURVEY SUMMARY OF THE UST 71A SITE

A field potential receptor survey was conducted for the UST 71A site in June 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 DPW, was used to determine the location of the nearest public and non-public water supply wells and downgradient surface water bodies not located during the field survey.

2.1 Water Supply Wells Near the UST 71A

The UST 71A site is located approximately 2650 feet northwest (upgradient) of Well #1. Therefore, the UST 71A site is classified as being located greater than 500 feet to a withdrawal point. The nearest downgradient water supply well is Well #3. This well is located 3950 feet northwest of the UST 71A site.

2.2 Surface Water Bodies Near the UST 71A Site

At the closest point, Mill Creek is located approximately 2500 feet southwest of the UST 71A site. In the direction of groundwater flow, Childpen's Pond is located approximately 7250 feet northwest of the UST 71A site. Based on the distances between the UST and the nearest surface water body, the site is classified as being located greater than 500 feet to a downgradient surface water body.

2.3 Underground Utilities Near the UST 71A Site

Water and sanitary sewer lines are located approximately 30 feet southwest (side gradient) of the site and run parallel to McFarland Avenue. The depth of these lines is estimated to be approximately 4 to 6 feet BGS.

APPENDIX IV

SOIL BORING LOGS

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HTRW DRILLING LOG

HOLE NUMBER 81-01

PROJECT: Fort Stewart USTs | INSPECTOR J.K. Ledbetter | SHEET 1 OF 1

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Concrete				Ran 4.0, Rec.
	1	Sandy SILT, 15% fine to medium grained sand, subrounded, soft, dry, (10YR3/3) dark brown	6.5 ppm		Soil Sample 810111	
	2					
	3	color grading to (10YR5/6) yellowish brown	5.5 ppm		Soil Sample 810121	
	4	No Recovery				
	5					▼ Wet below 4.3 FT BGS Ran 4.0 Rec. 4.0
	6					
	7					
	8					
	9					Drilled to 10.0 FT BGS. Set piezometer
	10					

HTRW DRILLING LOG

HOLE NUMBER 81-02

PROJECT: Fort Stewart USTs | INSPECTOR J. K. Ledbetter | SHEET 1 OF 1

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0–1	Concrete				Ran 4.0 Rec 4.0
	1–2	Sandy SILT, 15% medium grained sand, subrounded, soft, dry, (10YR3/3) dark brown, mottled with (10YR6/3) pale brown	0ppm			
	2–3		0 ppm		Soil Sample 81021	
	3–4					
	4–5		0ppm		Soil Sample 81022	Ran 4.0 Rec. 4.0 ▼ wet below 5.1 FT BGS
	5–6					
	6–7		N/A			
	7–8					
	8–9					Drilled to 10.0 FT BGS. Set piezometer
	9–10					

HTRW DRILLING LOG

HOLE NUMBER 81-03

PROJECT: Fort Stewart USTs | INSPECTOR J.K. Ledbetter | SHEET 1 OF 1

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0–1	Concrete			Soil Sample 810321	
	1–2	Sandy SILT, 5% fine grained, sub rounded, sand, soft, dry. (10YR4/3) brown	40ppm			
	2–4	Shelby Tube	N/A	Soil Sample 810331		
	4–8	Same as above, wet				▼ Wet below 4.3 FT BGS
	8–10					Drilled to 10.0 FT BGS. Set piezometer

HTRW DRILLING LOG

HOLE NUMBER 81-04

PROJECT: Fort Stewart USTs | INSPECTOR S.K. Ledbetter | SHEET 1 OF 1

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Concrete				
	1	Silty SAND, 30% silt, fine to medium grained, subrounded sand, soft to firm, dry, (10YR4/3) brown	25ppm		Soil Sample 810411	
	2					
	3		34ppm			
	4	No Recovery				
	4	same as above 0.8FT TO 3.0FT BGS	45ppm		Soil Sample 810421	▼ Wet below 5.1 FT BGS
	5					
	6	No Recovery				
	7					
	8					
	9					Drilled to 10.0FT BGS. Set piezometer
	10					

APPENDIX V

SOIL LABORATORY REPORTS

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TABLE V-A. SUMMARY OF SOIL ANALYTICAL RESULTS

Station:	Georgia UST	81-01	81-01	81-02	81-02	81-03	81-04	81-04
Sample ID:	Corrective	810111	810121	810211	810221	810321	810411	810421
Sample Interval:	Action	0.0' - 2.0'	2.0' - 4.0'	2.0' - 4.0'	4.0' - 6.0'	0.0' - 2.0'	0.0' - 2.0'	4.0' - 6.0'
Collection Date:	Levels for Soil[1]	25-Jun-98	25-Jun-98	25-Jun-98	25-Jun-98	26-Jun-98	27-Jun-98	27-Jun-98
Units:	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
VOLATILE ORGANIC COMPOUNDS								
Benzene	0.008	0.0022 U	0.0022 U	0.0023 U	0.0022 U	0.0022 U	0.0021 U	0.0022 U
Toluene	6	0.0516 =	0.06 =	0.0255 =	0.0289 =	0.0437 =	0.0118 =	0.0098 J
Ethylbenzene	10	0.0022 U	0.0022 U	0.0023 U	0.0022 U	0.0022 UJ	0.0021 U	0.0022 U
Xylenes, Total	700	0.0065 U	0.0065 U	0.0069 U	0.0064 U	0.0065 UJ	0.0064 U	0.0064 U
POLYNUCLEAR AROMATIC HYDROCARBONS								
2-Chloronaphthalene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Acenaphthene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Acenaphthylene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Anthracene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Benzo(a)anthracene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.0551 J
Benzo(a)pyrene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.0463 J
Benzo(b)fluoranthene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.0827 J
Benzo(g,h,i)perylene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Benzo(k)fluoranthene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Chrysene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.0519 J
Dibenzo(a,h)anthracene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Fluoranthene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.0397 J
Fluorene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Indeno(1,2,3-cd)pyrene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Naphthalene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Phenanthrene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.358 U
Pyrene	NRC	0.362 U	0.362 U	1.53 U	1.43 U	1.45 U	3.55 U	0.058 J
OTHER ANALYTES								
Lead	NRC		7.4 =		2.4 =	17 =		5.6 =
Total Organic Carbon	NRC					6520 =		
Total Petroleum Hydrocarbons	NRC	13.3 =	60.3 =	19.6 =	53 =	176 =	8.31 J	6.31 =

NOTE:

Contract for field work was issued prior to the new CAP-A guidance published in May 1998, thus the new analytical methods were not used.

[1] Georgia Department of Natural Resources Applicable Soil Threshold Levels (Table A, Column 2)

Bold values exceed soil threshold levels

NRC No regulatory criteria

QA/QC samples were collected. The laboratory data sheets have been included in this appendix, but the results are not summarized.

Laboratory Qualifiers

U Indicates that the compound was not detected above the reported sample quantitation limit

UJ Indicates that the compound was not detected above an approximated sample quantitation limit

J Indicates that the value for the compound was an estimated value.

= Indicates that the compound was detected at the concentration reported.

98-160PS(doc-71A-4si) 111098

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VOLATILE ORGANICS ANALYSIS DATA SHEET 1A

EPA SAMPLE NO.

810111

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-14

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P2021

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: not dec. 8 Date Analyzed: 06/30/98

GC Column: J&W DB-624 (PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(ml) Soil Aliquot Volume: _____(uL)

DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	2.2	U
108-88-3	Toluene	51.6	
100-41-4	Ethylbenzene	2.2	U
1330-20-7	Xylenes (total)	6.5	U

CCG

LW
8-05-98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810111

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-14

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 7B321

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: 8 decanted: (Y/N) N Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 07/09/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
91-20-3	naphthalene	362	U	U
91-58-7	2-chloronaphthalene	362	U	
208-96-8	acenaphthylene	362	U	
83-32-9	acenaphthene	362	U	
86-73-7	fluorene	362	U	
85-01-8	phenanthrene	362	U	
120-12-7	anthracene	362	U	
206-44-0	fluoranthene	362	U	
129-00-0	pyrene	362	U	
56-55-3	benzo(a)anthracene	362	U	
218-01-9	chrysene	362	U	
205-99-2	benzo(b)fluoranthene	362	U	
207-08-9	benzo(k)fluoranthene	362	U	
50-32-8	benzo(a)pyrene	362	U	
193-39-5	indeno(1,2,3-cd)pyrene	362	U	
53-70-3	dibenz(a,h)anthracene	362	U	
191-24-2	benzo(g,h,i)perylene	362	U	

LW - 8-05-98

Client: Science Applications International Corp.
P.O. Box 2502
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831
Contact: Ms. Lorene Rollins
Project Description: CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598 Report Date: July 09, 1998

Sample ID : 810111
Lab ID : 9806805-14
Matrix : Soil
Date Collected : 06/25/98
Date Received : 06/26/98
Priority : Routine
Collector : Client

DATA VALIDATION COPY

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		13.3	2.16	10.0	mg/kg	1.0	JLP	06/30/98	1600	125127	1

= Foe

M = Method	Method-Description
M 1	EPA 418.1 Modified

LW
8-18-98

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

9806805-14

268

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810113

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-10

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P2032

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: not dec. 10 Date Analyzed: 07/01/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
71-43-2	Benzene	2.2	U	CLC
108-88-3	Toluene	30.2		
100-41-4	Ethylbenzene	2.2	U	
1330-20-7	Xylenes (total)	6.7	U	

LW
8-05-98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810113

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-10

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 7B317

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: 10 decanted: (Y/N) N Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 07/09/98

Injection Volume: 1.0(uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: 7.0

DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	naphthalene	1480	U
91-58-7	2-chloronaphthalene	1480	U
208-96-8	acenaphthylene	1480	U
83-32-9	acenaphthene	1480	U
86-73-7	fluorene	1480	U
85-01-8	phenanthrene	1480	U
120-12-7	anthracene	1480	U
206-44-0	fluoranthene	1480	U
129-00-0	pyrene	1480	U
56-55-3	benzo(a)anthracene	1480	U
218-01-9	chrysene	1480	U
205-99-2	benzo(b)fluoranthene	1480	U
207-08-9	benzo(k)fluoranthene	1480	U
50-32-8	benzo(a)pyrene	1480	U
193-39-5	indeno(1,2,3-cd)pyrene	1480	U
53-70-3	dibenz(a,h)anthracene	1480	U
191-24-2	benzo(g,h,i)perylene	1480	U

U

LW
8-05-98

Client:	Science Applications International Corp. P.O. Box 2502 800 Oak Ridge Turnpike Oak Ridge, Tennessee 37831
Contact:	Ms. Lorene Rollins
Project Description:	CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598 Report Date: July 09, 1998

Sample ID	: 810113
Lab ID	: 9806805-10
Matrix	: Soil
Date Collected	: 06/25/98
Date Received	: 06/26/98
Priority	: Routine
Collector	: Client

DATA VALIDATION COPY

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		83.2	2.20	10.0	mg/kg	1.0	JLP	06/30/98	1600	125127	1

= FOB

M = Method	Method-Description
M 1	EPA 418.1 Modified

LW
8-18-98

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

264

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810121

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-17

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P2026

Level: (low/med) LOW DATA VALIDATION COPY Date Received: 06/26/98

% Moisture: not dec. 8 Date Analyzed: 07/01/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	2.2	U
108-88-3	Toluene	60.0	
100-41-4	Ethylbenzene	2.2	U
1330-20-7	Xylenes (total)	6.5	U

LW
8-05-98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810121

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-17

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 7B403

Level: (low/med) LOW DATA VALIDATION Date Received: 06/26/98

% Moisture: 8 decanted: (Y/N) N COPY Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 07/09/98

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
91-20-3	naphthalene	362	U	U
91-58-7	2-chloronaphthalene	362	U	
208-96-8	acenaphthylene	362	U	
83-32-9	acenaphthene	362	U	
86-73-7	fluorene	362	U	
85-01-8	phenanthrene	362	U	
120-12-7	anthracene	362	U	
206-44-0	fluoranthene	362	U	
129-00-0	pyrene	362	U	
56-55-3	benzo(a)anthracene	362	U	
218-01-9	chrysene	362	U	
205-99-2	benzo(b)fluoranthene	362	U	
207-08-9	benzo(k)fluoranthene	362	U	
50-32-8	benzo(a)pyrene	362	U	
193-39-5	indeno(1,2,3-cd)pyrene	362	U	
53-70-3	dibenz(a,h)anthracene	362	U	
191-24-2	benzo(g,h,i)perylene	362	U	

LW
8-05-98

Client: Science Applications International Corp.
P.O. Box 2502
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831
Contact: Ms. Lorene Rollins
Project Description: CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598 Report Date: July 09, 1998

Sample ID	: 810121
Lab ID	: 9806805-17
Matrix	: Soil
Date Collected	: 06/25/98
Date Received	: 06/26/98
Priority	: Routine
Collector	: Client

DATA VALIDATION COPY

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		60.3	2.16	10.0	mg/kg	1.0	JLP	06/30/98	1600	125127	1

= FOR

M = Method	Method-Description
M 1	EPA 418.1 Modified

LW
8-18-98

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

271

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4A03S

Method Type: Total Metals

Sample ID: 9806805-17

Client ID: 810121

Contract: SAIC00598 Lab Code: GEL Case No.: SAS No.:

Matrix: SOIL Date Received: 6/26/98 Level: LOW

% Solids: 92.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	7.4	mg/kg			P	0.16	TJA61 Trace ICPAES	980701-3

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

DATA VALIDATION COPY

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810211

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-11

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P2018

Level: (low/med) LOW DATA VALIDATION COPY Date Received: 06/26/98

% Moisture: not dec. 13 Date Analyzed: 06/30/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
71-43-2	Benzene	2.3	U	C
108-88-3	Toluene	25.5		
100-41-4	Ethylbenzene	2.3	U	
1330-20-7	Xylenes (total)	6.9	U	

LW
8-05-98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810211

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-11

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 7B318

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: 13 decanted: (Y/N) N Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 07/09/98

Injection Volume: 1.0 (uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	naphthalene	1530	U
91-58-7	2-chloronaphthalene	1530	U
208-96-8	acenaphthylene	1530	U
83-32-9	acenaphthene	1530	U
86-73-7	fluorene	1530	U
85-01-8	phenanthrene	1530	U
120-12-7	anthracene	1530	U
206-44-0	fluoranthene	1530	U
129-00-0	pyrene	1530	U
56-55-3	benzo(a)anthracene	1530	U
218-01-9	chrysene	1530	U
205-99-2	benzo(b)fluoranthene	1530	U
207-08-9	benzo(k)fluoranthene	1530	U
50-32-8	benzo(a)pyrene	1530	U
193-39-5	indeno(1,2,3-cd)pyrene	1530	U
53-70-3	dibenz(a,h)anthracene	1530	U
191-24-2	benzo(g,h,i)perylene	1530	U

LW
8-05-98

Client: Science Applications International Corp.
P.O. Box 2502
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831
Contact: Ms. Lorene Rollins
Project Description: CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598 Report Date: July 09, 1998

Sample ID	: 810211
Lab ID	: 9806805-11
Matrix	: Soil
Date Collected	: 06/25/98
Date Received	: 06/26/98
Priority	: Routine
Collector	: Client

DATA VALIDATION COPY

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		19.6	2.28	10.0	mg/kg	1.0	JLP	06/30/98	1600	125127	1

FOR

M = Method	Method-Description
M 1	EPA 418.1 Modified

LW
8-18-98

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

9806805-11

265

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810221

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-15

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P2022

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: not dec. 7 Date Analyzed: 06/30/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
71-43-2	Benzene	2.2	U	C
108-88-3	Toluene	28.9		C
100-41-4	Ethylbenzene	2.2	U	C
1330-20-7	Xylenes (total)	6.4	U	C

LW
8-05-98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810221

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A03S

Matrix: (soil/water) SOIL Lab Sample ID: 9806805-15

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 7B322

Level: (low/med) LOW DATA VALIDATION Date Received: 06/26/98

% Moisture: 7 decanted: (Y/N) N COPY Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 07/09/98

Injection Volume: 1.0(uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	naphthalene	1430	U
91-58-7	2-chloronaphthalene	1430	U
208-96-8	acenaphthylene	1430	U
83-32-9	acenaphthene	1430	U
86-73-7	fluorene	1430	U
85-01-8	phenanthrene	1430	U
120-12-7	anthracene	1430	U
206-44-0	fluoranthene	1430	U
129-00-0	pyrene	1430	U
56-55-3	benzo(a)anthracene	1430	U
218-01-9	chrysene	1430	U
205-99-2	benzo(b)fluoranthene	1430	U
207-08-9	benzo(k)fluoranthene	1430	U
50-32-8	benzo(a)pyrene	1430	U
193-39-5	indeno(1,2,3-cd)pyrene	1430	U
53-70-3	dibenz(a,h)anthracene	1430	U
191-24-2	benzo(g,h,i)perylene	1430	U

U

LW - 8-05-98

FORM I SV-1 OLM03.0

Client: Science Applications International Corp.
P.O. Box 2502
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831
Contact: Ms. Lorene Rollins
Project Description: CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598

Report Date: July 09, 1998

Sample ID	: 810221
Lab ID	: 9806805-15
Matrix	: Soil
Date Collected	: 06/25/98
Date Received	: 06/26/98
Priority	: Routine
Collector	: Client

DATA VALIDATION COPY

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		53.0	2.14	10.0	mg/kg	1.0	JLP	06/30/98	1600	125127	1

M = Method	Method-Description
M 1	EPA 418.1 Modified

LW
8-18-98

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4A03S

Method Type: Total Metals

Sample ID: 9806805-15

Client ID: 810221

Contract: SAIC00598 Lab Code: GEL Case No.: SAS No.:

Matrix: SOIL Date Received: 6/26/98 Level: LOW

% Solids: 93.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	2.4	mg/kg			P	0.16	TJA61 Trace ICPAES	980701-3

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

DATA VALIDATION COPY

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810321

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A11S

Matrix: (soil/water) SOIL Lab Sample ID: 9806844-17

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P3037

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: not dec. 8 Date Analyzed: 07/02/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
71-43-2	Benzene	2.2	U	U = UJ C14
108-88-3	Toluene	43.7		
100-41-4	Ethylbenzene	2.2	U	
1330-20-7	Xylenes (total)	6.5	U	UJ C14

LW
8-06-98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810321

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A11S

Matrix: (soil/water) SOIL Lab Sample ID: 9806844-17

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 4B512

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: 8 decanted: (Y/N) N Date Extracted: 07/06/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 07/10/98

Injection Volume: 1.0(uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	naphthalene	1450	U
91-58-7	2-chloronaphthalene	1450	U
209-96-8	acenaphthylene	1450	U
83-32-9	acenaphthene	1450	U
86-73-7	fluorene	1450	U
85-01-8	phenanthrene	1450	U
120-12-7	anthracene	1450	U
206-44-0	fluoranthene	1450	U
129-00-0	pyrene	1450	U
56-55-3	benzo(a)anthracene	1450	U
218-01-9	chrysene	1450	U
205-99-2	benzo(b)fluoranthene	1450	U
207-08-9	benzo(k)fluoranthene	1450	U
50-32-8	benzo(a)pyrene	1450	U
193-39-5	indeno(1,2,3-cd)pyrene	1450	U
53-70-3	dibenz(a,h)anthracene	1450	U
191-24-2	benzo(g,h,i)perylene	1450	U

J

LW
8-10-98

Client:	Science Applications International Corp. P.O. Box 2502 800 Oak Ridge Turnpike Oak Ridge, Tennessee 37831
Contact:	Ms. Lorene Rollins
Project Description:	CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598 Report Date: July 14, 1998

Sample ID	: 810321
Lab ID	: 9806844-17
Matrix	: Soil
Date Collected	: 06/26/98
Date Received	: 06/29/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		176	2.16	10.9	mg/kg	1.0	JLP	07/09/98	1100	125709	1
TOTAL ORGANIC CARBON (TOC)		6520	24.1	100	mg/kg	1.0	LS	07/09/98	1600	125629	2

M = Method	Method-Description
M 1	EPA 418.1 Modified
M 2	SW846 9060 modified

LW 8-21-98

Notes:
The qualifiers in this report are defined as follows:
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U indicates that the analyte was not detected at a concentration greater than the detection limit.
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This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

9806844 17

280

DATA VALIDATION COPY

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4A11S

Method Type: Total Metals

Sample ID: 9806844-17

Client ID: 810321

Contract: SAIC00598 Lab Code: GEL Case No.: SAS No.:

Matrix: SOIL Date Received: 6/29/98 Level: LOW

% Solids: 92.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	17.0	mg/kg			P	0.16	TJA61 Trace ICPAES	980630-1

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

DATA VALIDATION COPY

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810411

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A10S

Matrix: (soil/water) SOIL Lab Sample ID: 9806843-13

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P3025

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: not dec. 6 Date Analyzed: 07/02/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
71-43-2	Benzene	2.1	U	CC = U
108-88-3	Toluene	11.8		
100-41-4	Ethylbenzene	2.1	U	
1330-20-7	Xylenes (total)	6.4	U	

LW
8-14-98

FORM I VOA

DATA VALIDATION COPY

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810411

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A10S

Matrix: (soil/water) SOIL

Sample wt/vol: 30.0 (g/mL) G

Lab Sample ID: 9806843-13

Level: (low/med) LOW

Lab File ID: 7B422

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

Date Received: 06/29/98

Concentrated Extract Volume: 1.00(mL)

Date Extracted:07/01/98

Injection Volume: 1.0(uL)

Date Analyzed: 07/10/98

GPC Cleanup: (Y/N) N pH: 7.0

Dilution Factor: 10.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	naphthalene	3550	U
91-58-7	2-chloronaphthalene	3550	U
208-96-8	acenaphthylene	3550	U
83-32-9	acenaphthene	3550	U
86-73-7	fluorene	3550	U
85-01-8	phenanthrene	3550	U
120-12-7	anthracene	3550	U
206-44-0	fluoranthene	3550	U
129-00-0	pyrene	3550	U
56-55-3	benzo(a)anthracene	3550	U
218-01-9	chrysene	3550	U
205-99-2	benzo(b)fluoranthene	3550	U
207-08-9	benzo(k)fluoranthene	3550	U
50-32-8	benzo(a)pyrene	3550	U
193-39-5	indeno(1,2,3-cd)pyrene	3550	U
53-70-3	dibenz(a,h)anthracene	3550	U
191-24-2	benzo(g,h,i)perylene	3550	U

U

LW
8-14-98

FORM I SV-1

OLM03.0

Client: Science Applications International Corp.
P.O. Box 2502
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831
Contact: Ms. Lorene Rollins
Project Description: CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598

Report Date: July 14, 1998

Sample ID	: 810411
Lab ID	: 9806843-13
Matrix	: Soil
Date Collected	: 06/27/98
Date Received	: 06/29/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons	J	8.31	~~J~~ 2.10	10.6	mg/kg	1.0	JLP	06/30/98	1600	125127	1

MAP 8/17/98

M = Method	Method-Description
M 1	EPA 418.1 Modified

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
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* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810421

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A11S

Matrix: (soil/water) SOIL Lab Sample ID: 9806844-01

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2P3027

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: not dec. 7 Date Analyzed: 07/02/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
71-43-2	Benzene	2.2	U	U U U U Hol, Ho4
108-88-3	Toluene	9.8		
100-41-4	Ethylbenzene	2.2	U	
1330-20-7	Xylenes (total)	6.4	U	

LW
8-06-98

FORM I VOA

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810421

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A11S

Matrix: (soil/water) SOIL Lab Sample ID: 9806844-01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 4B414

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: 7 decanted: (Y/N) N Date Extracted: 07/06/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 07/09/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	naphthalene	358	U
91-58-7	2-chloronaphthalene	358	U
209-96-8	acenaphthylene	358	U
83-32-9	acenaphthene	358	U
86-73-7	fluorene	358	U
85-01-8	phenanthrene	358	U
120-12-7	anthracene	358	U
206-44-0	fluoranthene	39.7	J
129-00-0	pyrene	58.0	J
56-55-3	benzo(a)anthracene	55.1	J
218-01-9	chrysene	51.9	J
205-99-2	benzo(b)fluoranthene	82.7	J
207-08-9	benzo(k)fluoranthene	358	U
50-32-8	benzo(a)pyrene	46.3	J
193-39-5	indeno(1,2,3-cd)pyrene	358	U
53-70-3	dibenz(a,h)anthracene	358	U
191-24-2	benzo(g,h,i)perylene	358	U

LW
8-10-98

FORM I SV-1 OLM03.0

DATA VALIDATION
COPY

Client: Science Applications International Corp.
P.O. Box 2502
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831
Contact: Ms. Lorene Rollins
Project Description: CAP-Part A for UST Sites (Task Order No. 8)

cc: SAIC00598

Report Date: July 14, 1998

Sample ID : 810421
Lab ID : 9806844-01
Matrix : Soil
Date Collected : 06/27/98
Date Received : 06/29/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		63.1	2.14	10.8	mg/kg	1.0	JLP	07/09/98	1100	125709	1

= Fo8

M = Method	Method-Description
M 1	EPA 418.1 Modified

LW
8-21-98

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (803) 769-7391.

Reviewed By

9806844-01

264

DATA VALIDATION COPY

Form I: Inorganic Analyses Data Sheet

SDG No.: FS4A11S

Method Type: Total Metals

Sample ID: 9806844-01		**Client ID:** 810421	
Contract: SAIC00598	**Lab Code:** GEL	**Case No.:**	**SAS No.:**
Matrix: SOIL	**Date Received:** 6/29/98	**Level:** LOW	
% Solids: 93.00			

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	5.6	mg/kg			P	0.16	TJA61 Trace ICPAES	980630-1

Color Before: **Clarity Before:** **Texture:**

Color After: **Clarity After:** **Artifacts:**

Comments:

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CHAIN OF CUSTODY RECORD

COC NO.: GA004

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): [signature] (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
860425	6/25/98	920	water			4							4	9806802-20 TPH Unpreserved 33616.13
860412	6/25/98	1145	↓		2								2	9806804-01 33617.1
860112	6/25/98	1530	↓		2								2	-02
830522	6/25/98	1755	↓		2								2	-03
810512	6/25/98	1510	↓		2								2	-04
*810514	6/25/98	1510	↓		1								1	↓

[initials] 6/26/98

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
[signature]	6/26/98 12:55	Tonne Francis	6/26/98 1640
COMPANY NAME: SAIC		COMPANY NAME: gel	
RECEIVED BY: Raymond Reed	6/26/98 12:55	RELINQUISHED BY:	
COMPANY NAME: G.E.L.		COMPANY NAME:	
RELINQUISHED BY: Raymond Reed	6/26/98 16:40	RECEIVED BY:	
COMPANY NAME: G.E.L.		COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 13

Cooler ID: #631

Cooler Temperature: 4°C

FEDEX NUMBER:

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CHAIN OF CUSTODY RECORD

COC NO.: GA005

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
810514	6/25/98	1510	water		1								1	9806804-05 (33619.1)
810522	6/25/98	1555			2								2	-06
830512	6/25/98	1655			2								2	-07
830532	6/25/98	1845			2								2	-08
810212	6/25/98	1755			2								2	-09
810112	6/25/98	1900			2								2	-10

6/26/98

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	6/26/98	Donna Francis	6/26/98
COMPANY NAME: SAIC	12:55	COMPANY NAME: GEL	1640
RECEIVED BY: Raynd Reed	Date/Time 6/26/98	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL	12:55	COMPANY NAME:	
RELINQUISHED BY: Raynd Reed	Date/Time 6/26/98	RECEIVED BY:	Date/Time
COMPANY NAME: GEL	16:40	COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 11

Cooler ID: ~~11~~ 555

Cooler Temperature: 4°C

FEDEX NUMBER:

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CHAIN OF CUSTODY RECORD

COC NO.: GA0006

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
810111	6/25/98	1635	Soil	1		1							2	980805-14 33618.13
810221	6/25/98	1715		1			1						2	-15 .14
860121	6/25/98	1455		1			1						2	-16
810121	6/25/98	1630		1			1						2	-17
860421	6/25/98	935		1			1						2	-18
800121	6/25/98	1540		1			1						2	-19
860112	6/25/98	925	Water	2									2	980806-01 33619.1
810512	6/25/98	1510		2									2	-02
830512	6/25/98	1655		2									2	-03
810514	6/25/98	1510		2									2	-04
830532	6/25/98	1640		2									2	-05
830522	6/25/98	1755		2									2	-06
810522	6/25/98	1555		2									2	-07

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time	TOTAL NUMBER OF CONTAINERS:
Laura Lumley	6/26/98	Diane Ronald	6/26/98	Cooler Temperature: 4°C
COMPANY NAME: SAIC	12:55	COMPANY NAME: GEL	1640	Cooler ID: #627
RECEIVED BY: Raymond Reed	Date/Time 6/26/98	RELINQUISHED BY:	Date/Time	FEDEX NUMBER:
COMPANY NAME: GEL.	1255	COMPANY NAME:		
RELINQUISHED BY: Raymond Reed	Date/Time 6/26/98	RECEIVED BY:	Date/Time	
COMPANY NAME: GEL.	16:40	COMPANY NAME:		

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CHAIN OF CUSTODY RECORD

COC NO.: GA0006

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
880542	6/24/98	1125	water	2									2	9806807-01 (33620.11)
880522	6/24/98	940		2									2	-02
880514	6/24/98	905		2									2	-03
880414	6/24/98	1435		2									2	-04
880412	6/24/98	1435		2									2	-05
810112	6/25/98	1900		2									2	Unpreserved -06
860112	6/25/98	1530		2									2	Unpreserved -07
810212	6/25/98	1755		2									2	Unpreserved -08
860412	6/25/98	1630		2									2	Unpreserved -09
TBA014	6/24/98	745		2									2	-10
TBA015	6/25/98	745		2									2	-11
870516	6/24/98	1705		1									1	-12
880225	6/25/98	1011							2				2	-13 (12)

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	6/24/98 12:55	Dionne Francis	6/26/98 1640
COMPANY NAME: SAIC		COMPANY NAME: GEL	
RECEIVED BY: Raynal Reed	Date/Time 6/26/98 12:55	RELINQUISHED BY:	Date/Time
COMPANY NAME: G.E.L.		COMPANY NAME:	
RELINQUISHED BY: Raynal Reed	Date/Time 6/26/98 16:40	RECEIVED BY:	Date/Time
COMPANY NAME: G.E.L.		COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 103

Cooler ID: # 627

Cooler Temperature: 4°C

FEDEX NUMBER:

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CHAIN OF CUSTODY RECORD

COC NO.: GA007

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
810312	6/26/98	1020	water		2								2	9806839-01 33639 '1
800312	6/26/98	1400			2								2	-02
860212	6/26/98	1230			2								2	-03
800112	6/26/98	1035			2								2	-04
870212	6/26/98	1435			2								2	-05
870225	6/26/96	1350	↓							3			3	-06 '2

REQUESTED PARAMETERS

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time	TOTAL NUMBER OF CONTAINERS: 13	Cooler Temperature: 4°C
Laura Lumley	6/29/98	[illegible]	6/29/98		
COMPANY NAME: SAIC	1215	COMPANY NAME: [illegible]	1645	Cooler ID: ~~#~~ 4860	FEDEX NUMBER:
RECEIVED BY: [illegible]	Date/Time 6/29/98	RELINQUISHED BY:	Date/Time		
COMPANY NAME: [illegible]	1215	COMPANY NAME:			
RELINQUISHED BY: [illegible]	Date/Time 6/29/98	RECEIVED BY:	Date/Time		
COMPANY NAME: [illegible]	1645	COMPANY NAME:			

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CHAIN OF CUSTODY RECORD

COC NO.: GA 8869

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
830212	6/26/98	1920	water		1								1	9806839 -13 (536391 1)
810412	6/27/98	955			2								2	-14
630312	6/26/98	1735			2								2	-15
830114	6/26/98	1745			2								2	-16
930532	6/27/98	1050			2								2	-17
880312	6/27/98	855			2								2	-18
930552	6/27/98	1140			2								2	-19

SH 6/29/98

REQUESTED PARAMETERS

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	6/29/98	A Francis	6/29/98
COMPANY NAME: SAIC	1215	COMPANY NAME: GEL	1645
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL	6/29/98 1215	COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME: GEL	6/29/98 1645	COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 13

Cooler ID: # 630

Cooler Temperature: 4°C

FEDEX NUMBER:

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CHAIN OF CUSTODY RECORD

COC NO.: GA018

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature) Laura Lumley (Printed Name) Laura Lumley

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:
800212	6/26/98	1300	water	2									2
800532	6/26/98	1215		2									2
800542	6/26/98	1245		2									2
800514	6/26/98	1110		2									2
800522	6/26/98	1150		2							-		2
800512	6/26/98	1110		2									2
TBA016	6/26/98	745		2									2
TBA017	6/27/98	745		2									2
TBA018	6/28/98	600		2									2
860212	6/26/98	1230		2									2
810312	6/26/98	1020		2									2
810412	6/27/98	955		2									2
670225	6/26/98	1350	✓					2					2

REQUESTED PARAMETERS

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod Charleston, SC 29417

PHONE NO: (803) 556-8171

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

980849-06	33647.1
-07	
-08	
-09	
-10	
-11	
-12	
-13	
-14	
-15 Unpreserved	
-16 Unpreserved	
-17 Unpreserved	
-18	-12

RELINQUISHED BY: Laura Lumley	Date/Time 6/29/98 1215	RECEIVED BY: ANACOM	Date/Time 6/29/98 1645	TOTAL NUMBER OF CONTAINERS: 130	Cooler Temperature: 4.0 C
COMPANY NAME: SAIC		COMPANY NAME:		Cooler ID: ~~#~~ 560	FEDEX NUMBER:
RECEIVED BY:	Date/Time 6/29/98 1215	RELINQUISHED BY:	Date/Time		
COMPANY NAME:		COMPANY NAME:			
RELINQUISHED BY:	Date/Time 6/29/98 1645	RECEIVED BY:	Date/Time		
COMPANY NAME:		COMPANY NAME:			

PERMEABILITY TEST ANALYSIS (ASTM D5084)

Project : Fort Stewart

Location of Project : CAP Part A

Description of Soil : Dark Brown Silty Sand

Job # : 98066
Date of Testing: 7/29-31/98
Tested by: BV-CA
Boring # :
Sample # : 810331
Sample Depth : 2-4 ft.

Sample Type (Undisturbed or Remolded)
Standard Proctor:
Maximim Dry Density: _____ pcf
Optimum Moisture Content: _____ %

% Sample Compaction: _____ %
Sample Dry Density: _____ pcf
Sample Moisture Content: _____ %
Sample Wet Density: _____ pcf

Sample Permeation:

De-Aired Water
% Saturation: 100 %
Cell Pressure: 70 psi
Lower Pressure: 66 psi
Upper Pressure: 65 psi
Gradient: 14.36

Sample Dimensions		
	Before	After
Length (cm)	4.90	5.70
Diameter (cm)	4.70	4.70
Water Content (%)	7.3	22.1
Weight (g)	158.9	190.2

Constant Head Calculation:

$$K = [V(t_1,t_2)\, LR_T]/[P_B A t] \text{ (cm/sec)}$$

$V(t_1,t_2)$ = Volume of flow from t_1 to t_2 (cm^3)
L = Length of Sample = 4.90 cm
A = Area of Sample = 17.35 cm^2
t = $t_2 - t_1$ (sec)
P_B = Bias Pressure = 1 psi x 70.37 cm/psi $_{(cm - H2O)}$ 70.37 cm
R_T = Temperature correction = 0.931

t_2 (sec)	t_1 (sec)	$(t_2 - t_1)$ (sec)	V (cm^3)	$[LR_T]/[P_B A]$ (cm^3)	K (cm/sec)
8	5	3	3.0	3.74E-03	3.74E-03
11	8	3	2.5	3.74E-03	3.11E-03
14	11	3	2.9	3.74E-03	3.61E-03
17	14	3	2.3	3.74E-03	2.86E-03

K_{avg} = 3.33E-03 cm/sec

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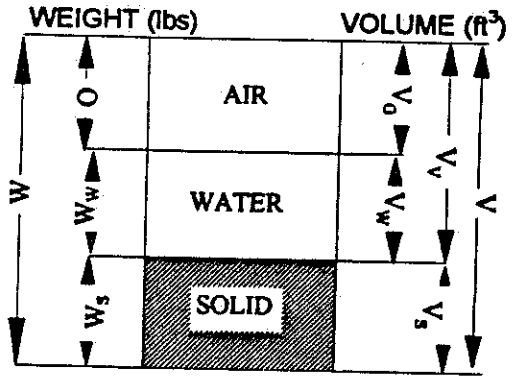
SPECIFIC GRAVITY AND POROSITY

PROJECT: Fort Stewart
LOCATION OF PROJECT: CAP Part A
DESCRIPTION OF SOIL: Dark Brown Silty Sand
TESTED BY: B.J. Vance

JOB NO.: 98066
SAMPLE NO: 810331
DEPTH OF SAMPLE: 2-4 ft.
DATE OF TESTING: 7/29/98



W = 0.58223
$W_W = W - W_S$ = 0.03698
$W_S = Y_d * V$ = 0.5453

V = 0.00576
$V_W = W_W/Y_W$ = 0.0006
$V_S = W_S/G_S * Y_W$ = 0.0033
$V_G = V - (V_S + V_W)$ = 0.00185
$V_V = V_G + V_W$ = 0.0024

MEASUREMENTS OF TUBE/CAN

HEIGHT= 9.4 cm
DIAMETER= 4.7 cm

CALCULATED VOLUME OF TUBE/CAN

V= 163.08 cm^3
0.00576 ft^3

WT. OF TUBE/CAN + WET SOIL= 439.30 g
WEIGHT OF TUBE/CAN= 175.2 g
WEIGHT OF WET SOIL= 264.10 g
W = 0.58223 lb

MOISTURE CONTENT

M_{CWS} = 20.23 g
M_{CDS} = 19.64 g
M_W = 0.59 g
M_C = 10.94 g
M_S = 8.70 g
w = 6.8 %

Wet Density, $Y_m = W / V$

Dry Density, $Y_d = W_s / V$ or $Y_d = Y_m / (1+ w)$

double check
$Y_d = W_s / V$
Y_d= 94.66 lbs/ft^3

$Y_d = Y_m / (1+ w)$
Y_m= 101.08 lbs/ft^3
Y_d= 94.66 lbs/ft^3

Void Ratio, $e = V_V/V_S$
e = 0.7345

Porosity, $n = V_V / V$
n = 0.42

Specific Gravity = 2.63

Degree of Saturation, $S = V_W/V_V$
S = 0.2428

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GRAIN SIZE ANALYSIS-SIEVE (ASTM D422)

Project Fort Stewart — Job No. 98066

Location of Project Cap Part A — Sample No. # 810331

Description of Soil Dk Brown Silty Sand — Depth of Sample 2-4' — Boring No. ____

Tested By CA — Date of Testing 7/22/98

Sample preparation procedures outlined in ASTM D421 and D2217.

Nominal diameter of largest particle	Approximate minimum Wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Weight of sample used, M_{ws} = _____ g

M_{can}	M_{dry}	M_c X18	M_w	M_s	w %	M_{ws}	M_s
		115.17					81.58

Sieve analysis and grain shape

Sieve no.	Diam. (mm)	Wt. retained	% retained	Σ % retained	% passing
3"					
2"					
1 1/2 "					
3/4"					
3/8"					
#4		2.05	2.51	2.51	97.49
#10		0.93	1.14	3.65	96.35
#20		7.63	9.35	13.0	87.0
#40		11.43	14.01	27.01	72.99
#60		10.63	13.03	40.04	59.96
#140		39.84	48.84	88.88	11.12
#200		2.68	3.29	92.17	7.83
pan		0.11	0.13	92.3	—

% retained = (Wt. retained/W_s) · 100

% passing = 100 - Σ % retained.

APPENDIX VI

ALTERNATE THRESHOLD LEVEL (ATL) CALCULATIONS

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Calculations of alternate threshold levels are not required at this time for the UST 71A site. However, the geotechnical data collected during the CAP-Part A investigation are presented in Table VI-A.

VI-A. Geotechnical Results for Soil Samples Collected at the UST 71A Site

	81-03
Sample ID	810331
Depth Interval (ft BGS)	2.0 – 4.0
Grain size analysis - % Fines	8
Grain size analysis - % Sand	89
Grain size analysis - % Gravel	3
Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP
Natural Moisture Content (%)	6.8
Permeability (cm/sec)	3.3×10^{-3}
Porosity	0.42
Specific Gravity	2.63

NP = Nonplastic.

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APPENDIX VII

MONITORING WELL DETAILS

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Monitoring wells were not installed as part of the CAP-Part A investigation. Temporary piezometers were installed at the UST 71A site. Refer to Figures 4 and 5 (Appendix I) for locations.

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APPENDIX VIII

GROUNDWATER LABORATORY RESULTS

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TABLE VIII-A. SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Station:			81-01	81-02	81-03	81-04	81-05	81-05
Sample ID:		In Stream	810112	810212	810312	810412	810512	810522
Sample Interval:	Federal	Water Quality	0.0 – 10.0	0.0 – 10.0	0.0 – 10.0	0.0 – 10.0	8.0 – 10.0	13.0 – 15.0
Collection Date:	SDWA MCLs[1]	Standards[2]	25-Jun-98	25-Jun-98	26-Jun-98	27-Jun-98	25-Jun-98	25-Jun-98
Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILE ORGANIC COMPOUNDS								
Benzene	5	71.28	4.9 J	2 U	2 UJ	2 UJ	2 U	2 U
Toluene	1000	200,000	2 U	2 U	2 UJ	2 UJ	2 U	2 U
Ethylbenzene	700	28,718	2 U	2 U	2 UJ	2 UJ	2 U	2 U
Xylenes, Total	10000	–	6 U	6 U	6 UJ	6 UJ	6 U	6 U
POLYNUCLEAR AROMATIC HYDROCARBONS								
2-Chloronaphthalene		–	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Acenaphthene		–	13.2 U	43.5 U	10 UJ	100 UJ	11.6 U	11.4 U
Acenaphthylene		–	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Anthracene		110,000	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Benzo(a)anthracene		0.0311	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Benzo(a)pyrene	0.2	0.0311	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Benzo(b)fluoranthene		–	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Benzo(g,h,i)perylene		–	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Benzo(k)fluoranthene		0.0311	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Chrysene		0.0311	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Dibenzo(a,h)anthracene		0.0311	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Fluoranthene		370	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Fluorene		14,000	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Indeno(1,2,3-cd)pyrene		0.0311	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Naphthalene		–	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Phenanthrene		–	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U
Pyrene		11,000	13.2 U	43.5 U	10 U	100 U	11.6 U	11.4 U

NOTES:

Contract for field work was issued prior to the new CAP-A guidance published in May 1998, thus the new analytical methods were not used.

[1] U.S. Environmental Protection Agency maximum contaminant level

[2] GA EPD water quality standards (Chapter 391-3-6.03)

Bold values exceed MCLs

QA/QC samples were collected. The laboratory data sheets have been included in this appendix, but the results are not summarized.

Laboratory Qualifiers

U Indicates the compound was not detected at the concentration reported

UJ Indicates that the compound was not detected above an approximated sample quantitation limit

J Indicates the value for the compound is an estimated value

= Indicates the compound was detected at the concentration reported

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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810112

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A05W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806807-06

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 206012

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: not dec. _____ Date Analyzed: 06/27/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	4.9	P
108-88-3	Toluene	2.0	U
100-41-4	Ethylbenzene	2.0	U
1330-20-7	Xylenes (total)	6.0	U

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DATA VALIDATION COPY

FORM I VOA

SEMIVOLATILE ORGANICS 1B ANALYSIS DATA SHEET

EPA SAMPLE NO.

810112

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806804-10

Sample wt/vol: 760.0 (g/mL) ML Lab File ID: 2B408

Level: (low/med) LOW

% Moisture: _____ decanted: (Y/N)___ Date Received: 06/26/98

Concentrated Extract Volume: 1.00(mL) Date Extracted:06/29/98

Injection Volume: 1.0(uL) Date Analyzed: 07/09/98

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	13.2	U
91-58-7	2-chloronaphthalene	13.2	U
209-96-8	acenaphthylene	13.2	U
83-32-9	acenaphthene	13.2	U
86-73-7	fluorene	13.2	U
85-01-8	phenanthrene	13.2	U
120-12-7	anthracene	13.2	U
206-44-0	fluoranthene	13.2	U
129-00-0	pyrene	13.2	U
56-55-3	benzo(a)anthracene	13.2	U
218-01-9	chrysene	13.2	U
205-99-2	benzo(b)fluoranthene	13.2	U
207-08-9	benzo(k)fluoranthene	13.2	U
50-32-8	benzo(a)pyrene	13.2	U
193-39-5	indeno(1,2,3-cd)pyrene	13.2	U
53-70-3	dibenz(a,h)anthracene	13.2	U
191-24-2	benzo(g,h,i)perylene	13.2	U

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FORM I SV-1

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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810212

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A05W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806807-08

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 206015

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: not dec. _____ Date Analyzed: 06/27/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	2.0	U
108-88-3	Toluene	2.0	U
100-41-4	Ethylbenzene	2.0	U
1330-20-7	Xylenes (total)	6.0	U

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7-22-98

FORM I VOA

COPY

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810212

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806804-09

Sample wt/vol: 920.0 (g/mL) ML Lab File ID: 2B407

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: _____ decanted: (Y/N) Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 07/09/98

Injection Volume: 1.0 (uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: 7.0

DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	43.5	U
91-58-7	2-chloronaphthalene	43.5	U
209-96-8	acenaphthylene	43.5	U
83-32-9	acenaphthene	43.5	U
86-73-7	fluorene	43.5	U
85-01-8	phenanthrene	43.5	U
120-12-7	anthracene	43.5	U
206-44-0	fluoranthene	43.5	U
129-00-0	pyrene	43.5	U
56-55-3	benzo(a)anthracene	43.5	U
218-01-9	chrysene	43.5	U
205-99-2	benzo(b)fluoranthene	43.5	U
207-08-9	benzo(k)fluoranthene	43.5	U
50-32-8	benzo(a)pyrene	43.5	U
193-39-5	indeno(1,2,3-cd)pyrene	43.5	U
53-70-3	dibenz(a,h)anthracene	43.5	U
191-24-2	benzo(g,h,i)perylene	43.5	U

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FORM I SV-1

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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810312

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A14W

Matrix: (soil/water) WATER Lab Sample ID: 9806849-16

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2Q1037

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: not dec. _____ Date Analyzed: 07/07/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	2.0	U
108-88-3	Toluene	2.0	U
100-41-4	Ethylbenzene	2.0	U
1330-20-7	Xylenes (total)	6.0	U

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FORM I VOA

DATA VALIDATION

COVER 1B SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810312

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A06W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806839-01

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: 1B507

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted:06/30/98

Concentrated Extract Volume: 0.50(mL) Date Analyzed: 07/10/98

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	10.0	U
91-58-7	2-chloronaphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

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FORM I SV-1

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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810412

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A14W

Matrix: (soil/water) WATER Lab Sample ID: 9806849-17

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2Q1038

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: not dec. _____ Date Analyzed: 07/07/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	2.0	U
108-88-3	Toluene	2.0	U
100-41-4	Ethylbenzene	2.0	U
1330-20-7	Xylenes (total)	6.0	U

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8-18-98

FORM I VOA

DATA VALIDATION

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810412

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A06W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806839-14

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: 1B520

Level: (low/med) LOW Date Received: 06/29/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 06/30/98

Concentrated Extract Volume: 0.50 (mL) Date Analyzed: 07/11/98

Injection Volume: 1.0 (uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	100	U
91-58-7	2-chloronaphthalene	100	U
209-96-8	acenaphthylene	100	U
83-32-9	acenaphthene	100	U
86-73-7	fluorene	100	U
85-01-8	phenanthrene	100	U
120-12-7	anthracene	100	U
206-44-0	fluoranthene	100	U
129-00-0	pyrene	100	U
56-55-3	benzo(a)anthracene	100	U
218-01-9	chrysene	100	U
205-99-2	benzo(b)fluoranthene	100	U
207-08-9	benzo(k)fluoranthene	100	U
50-32-8	benzo(a)pyrene	100	U
193-39-5	indeno(1,2,3-cd)pyrene	100	U
53-70-3	dibenz(a,h)anthracene	100	U
191-24-2	benzo(g,h,i)perylene	100	U

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FORM I SV-1

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DATA VALIDATION

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810512

Lab Name: GENERAL ENGINEERING LABORATORY Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A04W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806806-02

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 20608

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: not dec. _____ Date Analyzed: 06/27/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(ml) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	2.0	U
108-88-3	Toluene	2.0	U
100-41-4	Ethylbenzene	2.0	U
1330-20-7	Xylenes (total)	6.0	U

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7-22-98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

810512RE

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806804-04

Sample wt/vol: 860.0 (g/mL) ML Lab File ID: 2C111

Level: (low/med) LOW

% Moisture: _____ decanted: (Y/N) ___ Date Received: 06/26/98

Concentrated Extract Volume: 1.00(mL) Date Extracted:06/29/98

Injection Volume: 1.0(uL) Date Analyzed: 07/13/98

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.0

USG

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	11.6	U
91-58-7	2-chloronaphthalene	11.6	U
209-96-8	acenaphthylene	11.6	U
83-32-9	acenaphthene	11.6	U
86-73-7	fluorene	11.6	U
85-01-8	phenanthrene	11.6	U
120-12-7	anthracene	11.6	U
206-44-0	fluoranthene	11.6	U
129-00-0	pyrene	11.6	U
56-55-3	benzo(a)anthracene	11.6	U
218-01-9	chrysene	11.6	U
205-99-2	benzo(b)fluoranthene	11.6	U
207-08-9	benzo(k)fluoranthene	11.6	U
50-32-8	benzo(a)pyrene	11.6	U
193-39-5	indeno(1,2,3-cd)pyrene	11.6	U
53-70-3	dibenz(a,h)anthracene	11.6	U
191-24-2	benzo(g,h,i)perylene	11.6	U

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8-19-98

FORM I SV-1

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VOLATILE ORGANICS ANALYSIS DATA SHEET

810514

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A04W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806806-04

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2O6010

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: not dec. _____ Date Analyzed: 06/27/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
71-43-2	Benzene	2.0	U	U
108-88-3	Toluene	2.0	U	↓
100-41-4	Ethylbenzene	2.0	U	
1330-20-7	Xylenes (total)	6.0	U	

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7-22-98

FORM I VOA

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET 1B

EPA SAMPLE NO.

810514

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806804-05

Sample wt/vol: 790.0 (g/mL) ML Lab File ID: 2B321

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: ____ decanted: (Y/N) ___ Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 07/08/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

DATA VALIDATION COPY

USE

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	12.6	U
91-58-7	2-chloronaphthalene	12.6	U
209-96-8	acenaphthylene	12.6	U
83-32-9	acenaphthene	12.6	U
86-73-7	fluorene	12.6	U
85-01-8	phenanthrene	12.6	U
120-12-7	anthracene	12.6	U
206-44-0	fluoranthene	12.6	U
129-00-0	pyrene	12.6	U
56-55-3	benzo(a)anthracene	12.6	U
218-01-9	chrysene	12.6	U
205-99-2	benzo(b)fluoranthene	12.6	U
207-08-9	benzo(k)fluoranthene	12.6	U
50-32-8	benzo(a)pyrene	12.6	U
193-39-5	indeno(1,2,3-cd)pyrene	12.6	U
53-70-3	dibenz(a,h)anthracene	12.6	U
191-24-2	benzo(g,h,i)perylene	12.6	U

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VOLATILE ORGANICS 1A ANALYSIS DATA SHEET

EPA SAMPLE NO.

DATA VALIDATION COPY

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA	Case No.: NA
Matrix: (soil/water) GROUNDH2O	SAS No.: NA
Sample wt/vol: 10.00 (g/ml) ML	SDG No.: FS4A04W
Level: (low/med) LOW	Lab Sample ID: 9806806-07
% Moisture: not dec. _____	Lab File ID: 206014
GC Column: J&W DB-624 (PID) ID: 0.53 (mm)	Date Received: 06/26/98
Soil Extract Volume: _____ (ml)	Date Analyzed: 06/27/98
	Dilution Factor: 1.0
	Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	2.0	U
108-88-3	Toluene	2.0	U
100-41-4	Ethylbenzene	2.0	U
1330-20-7	Xylenes (total)	6.0	U

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FORM I VOA

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET 1B

EPA SAMPLE NO.

810522

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4A02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9806804-06

Sample wt/vol: 880.0 (g/mL) ML Lab File ID: 2B322

Level: (low/med) LOW Date Received: 06/26/98

% Moisture: _____ decanted: (Y/N) ___ Date Extracted: 06/29/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 07/08/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	11.4	U
91-58-7	2-chloronaphthalene	11.4	U
209-96-8	acenaphthylene	11.4	U
83-32-9	acenaphthene	11.4	U
86-73-7	fluorene	11.4	U
85-01-8	phenanthrene	11.4	U
120-12-7	anthracene	11.4	U
206-44-0	fluoranthene	11.4	U
129-00-0	pyrene	11.4	U
56-55-3	benzo(a)anthracene	11.4	U
218-01-9	chrysene	11.4	U
205-99-2	benzo(b)fluoranthene	11.4	U
207-08-9	benzo(k)fluoranthene	11.4	U
50-32-8	benzo(a)pyrene	11.4	U
193-39-5	indeno(1,2,3-cd)pyrene	11.4	U
53-70-3	dibenz(a,h)anthracene	11.4	U
191-24-2	benzo(g,h,i)perylene	11.4	U

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FORM I SV-1

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Science Applications International Corporation
800 Oak Ridge Turnpike, Oak Ridge, TN 37831 (423) 481-4600

CHAIN OF CUSTODY RECORD

COC NO.: GA0006

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature) Laura Lumley (Printed Name) Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
880111	6/24/98	1505	S: 1						1	1			2	9806805-01 (35018 :1)
880211	6/25/98	1020							1	1			2	-02
880123	6/25/98	855							1	1			2	-03
880411	6/24/98	1350							1	1			2	-04
880421	6/24/98	1415							1		1		2	-05 (:2)
880121	6/25/98	855							1		1		2	-06
880221	6/25/98	1035							1		1		2	-07
860111	6/25/98	1430		1		1							2	-08 (:3)
860411	6/25/98	1000		1		1							2	-09
810113	6/25/98	1430		1		1							2	-10
810211	6/25/98	1705		1		1							2	-11
800111	6/25/98	1515		1		1							2	-12
800113	6/25/98	1515		1		1							2	-13

REQUESTED PARAMETERS

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	6/26/98	Diane Marcus	6/26/98
COMPANY NAME: SAIC	12:55	COMPANY NAME: GEL	1640
RECEIVED BY: Raymond Reed	Date/Time 6/26/98	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL	12:55	COMPANY NAME:	
RELINQUISHED BY: Raymond Reed	Date/Time 6/26/98	RECEIVED BY:	Date/Time
COMPANY NAME: GEL	1640	COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS:

Cooler ID: #627

Cooler Temperature: 4°C

FEDEX NUMBER:

SAIC An Employee-Owned Company
Science Applications International Corporation
800 Oak Ridge Turnpike, Oak Ridge, TN 37831 (423) 481-4600

2 of 4

CHAIN OF CUSTODY RECORD

COC NO.: GA0006

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
810111	6/25/98	1635	Soil	1		1							2	9806805-14 33618 13
810221	6/25/98	1715		1			1						2	-15 14
860121	6/25/98	~~1830~~ 1455		1			1						2	-16
810121	6/25/98	1830		1			1						2	-17
860421	6/25/98	935		1			1						2	-18
800121	6/25/98	1540		1			1						2	-19
860112	6/25/98	925	Water	2									2	9806806-01 33619 1
810512	6/25/98	1510		2									2	-02
830512	6/25/98	1655		2									2	-03
810514	6/25/98	1510		2									2	-04
830532	6/25/98	1640		2									2	-05
830522	6/25/98	1755		2									2	-06
810522	6/25/98	1555		2									2	-07

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	6/26/98	Diana Tomal	6/26/98
COMPANY NAME: SAIC	12:55	COMPANY NAME: GEL	1640
RECEIVED BY: Raymel Reed	Date/Time 6/26/98	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL	1255	COMPANY NAME:	
RELINQUISHED BY: Raymel Reed	Date/Time 6/26/98	RECEIVED BY:	Date/Time
COMPANY NAME: GEL	16:40	COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS:

Cooler ID: #627

Cooler Temperature: 4°C

FEDEX NUMBER:

SAIC An Employee Owned Company
Science Applications International Corporation
800 Oak Ridge Turnpike, Oak Ridge, TN 37831 (423) 481-4600

1 of 2

CHAIN OF CUSTODY RECORD

COC NO.: GA017

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
840211	6/27/98	1330	Soil	1		1							2	9806843-07 (336043 14)
830221	6/26/98	1720		1		1							2	-08
840311	6/27/98	920		1		1							2	-09
860311	6/27/98	1645		1		1							2	-10
800411	6/26/98	1105		1		1							2	-11
830111	6/26/98	1610		1		1							2	-12
810411	6/27/98	925		1		1							2	-13
840421	6/27/98	1200		1		1							2	-14
860211	6/26/98	1115		1		1							2	-15
840111	6/27/98	1300		1		1							2	-16
830311	6/26/98	1820		1		1							2	-17
800311	6/26/98	930		1		1							2	-18
830411	6/26/98	1455	N	1		1							2	-19

RELINQUISHED BY: Laura Lumley	Date/Time 6/29/98	RECEIVED BY:	Date/Time 6/29/98	TOTAL NUMBER OF CONTAINERS:	
COMPANY NAME: SAIC	12:15	COMPANY NAME:	1645	Cooler ID: # 643	
RECEIVED BY:	Date/Time 6-29-98	RELINQUISHED BY:	Date/Time		
COMPANY NAME:	1215	COMPANY NAME:			
RELINQUISHED BY:	Date/Time 6/29/98	RECEIVED BY:	Date/Time		
COMPANY NAME:	1645	COMPANY NAME:			

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Cooler Temperature: 4°C

FEDEX NUMBER:

SAIC An Employee-Owned Company
Science Applications International Corporation
800 Oak Ridge Turnpike, Oak Ridge, TN 37831 (423) 481-4600

2012

CHAIN OF CUSTODY RECORD

COC NO.: GA017

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Laura Lumley (Printed Name): Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
600211	6/26/96	1205	Soil	1		1							2	9806843-20 336434
610421	6/27/96	935		1			1						2	9806844-01 336041
640221	6/27/96	1350		1			1						2	-02
630321	6/26/96	825		1			1						2	-03
600421	6/26/96	1140		1			1						2	-04
630123	6/26/96	1650		1			1						2	-05
630421	6/26/96	1910		1			1						2	-06
640411	6/27/96	1135		1			1						2	-07
600221	6/26/96	1220		1			1						2	-08
630121	6/26/96	1650		1			1						2	-09
630211	6/26/96	1714		1				1					2	-10 12
600321	6/26/96	935		1				1					2	-11
640321	6/27/96	925		1				1					2	-12

REQUESTED PARAMETERS

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	6/29/96	D Francis	6/29/96
COMPANY NAME: SAIC	1215	COMPANY NAME: GEL	1645
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL	6-29-96 1215	COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME: GEL	6/29/96 1645	COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 52

Cooler ID: ~~#~~ 643

Cooler Temperature: 4°C

FEDEX NUMBER:

SAIC An Employee-Owned Company
Science Applications International Corporation
800 Oak Ridge Turnpike, Oak Ridge, TN 37831 (423) 481-4600

1 of 5

CHAIN OF CUSTODY RECORD

COC NO.: GA018

PROJECT NAME: Fort Stewart CAP Part A UST Investigations (Options)

PROJECT NUMBER: 01-0331-04-9805-210

PROJECT MANAGER: Patty Stoll

Sampler (Signature) Laura Lumley (Printed Name) Laura Lumley

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, DRO, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
860321	6/27/98	1745	Soil				1						2	9806844-13 33644.1
840123	6/27/98	1220					1						2	-14
840121	6/27/98	1220					1						2	-15
860221	6/26/98	1200						1					2	-16 12
810321	6/26/98	945						1					2	-17
930111	6/27/98	1635							1	1			2	-18 13
930421	6/27/98	1435							1		1		2	-19 14
940116	6/26/98	1935	water	2									2	9806846 -01 33645.1
940522	6/26/98	1205		2									2	-02
940212	6/26/98	1440		2									2	-03
940112	6/26/98	1925		2									2	-04
940512	6/26/98	1030		2									2	-05
930542	6/27/98	1115		2									2	-06

RELINQUISHED BY: Laura Lumley	Date/Time 6/29/98 1215	RECEIVED BY: [illegible]	Date/Time 6/29/98 1645	TOTAL NUMBER OF CONTAINERS:	Cooler Temperature: 4.0°C
COMPANY NAME: SAIC		COMPANY NAME: GEL		Cooler ID: # 580	FEDEX NUMBER:
RECEIVED BY: [illegible]	Date/Time 6/29/98 1215	RELINQUISHED BY:	Date/Time		
COMPANY NAME: GEL		COMPANY NAME:			
RELINQUISHED BY: [illegible]	Date/Time 6/29/98 1645	RECEIVED BY:	Date/Time		
COMPANY NAME: GEL		COMPANY NAME:			

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APPENDIX IX

EXCAVATION OF CONTAMINATED SOIL AND SUPPORTING MANIFESTS

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All contaminated soil removed during the entire project (i.e., all USTs removed under contract with ACE, to include clean and non-clean closures) was tested and transported to Kedesh, Inc., Highway 84, Ludowici, GA, 31316. The Installation has records of all manifests and weight tickets for this project and provided copies to GA EPD USTMP in September 1988. However, site/UST-specific information is not available.

I certify that the above information is true and accurate.

Name: Thomas C. Fry

Title: Chief, Environmental Branch

Signature: Thomas C. Fry

Date: 03/19/99

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APPENDIX X

SITE RANKING FORM

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SITE RANKING FORM

Facility Name: USTs 71A **Ranked by:** L. Lumley

County: Liberty **Facility ID #:** 9-089023 **Date Ranked:** 9/11/98

SOIL CONTAMINATION

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

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

B. Total Benzene -
Maximum Concentration found on the site

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

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

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

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

GROUNDWATER CONTAMINATION

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

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

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

☒	≤5 µg/L	= 0
☐	>5 - 100 µg/L	= 5
☐	>100 - 1,000 µg/L	= 50
☐	>1,000 - 10,000 µg/L	= 100
☐	>10,000 µg/L	= 250

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

POTENTIAL RECEPTORS (MUST BE FIELD-VERIFIED)

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

H. Public Water Supply

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

For lower susceptibility areas only:

☐	>1 mi	= 0

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

✳ For justification that withdrawal point is not hydraulically connected, see page X-5.

I. Non-Public Water Supply

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

For lower susceptibility areas only:

☐	>¼ mi	= 0

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

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

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

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

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

(G. 0) x (L. 50) = M. 0

(M. 0) + (D. 0) = N. 0

P. **SUSCEPTIBILITY AREA MULTIPLIER**

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

☒ All other sites = 1

Q. **EXPLOSION HAZARD**

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

☐ Yes = 200,000

☒ No = 0

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

= 0

ENVIRONMENTAL SENSITIVITY SCORE

OTHER GEOLOGIC AND HYDROLOGIC 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 Fort Stewart to support determinations of groundwater flow pathway(s) or direction(s) and contaminant transport.

1.0 REGIONAL AND LOCAL GEOLOGY

Fort Stewart is located within the coastal plain physiographic province. This province is typified by nine southeastward dipping strata that increase in thickness from 0 feet at the fall line located approximately 350 miles inland from the Atlantic coast, to approximately 4,200 feet at the coast. State geologic records describe a probable petroleum exploration well (the No. 1 Jelks-Rogers) located in the region as encountering crystalline basement rocks at a depth of 4254 feet BGS. This well provides the most complete record for Cretaceous, Tertiary, and Quaternary sedimentary strata in the region.

The Cretaceous section was found to be approximately 1,970 feet thick and dominated by clastics. The Tertiary section was found to be approximately 2,170 feet thick and dominated by limestone with a 175-foot thick cap of dark green phosphatic clay. This clay is regionally extensive and is known as the Hawthorn Group. The interval from approximately 110 feet to the surface is Quaternary in age and composed primarily of sand with interbeds of clay or silt. This section is undifferentiated into separate formations (Metcalf & Eddy 1996).

State geologic records contain information regarding a well drilled in October 1942, 1.8 miles north of Flemington at Liberty Field of Camp Stewart (now known as Fort Stewart). This well is believed to be an artesian well located approximately one-quarter mile north of the runway at Wright Army Airfield within the Fort Stewart Military Reservation. The log for this well describes a 410-foot section, the lowermost 110 feet of which consisted predominantly of limestone sediments, above which 245 feet of dark green phosphatic clay typical of the Hawthorn Group was encountered. The uppermost portion of the section was found to be Quaternary age interbedded sands and clays. The top 15 feet of these sediments were described as sandy clay (Metcalf & Eddy 1996).

The surface soil located throughout the Fort Stewart garrison area consists of Stilson loamy sand. The surface layer of this soil is typically dark grayish brown loamy sand measuring approximately 6 inches in depth. The surface layer is underlain by material consisting of pale yellow loamy sand and extends to a depth of approximately 29 inches. The subsoil is dominantly sandy clay loam and extends to a depth of 72 inches or more (Metcalf & Eddy 1996).

2.0 REGIONAL AND LOCAL HYDROGEOLOGY

The hydrogeology in the vicinity of Fort Stewart is dominated by two aquifers referred to as the Principal Artesian and the surficial aquifers. The Principal Artesian aquifer is the lowermost hydrologic unit and is regionally extensive from South Carolina through Georgia, Alabama, and most of Florida. Known elsewhere as the Floridan, this aquifer is composed primarily of Tertiary age limestone, including the Bug Island Formation, the Ocala Group, and the Suwannee Limestone. These formations are approximately 800 feet thick, and groundwater from this aquifer is used primarily for drinking water (Arora 1984).

The uppermost hydrologic unit is the surficial aquifer, which consists of widely varying amounts of sand and clay ranging from 55 to 150 feet in thickness. This aquifer is primarily used for domestic lawn and agricultural irrigation. The top of the water table ranges from approximately 2 to 10 feet BGS (Geraghty and Miller 1993). The base of the aquifer corresponds to the top of the underlying dense clay of the Hawthorn Group. The Hawthorn Group was not encountered during drilling at this site, but is believed to be located at 40 to 50 feet BGS, thus the effective aquifer thickness would be approximately 35 to 45 feet. Soil surveys for Liberty and Long Counties describe the occurrence of a perched water table within the Stilson loamy sands present within Fort Stewart (Looper 1980).

The confining layer for the Principal Artesian aquifer is the phosphatic clay of the Hawthorn Group and ranges in thickness from 15 to 90 feet. The vertical hydraulic conductivity of this confining unit is on the order of 10^{-8} cm/sec. There are minor occurrences of aquifer material within the Hawthorn Group; however, they have limited utilization (Miller 1990). The Hawthorn Group has been divided into three formations: Cooswhatchie Formation, Markshead Formation, and the Parachula Formation, which are listed from youngest to oldest.

The Coosawhatchie Formation is composed predominantly of clay, but also has sandy clay, argillaceous sand, and phosphorite units. The formation is approximately 170 feet thick in the Savannah Georgia area. This unit disconformably overlies the Markshead Formation and is distinguished from the underlying unit by dark phosphatic clays or phosphorite in the lower part and fine-grained sand in the upper part.

The Marshead Formation is approximately 70 feet thick in the Savannah Georgia area and consists of light colored phosphatic, slightly dolomitic, argillaceous sand to fine-grained sandy clay with scattered beds of dolostone, limestone, and siliceous, and dolomitic and less calcareous.

The Parachula Formation consists of sand, clay, limestone, and dolomite, and is approximately 10 feet thick in the Savannah Georgia area. The Parachula Formation generally overlies the Suwannee Limestone in Georgia.

APPENDIX XI

PUBLIC NOTIFICATION

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STATE OF GEORGIA
CHATHAM COUNTY

Affidavit of Publication
___Savannah Morning News
___Savannah Evening Press

Personnally appeared before me, Joan T. Jenkins, to me known, who being sworn, deposes and says:

That he is the Classified Adv Supv of Southeastern Newspapers Corporation, a Georgia corporation, doing business in Chatham County, Georgia, under the trade name of Savannah Morning News/Savannah Evening Press, a daily newspaper published in said county;

That he is authorized to make affidavits of publication on behalf of said published corporation;

That said newspaper is of general circulation in said county and in the area adjacent thereto;

That he has reviewed the regular editions of the Savannah Morning News/Savannah Evening Press, published on 10-18, 1998, 10-25, 1998, _____, 19___, _____, 19___, and finds that the following Advertisement, to-wit:

Miscellaneous Notices 015

PUBLIC NOTICE
Notification of Corrective Action Plan, Underground Storage Tank Releases, Fort Stewart Garrison Area, Fort Stewart, Georgia

The United States Army Corps of Engineers and Fort Stewart Directorate of Public Works have prepared Corrective Action Plan (CAP) - Part A and Part B reports to assess the environmental impact of diesel, gasoline, or waste oil releases from numerous underground storage tanks (USTs) located at the above referenced property. These reports will be submitted to the Georgia Environmental Protection Division after September 30, 1998. A listing of the UST sites for which CAP - Part A and Part B reports have been prepared is presented at the end of this notification.

The Georgia rules for UST management require notification of the public most directly affected by the plans. If you would like a copy of any of the plans, please contact:

Commander, 3rd Infantry Division (Mechanized) and Fort Stewart, attn: DPW/ENRD ENV. Br. (T. Rutland), 1557 Frank Cochran, Fort Stewart, Ga. 31314-4928

A copy of each requested plan will be mailed at a nominal copying and shipping fee.

To make comments on any of the plans, or to examine the Georgia Environmental Protection Division's files, contact the Corrective Action Unit, Underground Storage Tank Management Program, Environmental Protection Division, at 404-362-2687. The Underground Storage Tank Management Program will accept public comments on the CAP - Part A and Part B reports up to 30 days after submittal to the Georgia Environmental Protection Division. Following is their mailing address:

Corrective Action Unit, Underground Storage Tank Management Program, 4244 International Parkway, Suite 100, Atlanta, Ga. 30354.

Fort Stewart CAP - Part A and Part B Underground Storage Tank Sites

Tank Number; Facility ID; Building
54 and 55; 9 089053; 1056
56; 9 089116; 1056
714; 9 089023; 1260
200 and 201; 9 089043; 260
207; 9 089038; 232
255 and 256; 9 089087; 16012

appeared in each of said editions.

Joan T. Jenkins
(Deponent)

Sworn to and subscribed before me this 26 day of Oct., 1998.

Lillie D. Lang
Notary Public, Chatham County, Georgia

LILLIE D. LANG
Notary Public, Chatham County, Ga.
My Commission Expires Apr. 8, 2001

Form 121 rev.

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ATTACHMENT A

TECHNICAL APPROACH

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TECHNICAL APPROACH

1.0 INTRODUCTION

The overall objective of this project is to provide the engineering services required to produce Corrective Action Plans (CAPs) for the subject UST sites. These reports will conform to the site closure requirements of a CAP-Part A for sites in Georgia. The field investigations necessary to support the report preparation included the installation of temporary piezometers, soil borings, and associated sampling of soil and groundwater. Upon completion of the field investigations, a CAP-Part A will be prepared to meet GA EPD, Fort Stewart, and the USACE-Savannah requirements.

2.0 FIELD ACTIVITIES

The following sections detail the methodologies used for geoprobe drilling, sampling, and piezometer installation. A geologist from SAIC was on site at all times during operations. No drilling activities were undertaken until all utility clearances and permits had been obtained from Fort Stewart's utility personnel.

2.1 Subsurface Soil Sampling

2.1.1 Geoprobe Drilling

The geoprobe method was used during the project for collecting soil samples. During all geoprobe drilling, soil samples were collected continuously on 4.0-foot centers from the ground surface to the bottom of the borehole. The total depth of each borehole was dictated by the depth where the water table was encountered.

2.1.2 Sample Collection

Soil samples for chemical analyses were collected from boreholes using 4.0-foot macro-core samplers. Upon retrieval of the sampling device, the soil core was split into two 2.0-foot sections using a stainless steel knife. A portion of each 2.0-foot section was collected for possible laboratory analysis. The remaining portion of each 2.0-foot section was used for field measurements.

Samples designated for possible laboratory analysis were collected from the section using a stainless steel spoon. The spoon was run lengthwise down the core to collect a sample representative of the entire core section. The portion of the sample designated for volatile organic analyses was placed into laboratory sample containers first, followed by placement of the remaining portion of the sample into the containers designated for other types of analyses. Sample containers designated for volatile organic analyses were filled so that minimal headspace was present in the containers. Headspace gas concentration measurements were made using a field organic vapor meter (OVM). Initially, soil from each 2.0-foot interval was placed into a glass jar, leaving some air space, and covered with aluminum foil to create an air-tight seal. The sample was allowed to volatilize for a minimum of 15 minutes. The sealed jar was punctured with the OVM probe and headspace gas drawn until the meter reading was stable. The concentration of the headspace gas was recorded to the nearest 0.1 part per million.

Immediately after collection of each sample and completion of bottle label information, each potential analytical sample container was placed into an ice-filled cooler to ensure preservation. A clean split-barrel sampling device was used to collect soil core from each interval of the project boreholes. Information regarding the criteria for selection of soil samples for off-site shipment to a laboratory for chemical analysis

is presented in Section 3.1.3 of the project Work Plan. Soil samples, which were not selected for laboratory analysis, were disposed of as investigation-derived waste (IDW).

2.2 Groundwater Sampling

2.2.1 Groundwater Collection

Groundwater samples from geoprobe boreholes installed during Preliminary Groundwater and CAP-Part A investigations were collected using a geoprobe sampler or from temporary piezometers. The geoprobe sampler is a probe that allows the collection of a groundwater sample from a discrete undisturbed depth interval in a soil boring. Temporary piezometers were constructed of 1.0-inch inside diameter (ID) polyvinyl chloride (PVC) casing with a 5-foot or 10-foot screened interval. These piezometers were installed in the open borehole following completion of all drilling activities.

Each soil borehole was advanced to the top of the water table using direct push methods. For each borehole, the geoprobe sampler was lowered to the bottom of the borehole and driven through the undisturbed soil to a depth of approximately 3.0 feet below the water table. The outer casing of the geoprobe sampler was retracted to expose the screen and allow groundwater to enter the chamber. In cases where the geoprobe sampler could not be driven or where groundwater recovery through the geoprobe sampler was poor, the groundwater sample was collected through the temporary piezometer.

Groundwater samples were collected using a peristaltic pump or a 0.75-inch diameter stainless steel bailer. The portion of the sample designated for volatile organic analysis was poured into laboratory sample containers first, followed by pouring of the remaining sample portion into containers designated for other types of chemical analyses. Sample containers designated for volatile organic analysis were filled so that no headspace was present in the containers.

2.2.2 Field Measurements

Groundwater field measurements performed during the project included measurement of static groundwater level, pH, specific conductance, and temperature. Measurement of groundwater levels in soil boreholes was accomplished through the installation of temporary PVC piezometers. A summary of the procedures and criteria to be used for groundwater sample field measurements is presented in the following sections.

Static Groundwater Level

Static groundwater level measurements were made using an electronic water level indicator. Initially, the indicator probe was lowered into each temporary piezometer casing until the alarm sounded and/or the indicator light illuminated. The probe was withdrawn several feet and slowly lowered again until the groundwater surface was contacted as noted by the alarm and/or indicator light. Water level measurements were estimated to the nearest 0.01 foot based on the difference between the nearest probe cord mark to the top of the piezometer casing.

The distance between the top of casing and the surrounding ground surface was taken into account in measuring the water level to within 0.01 foot. The static water level measurement procedure was repeated two or three times to ensure that the water level measurements were consistent (plus or minus 0.01 foot). If this was the case, then the first measured level was recorded as the depth to groundwater. If this was not the case, the procedure was repeated until consistent readings were obtained from three consecutive measurements.

pH, Specific Conductance, and Temperature

The pH, specific conductance, and temperature measurements were recorded for groundwater during groundwater sampling. The pH, temperature, and conductivity measurements were made using a combination meter designed to measure these parameters. A portion of each groundwater sample was retrieved from the PowerPunch sampler and poured into the collection cup. With the combination meter set in the pH mode, the meter electrode was swirled at a slow constant rate within the sample until the meter reading reached equilibrium. The sample pH was recorded to the nearest 0.1 pH unit. The pH measurement procedure was repeated, using a new sample each time, until the pH measurements were consistent (less than 0.2 pH units variation).

Upon completion of the pH measurement, conductivity and temperature measurements were made on a groundwater sample collected in the same manner as described above. With the combination meter set in the conductivity mode, the meter electrode was swirled at a slow constant rate within the sample until the meter reading reached equilibrium. Concurrently, a temperature probe was placed into the sample and allowed to reach equilibrium. The sample conductivity was recorded to the nearest 10 mmhos/cm and the temperature to the nearest 0.1° C. All recorded conductivity values were converted to conductance at 25° C. The conductivity and temperature measurement procedure was repeated a minimum of three times using a new sample each time, until the measurements are consistent (less than 10 percent variation for conductance and less than 0.5° C variation for temperatures).

2.3 Temporary Piezometer Installation

Following the collection of the groundwater sample, a 1.0-inch PVC piezometer, with a 5-foot or 10-foot screened section, was installed in the borehole to prevent the borehole from collapsing. These piezometers remained in the boreholes approximately 24 hours, after which time the static water level was measured.

2.4 Borehole Abandonment

Once the static water level was measured, the temporary piezometers were removed and the boreholes were abandoned. Abandonment was conducted in a manner precluding any current or subsequent fluid media from entering or migrating within the subsurface environment along the axis or from the endpoint of the borehole. Abandonment was accomplished by filling the entire volume of the borehole with grout.

2.5 Surveying

A topographic survey of the horizontal and vertical locations of all soil boreholes was conducted after completion of all field activities. The topographic survey was conducted by a surveyor registered in the state of Georgia.

The horizontal coordinates for each soil borehole were surveyed to the closest 1.0 foot and referenced to the State Plane Coordinate System. Ground elevations were surveyed to the closest 0.1 foot. Elevations were referenced to the National Geodetic Vertical Datum of 1983.

2.6 Decontamination Procedures

2.6.1 Geoprobe Equipment

Decontamination of equipment used for the drilling of boreholes was conducted within the temporary decontamination pad constructed at the central staging area. The decontamination pad was constructed so that all decontamination liquids were contained from the surrounding environment and were recovered for disposal as IDW. The entire geoprobe vehicle and equipment was decontaminated once it arrived on site and the geoprobe sampling equipment was decontaminated after completion of each soil borehole. The equipment was decontaminated by removing the caked soil material from the exterior of equipment using a rod and/or brush, steam cleaning the interior and exterior of equipment, allowing the equipment to air dry as long as possible, and wrapping or covering the equipment in plastic.

2.6.2 Sampling Equipment

Decontamination of equipment used for soil sampling and collection of groundwater samples was conducted at the temporary decontamination area. Nondedicated equipment was decontaminated after each use. The sampling equipment was washed with potable water and phosphate-free detergent using various types of brushes required to remove particulate matter and surface films, followed by a potable water rinse, American Society of Testing and Materials (ASTM) Type I or equivalent water rinse, isopropyl alcohol rinse, ASTM Type I or equivalent water rinse, allowed to air dry, and wrapped in plastic or aluminum foil.

In addition to the sampling equipment, field measurement instruments were also decontaminated between uses. Only those portions of each instrument that come into contact with potentially contaminated environmental media were decontaminated. Because of the delicate nature of these instruments, the decontamination procedure only involved initial rinsing of the instrument probes with ASTM Type I or equivalent water.

2.7 Documentation of field activities

All information pertinent to sampling activities, including instrument calibration data, was recorded in field logbooks. The logbooks were bound and the pages consecutively numbered. Entries in the logbooks were made in black permanent ink and included, at a minimum, a description of all activities, individuals involved in drilling and sampling activities, date and time of drilling and sampling, weather conditions, any problems encountered, and all field measurements. Sufficient information was recorded in the logbooks to permit reconstruction of all sampling activities

3.0 SAMPLE HANDLING AND ANALYSIS

3.1 Analytical Program

Soil samples were screened for the presence of volatile vapors using a organic vapor analyzer (OVA). The OVA was calibrated daily using 100 parts per million (ppm) isobutylene. The headspace of each sample was measured approximately 15 minutes after collection.

For sites where the UST had contained waste oil, soil samples were analyzed for BTEX by method SW846-8020, PAH by method SW846-8270, and TPH by method SW846-9073. Groundwater samples were analyzed for BTEX by method SW 846-8240 and PAH by method SW 846-8270. All samples were sent to General Engineering Laboratories, Charleston, South Carolina.

For sites where the UST had contained gasoline or diesel, soil samples were analyzed for BTEX by method SW 846-8020, PAH by method SW 846-8270, and TPH by method SW 846-8015 (modified). Groundwater samples were analyzed for BTEX by method SW 846-8240 and PAH by method SW 846-8270. TPH analysis included both gasoline range organics (GRO) and diesel range organics (DRO). All samples were sent to General Engineering Laboratories, Charleston, South Carolina.

Duplicate samples of soil and groundwater were collected throughout the project and represented approximately 10 percent of the total sample population. Rinsate blanks were collected to determine whether the sampling equipment was causing cross-contamination of the samples and represented approximately 5 percent of the total sample population. Duplicates and rinsates were submitted to General Engineering Laboratories, Charleston, South Carolina.

3.2 Sample Containers, Preservation, and Holding Times

The soil sample containers, preservatives, and holding times are summarized in Table A-1. The groundwater sample containers, preservatives, and holding times are summarized in Table A-2.

3.3 Sampling Packaging and Shipment

Each sample container was labeled, taped shut with electrical tape (except those containing samples designated for volatile organic analysis), and an initialed/dated custody seal was placed over the lid. Each sample bottle was placed into a separate plastic bag and sealed. The samples were placed upright in thermally insulated rigid-body coolers and surrounded by vermiculite to prevent breakage during shipment. In addition, samples were cooled to approximately 4° C with wet ice. These measures were taken to slow the decomposition and volatilization of contaminants during shipping and handling. The sample coolers were shipped to the analytical laboratory via courier service provided by the laboratory.

Table A-1. Summary of Sample Containers, Preservation Techniques, and Holding Times for Soil Samples Collected During the Site Investigation

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
BTEX	1 – 4 oz jar with Teflon®-lined cap (no headspace)	20 g	Cool, 4°C	14 d
TPH-GRO	use same container as BTEX	20 g	Cool, 4°C	14 d
PAHs	1 – 8 oz jar with Teflon®-lined cap	90 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
TPH-DRO	use same container as PAHs	90 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
TPH	use same container as PAHs	90 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
Metals (lead)	use same container as PAHs	20 g	Cool, 4°C	180 d

Table A-2. Summary of Sample Containers, Preservation Techniques, and Holding Times for Groundwater Samples Collected During the Site Investigation

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
BTEX	2 – 40 mL glass vials with Teflon®-lined septum (no headspace)	40 mL	Cool, 4°C HCl to pH < 2	14 d
PAHs	2 – 1L amber glass bottle with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)

ATTACHMENT B

REFERENCES

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