FINAL

CORRECTIVE ACTION PLAN - PART A REPORT
FOR
UNDERGROUND STORAGE TANK 214
FACILITY ID #9-089015
BUILDING 1503
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:

Science Applications International Corporation
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830

August 1999

TABLE OF CONTENTS

List of Appendices

Attachments

List of Abbreviations and Acronyms

ACE	Anderson Columbia Environmental, Inc.
ACL	alternate concentration limits
AMSL	above mean sea level
ARAR	applicable, relevant, and appropriate requirement
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
COCs	chemicals of concern
DAF	dilution-attenuation factor
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
HQ	hazard quotient
ID	inside diameter
IDW	investigation-derived waste
MCL	maximum contaminant level
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
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
USTMP	Underground Storage Tank Management Program

CORRECTIVE ACTION PLAN PART A

Facility Name: UST 214, Building 1503 Street Address: West 6th Street Southeast of McFarland Avenue.

Facility ID: 9-089015 City: Fort Stewart County: Liberty Zip Code: 31314

Latitude: 31° 51′ 51″ Longitude: 81° 37′ 15″

Submitted by UST Owner/Operator:	Prepared by Consultant/Contractor:
Name: Thomas C. Fry/ Environmental Branch	Name: Patricia A. Stoll
Company: U.S. Army/HQ 3d, Inf. Div (Mech)	Company: SAIC
Address: DPW ENRD ENV. Br. (Fry)	Address: P.O. Box 2502
1557 Frank Cochran Drive	
City: Fort Stewart State: GA	City: Oak Ridge State: TN
Zip Code: 31314-4928	Zip Code: 37831
Telephone: (912) 767-2010	Telephone: (423) 481-8792

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: 09/07/99

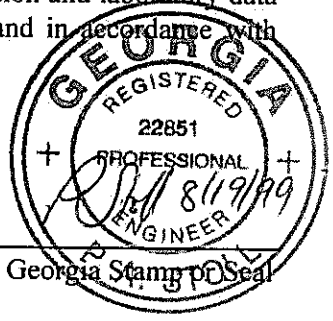
B. Registered Professional Engineer or Professional Geologist Certification

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: 8/19/99



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 214 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 214.

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
214	550	used oil	8/1/96

D. Initial Site Characterization

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

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

Anderson Columbia Environmental, Inc. (ACE) initiated characterization of petroleum-related contamination at the site during UST system closure activities on August 1, 1996. After removing the tank, one soil sample was collected from the tank pit (Figure 7). No BTEX compounds were detected in sample TK214-S1. However, the benzene detection limit of 0.112 mg/kg exceeded the applicable soil threshold level. TPH was detected in this sample at a concentration of 394 mg/kg. No groundwater samples were collected during the tank removal 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 214 and ancillary piping as configured during operation is presented in Figure 2. 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:*	2200	*feet*
ii. *Nearest down-gradient public water supply located within:*	>5280	*feet*
iii. *Nearest non-public water supply located within:*	>10,560	*feet*
iv. *Nearest down-gradient non-public water supply located within:*	>10,560	*feet*

c. *Surface Water Bodies and sewers:*

i. *Nearest surface water located within*	1700	*feet*
ii. *Nearest down-gradient surface water located within*	2000	*feet*
iii. *Nearest storm or sanitary sewer located within:*	5	*feet*
iv. *Depth to bottom of sewer at a point nearest the plume*	11.0	*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 1.5- or 2.0-foot intervals during the installation of six 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 BTEX, TPH, and PAH. In boreholes where organic vapors were detected, one sample was collected from the sample interval where the highest vapor concentration was recorded, and the other from the deepest sample interval with the lowest concentration. If organic vapors were not detected, one sample was collected from the sample interval nearest the midpoint of the boring, and the other from the sample 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 X NO ____

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

The benzene detection limit in the closure soil sample was 0.112 mg/kg. The exact location and depth of this sample is unknown. CAP-Part A investigation soil samples did not contain contaminant concentrations above applicable soil threshold levels.

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 temporary piezometer screened from ground surface to approximately 5.0 feet below the water table. At the vertical profile location (63-07), 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 X NO ____

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

YES ____ NO X

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

In May 1998, benzene was present in borings 63-01 and 63-02 at concentrations of 37.1 µg/L and 11.6 µg/L, respectively. Both of these borings were located within the former tank pit.

In September 1998, the investigation was extended to include additional sampling in an effort to determine extent. BTEX was not present in the four additional borings that were installed around the perimeter of contamination in September 1998. The 6.0 – 10.0 feet BGS interval of the vertical profile boring (63-07) contained 24.8 µg/L of benzene. Refer to Attachment C for supplemental information on risk screening and fate and transport modeling.

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):* 5.66 – 13.0 *(Table 4: Groundwater Elevations)*
b. *Groundwater Flow Direction:* south *(Figure 6: Potentiometric Surface Map)*
c. *Hydraulic Gradient* 0.0108 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 214 on August 1, 1996. The UST piping was drained into the tank, and all used 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 were lifted from the excavation pit. The ancillary piping was closed in-place due to the fact that it was located underneath a building. In-place closure consisted of purging the line and grouting the end as it enters Building 1503.

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:

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 Closure Report was not submitted to GA EPD in 1996 because review of the closure analytical data indicated that a CAP-Part A would be required (i.e., per requirements of GUST-9, Item 15, page 12, dated August 1995). However, all pertinent information (i.e., copies of analytical data, manifests, and maps) are provided in this CAP-Part A Report. Disposal manifests for the UST 214 site were submitted to GA EPD USTMP in September 1998 with the UST 207A (Facility ID#9-089039) Closure Report response to comments correspondence (Perez 1998). Approximately 22.67 tons of contaminated soil was excavated from the site.

7. Site Ranking:
Environmental Site Sensitivity Score: 2600
(Appendix X: Site Ranking Form)

8. Conclusions and Recommendations
Complete applicable section below, one section only

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

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

There was no soil contamination in excess of applicable GUST soil threshold levels (i.e., Table A Column 2) during the CAP-Part A investigation. However, the benzene detection limit in the closure soil sample exceeded the applicable soil threshold level. Benzene was detected in three CAP-Part A groundwater samples from three temporary wells with the highest concentration being 37.1 µg/L. Fate and transport modeling results indicate that maximum predicted benzene concentrations in excess of the 5 µg/L MCL may extend up to 50 feet from the former tank pit. These results have been confirmed by CAP-Part A sampling results. In addition, benzene will not reach the drainage ditch located 200 feet south of the site at detectable concentrations. The horizontal and vertical extent of contamination was determined during the CAP-Part A.

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

III. MONITORING ONLY PLAN (if applicable): N/A _____

A. Monitoring points

Four shallow monitoring wells will be installed as part of the long-term monitoring program as shown in Figure 8. The shallow wells will be screened across the water table with 3 to 5 feet of screen above the water table in order to detect the presence of free product. All monitoring wells will be completed flush with the ground surface. Boring logs and well construction diagrams will be provided in the first annual monitoring only report.

B. Period/Frequency of monitoring and reporting

Groundwater monitoring will be completed on a semiannual basis and the results will be summarized in an annual monitoring only report submitted to GA EPD. Monitoring will continue for a period of up to two years, for a total of up to four sampling events.

C. Monitoring Parameters

One groundwater sample will be collected from each of the four monitoring wells and analyzed for BTEX. Fluorene, naphthalene, and phenanthrene were the only PAH compounds detected in groundwater during the CAP-Part A investigation, however, the concentrations are below their respective risk screening criteria provided in Attachment C. Thus, PAH analysis will not be performed during the semiannual monitoring.

D. Milestone Schedule

Monitoring well installation will be conducted pending the availability of FY2000 funding. A milestone schedule will be provided to GA EPD upon availability of funds and approval of the monitoring only plan.

E. Scenarios for site closure or CAP-Part B

The monitoring system will be evaluated annually. A recommendation for no further action required will be made if benzene concentrations remain below the predicted two-year maximum concentrations that will be presented in the Monitoring Only Report.

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 N/A X

3. Surface Water N/A X

B. Proposed Investigation of Vadose Zone And Aquifer Characteristics:

Additional vadose zone and aquifer characteristics were collected as part of the CAP-Part A investigation, thus no additional data is required.

V. PUBLIC NOTICE

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

UST 214 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 June 27 and July 4, 1999.

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

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

Fort Stewart is a federally owned facility and has funded the investigation for UST 214, Building 1503, Facility ID #9-089015, using Department of Defense Environmental Restoration Account Funds. Application for Georgia Underground Storage Tank Trust Fund reimbursement is not being pursued at this time.

APPENDIX I

REPORT FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

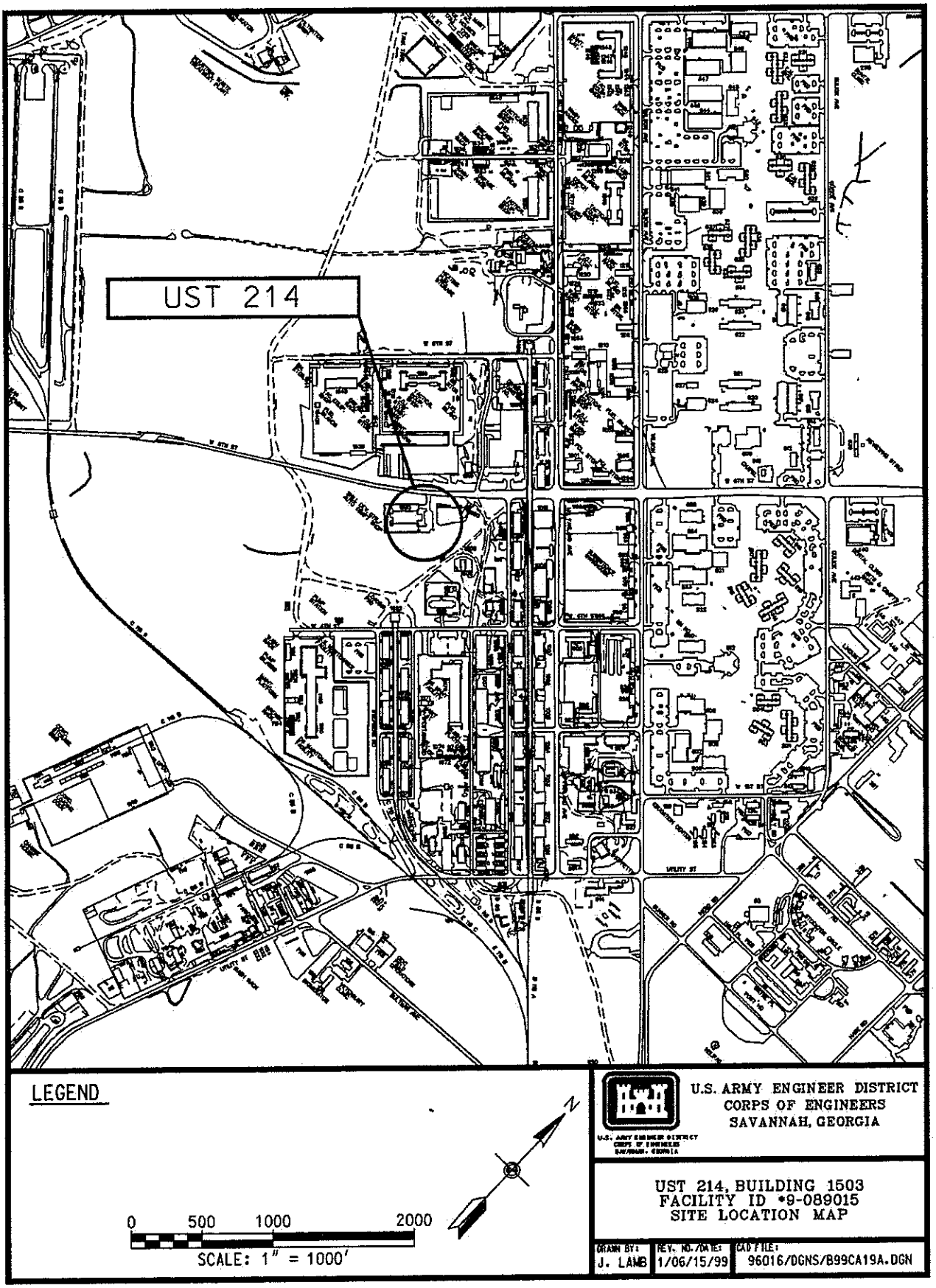


Figure 1. Location Map of UST 214, Fort Stewart, Liberty County, Georgia

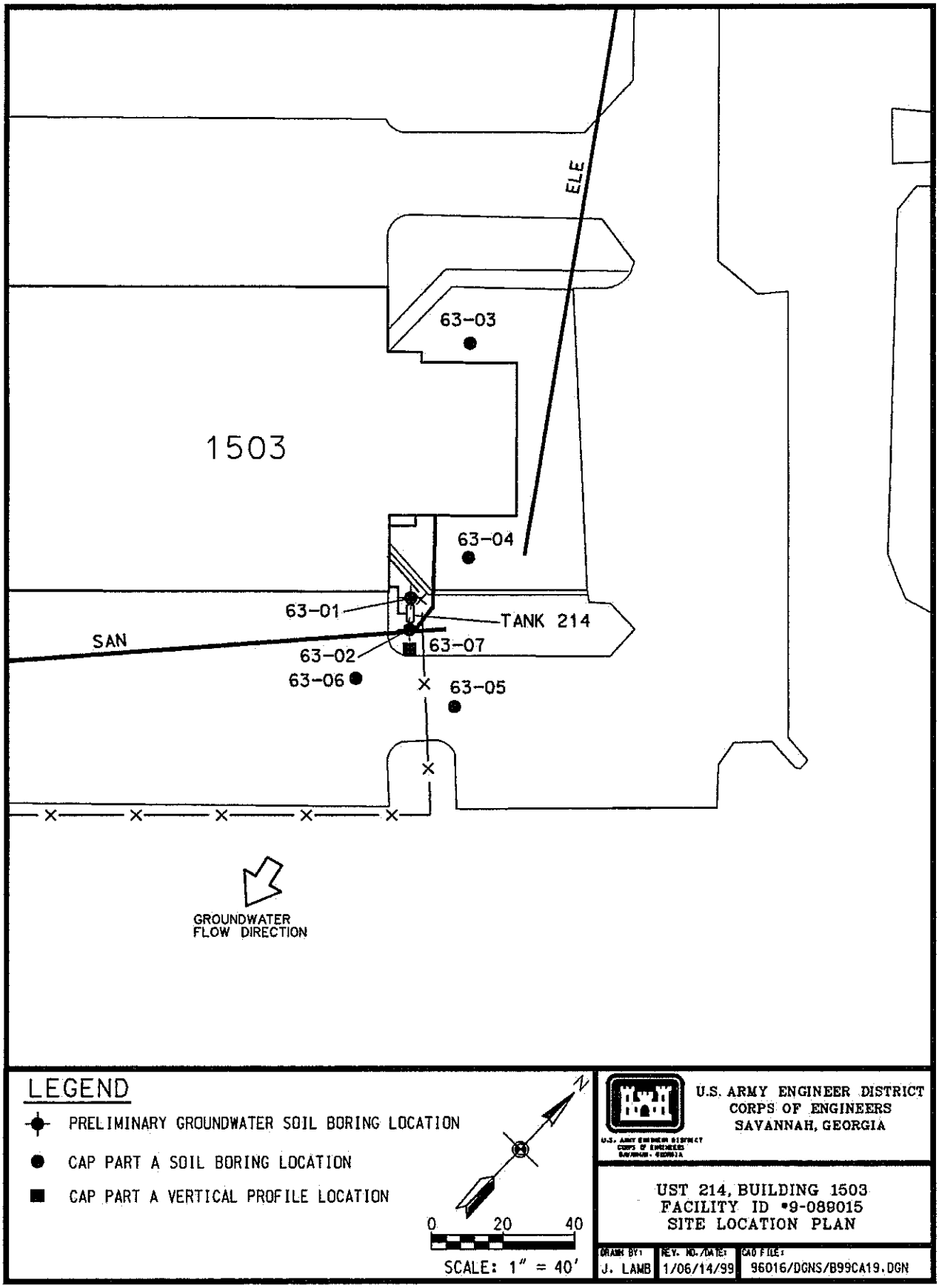


Figure 2. Site Plan for the UST 214 Site Investigation

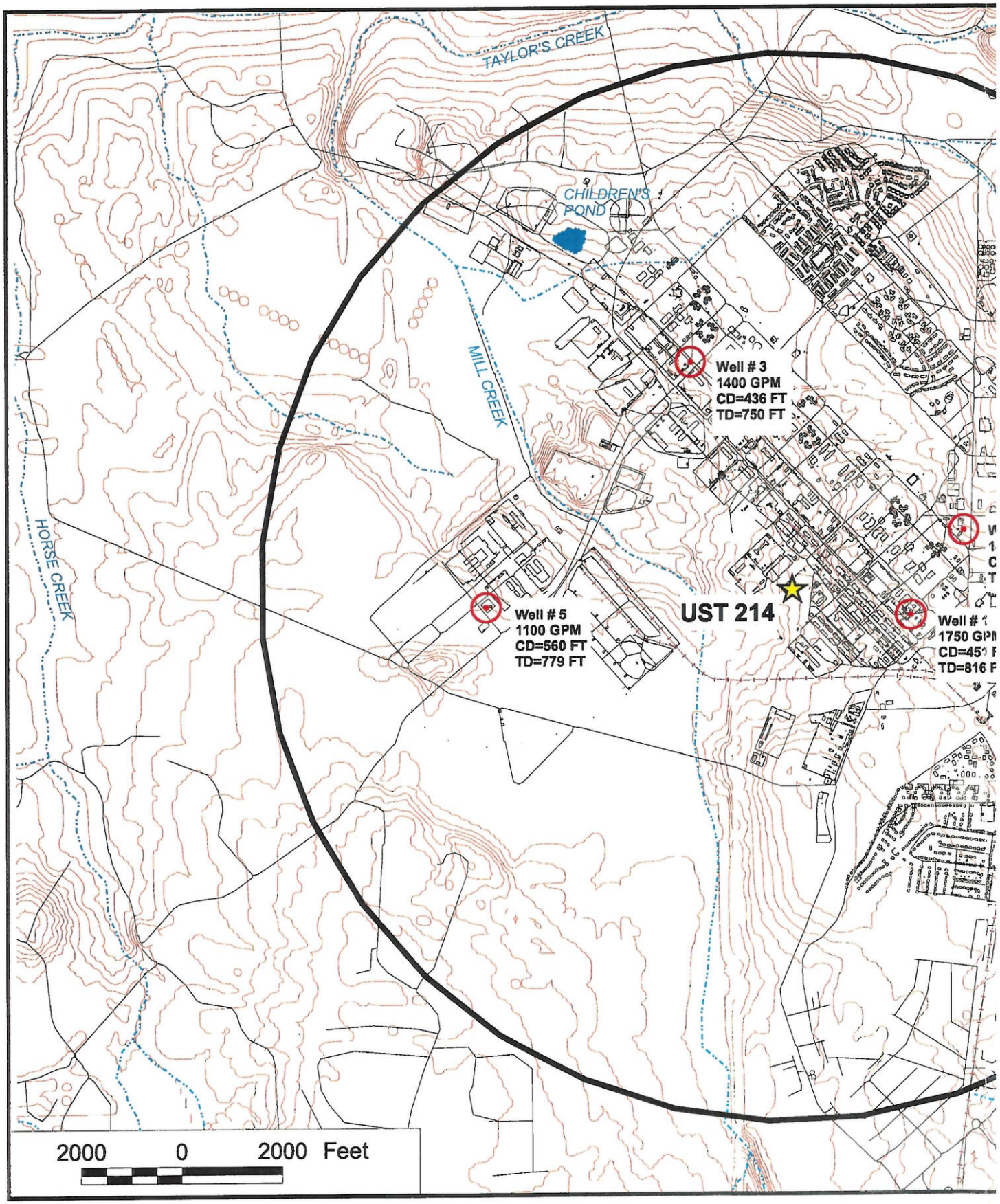


Figure 3. Map Showing Public and Private Drinking Water S
Bodies at Fort Stewart, Liberty County, G

THIS PAGE INTENTIONALLY LEFT BLANK

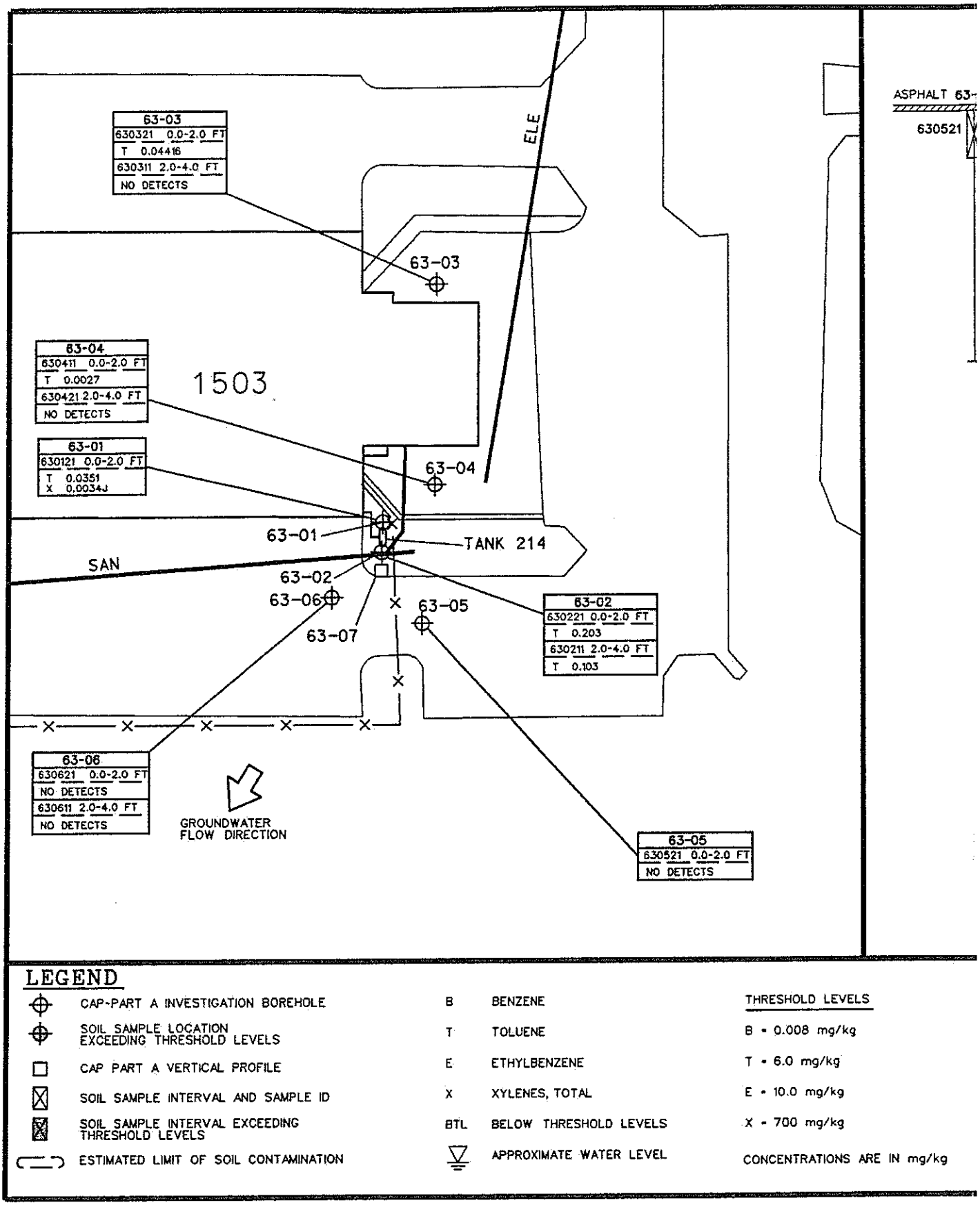


Figure 4. Soil Quality

THIS PAGE INTENTIONALLY LEFT BLANK

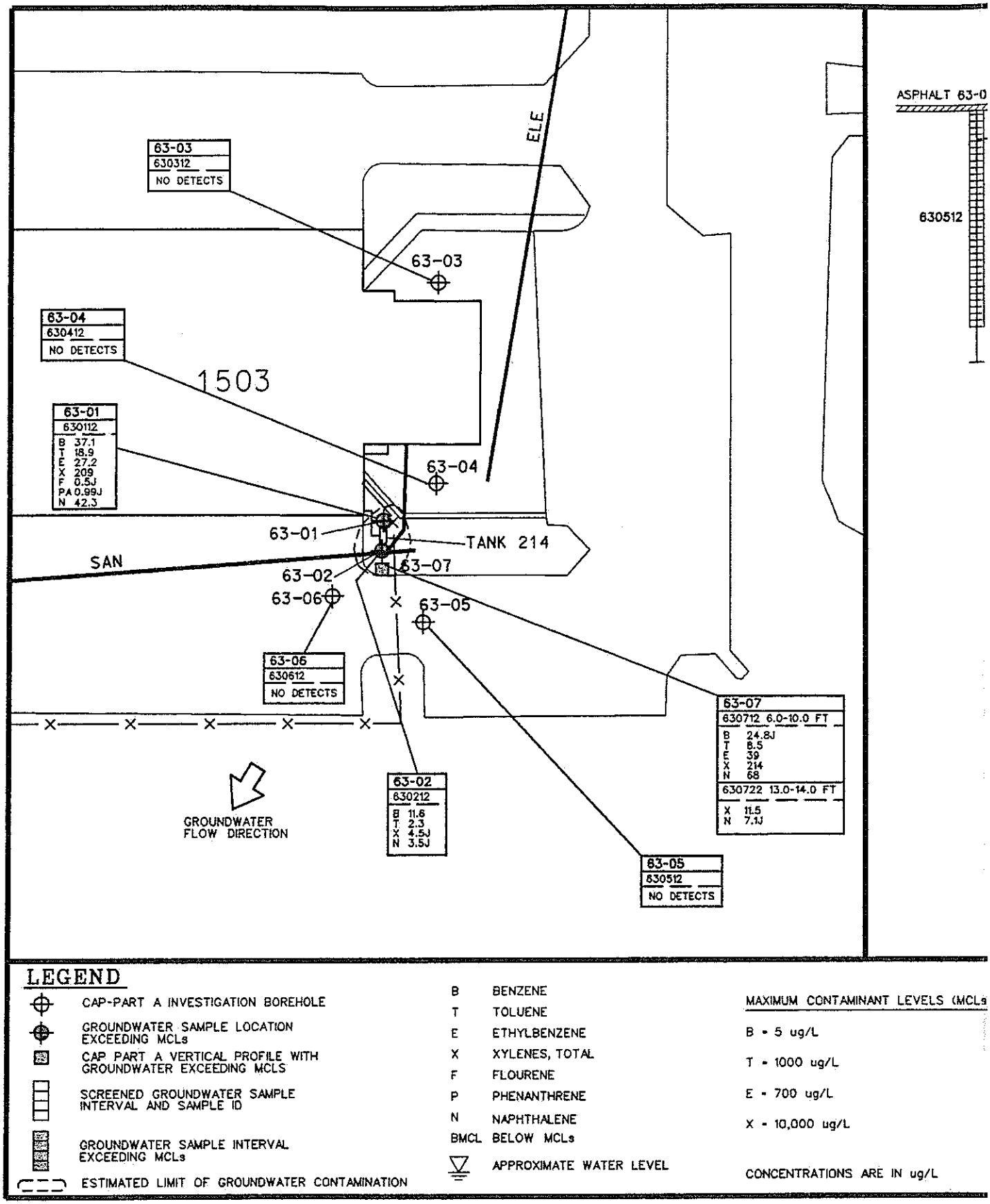


Figure 5. Groundwater Q

THIS PAGE INTENTIONALLY LEFT BLANK

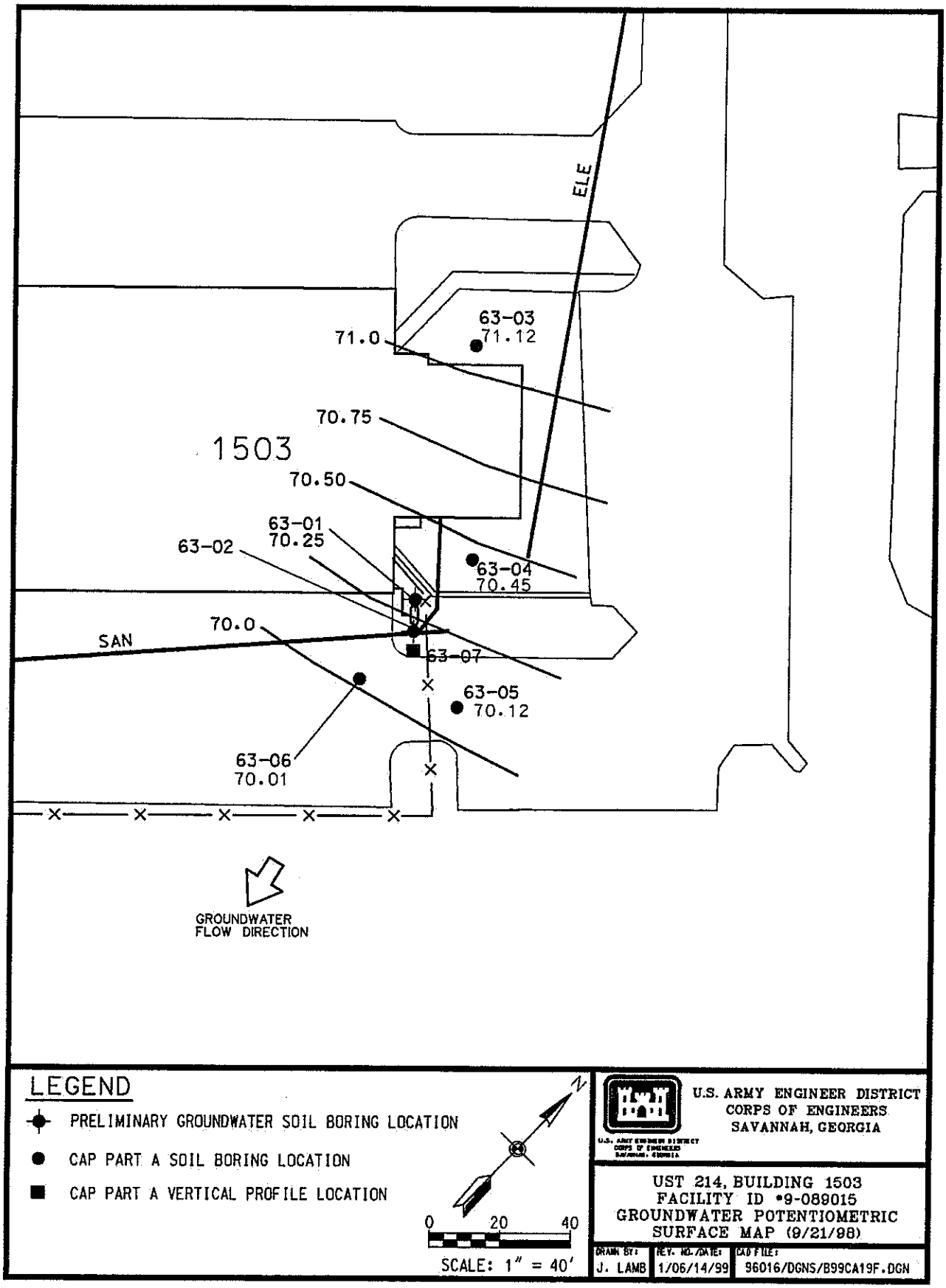


Figure 6. Potentiometric Surface Map of the UST 214 Site

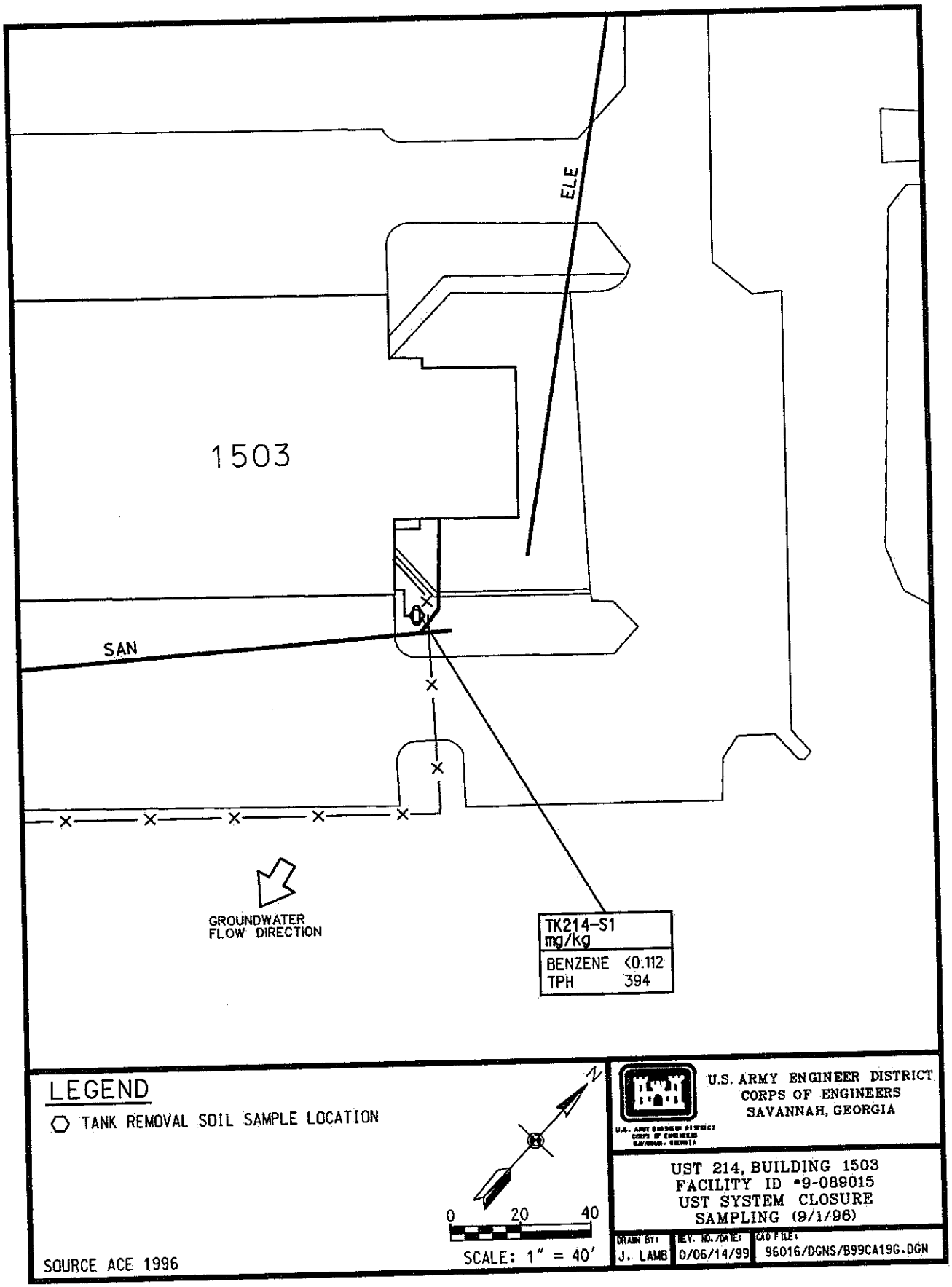


Figure 7. UST System Closure Sampling Locations at the UST 214 Site

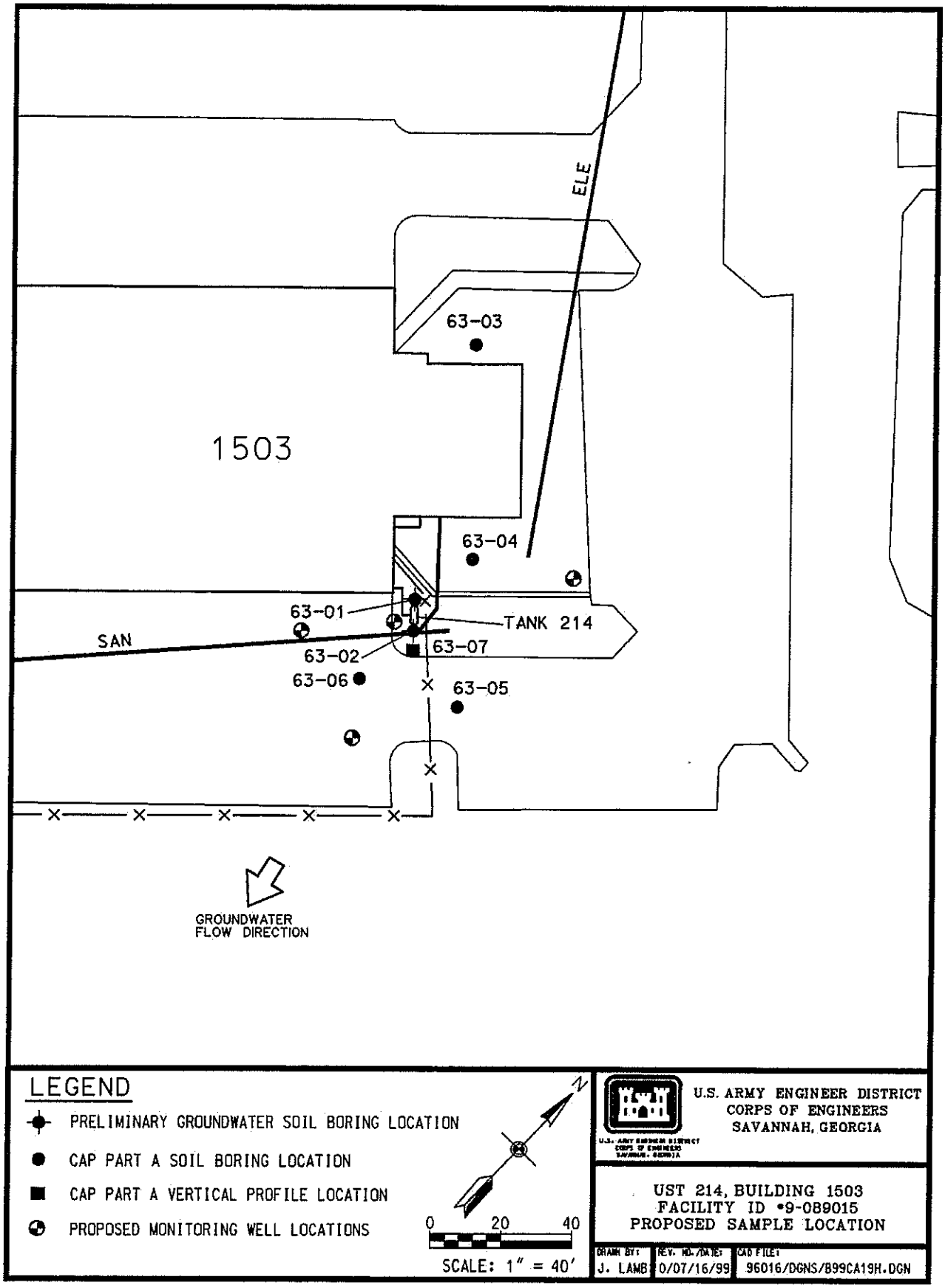


Figure 8. Proposed Additional Boring/Monitoring Well Locations

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

Figure 9. Tax Map

APPENDIX II

REPORT TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

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)
63-01	630121	0.0 - 2.0	5/9/98	0.0022 U	0.0351 =	0.0022 U	0.0034 J	0.0351	224 =
63-02	630211	2.0 - 4.0	5/9/98	0.0042 U	0.103 =	0.0042 U	0.0125 U	0.103	10.4 U
63-02	630221	0.0 - 2.0	5/9/98	0.0021 U	0.203 =	0.0021 U	0.0063 U	0.203	18.8 =
63-03	630311	2.0 - 4.0	9/19/98	0.0022 U	0.0022 U	0.0022 U	0.0066 U	ND	18 J
63-03	630321	0.0 - 2.0	9/19/98	0.0022 U	0.0416 =	0.0022 U	0.0066 U	0.0416	16.3 J
63-04	630411	0.0 - 2.0	9/19/98	0.0022 U	0.0027 =	0.0022 U	0.0065 U	0.0027	10.5 UJ
63-04	630421	2.0 - 4.0	9/19/98	0.0022 U	0.0022 U	0.0022 U	0.0066 U	ND	9.44 J
63-05	630521	0.0 - 2.0	9/19/98	0.0021 U	0.0021 U	0.0021 U	0.0064 U	ND	14.6 J
63-06	630611	2.0 - 4.0	9/19/98	0.0022 U	0.0022 U	0.0022 U	0.0065 U	ND	2.87 UJ
63-06	630621	0.0 - 2.0	9/19/98	0.0025 U	0.0025 U	0.0025 U	0.0074 U	ND	17.3 J
Applicable Standards[1]				0.008	6	10	700	NRC	NRC

NOTES:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998, thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

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

BGS Below ground surface

BTEX Benzene, toluene, ethylbenzene, and xylene

ND Not detected

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)
63-01	630121	0.0 - 2.0	5/9/98							ND
63-02	630211	2.0 - 4.0	5/9/98							ND
63-02	630221	0.0 - 2.0	5/9/98							ND
63-03	630311	2.0 - 4.0	9/19/98							ND
63-03	630321	0.0 - 2.0	9/19/98							ND
63-04	630411	0.0 - 2.0	9/19/98							ND
63-04	630421	2.0 - 4.0	9/19/98							ND
63-05	630521	0.0 - 2.0	9/19/98							ND
63-06	630611	2.0 - 4.0	9/19/98							ND
63-06	630621	0.0 - 2.0	9/19/98							ND
Applicable Standards[1]										NRC

NOTES:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998, thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

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

BGS Below ground surface

ND Not detected (refer to Appendix V, Table V-A, for complete list of PAH results)

NRC No regulatory criteria

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)
63-01	630112	3.0 - 8.0	5/9/98	37.1 =	18.9 =	27.2 =	209 =	292.2
63-02	630212	1.0 - 11.0	5/9/98	11.6 =	2.3 =	2 U	4.5 J	13.9
63-03	630312	0.0 - 9.5	9/19/98	2 U	2 U	2 U	6 U	ND
63-04	630412	0.0 - 8.8	9/19/98	2 U	2 U	2 U	6 U	ND
63-05	630512	0.0 - 8.2	9/19/98	2 U	2 U	2 U	6 U	ND
63-06	630612	0.0 - 9.6	9/19/98	2 U	2 U	2 U	6 U	ND
63-07	630712	6.0 - 10.0	9/19/98	24.8 J	8.5 =	39 =	214 =	286.3
63-07	630722	13.0 - 14.0	9/19/98	2 U	2 U	2 U	11.5 =	11.5
Applicable Standards[1]				5	1000	700	10000	NRC

NOTE:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998, thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

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

BTEX Benzene, toluene, ethylbenzene, and xylene

BGS Below ground surface

ND Not detected

NRC No regulatory criteria

Laboratory Qualifiers

U Indicates 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 the value for the compound is an estimated value.

= Indicates the compound was detected at the concentration reported.

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

Sample Location	Sample ID	Depth (ft BGS)	Date Sampled	Detected PAH Compounds (ug/L)				Total PAH (ug/L)
				Fluorene	Naphthalene	Phenanthrene		
63-01	630112	3.0 - 8.0	5/9/98	0.5 J	42.3 =	0.99 J		43.79
63-02	630212	1.0 - 11.0	5/9/98		3.5 J			3.5
63-03	630312	0.0 - 9.5	9/19/98					ND
63-04	630412	0.0 - 8.8	9/19/98					ND
63-05	630512	0.0 - 8.2	9/19/98					ND
63-06	630612	0.0 - 9.6	9/19/98					ND
63-07	630712	6.0 - 10.0	9/19/98		68 =			68
63-07	630722	13.0 - 14.0	9/19/98		7.1 J			7.1
Applicable Standards[1]				NRC	NRC	NRC		NRC

NOTE:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998, thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

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

BGS Below ground surface
N/A Not analyzes, insufficient sample volume for analysis
ND Not detected (refer to Appendix VIII, Table VIII-A, for complete list of PAH results)
NRC No regulatory criteria
PAH Polynuclear aromatic hydrocarbon

Laboratory Qualifiers

U Indicates 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 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)
63-01	5/10/98	76.20	78.64	3.0 - 8.0	N/A	12.38	N/A	N/A	66.26
63-02	5/10/98	76.43	80.25	1.0 - 11.0	N/A	13.02	N/A	N/A	67.23
63-03	9/21/98	76.79	77.31	0.0 - 9.5	N/A	6.19	N/A	N/A	71.12
63-04	9/21/98	76.50	77.67	0.0 - 8.8	N/A	7.22	N/A	N/A	70.45
63-05	9/21/98	75.68	75.78	0.0 - 8.2	N/A	5.66	N/A	N/A	70.12
63-06	9/21/98	75.86	76.29	0.0 - 9.6	N/A	6.28	N/A	N/A	70.01

NOTE:

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

TABLE 5a: UST SYSTEM CLOSURE[1] - SOIL ANALYTICAL RESULTS
(VOLATILE ORGANIC COMPOUNDS)

Sample Location	Depth (ft BGS)	Date Sampled	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH (mg/kg)
TK214-S1	unknown	9/1/96	0.112 U	0.112 U	0.112 U	0.112 U	ND	394 =
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)
TK214-S1	unknown	9/1/96					ND
Applicable Standards[2]							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)
BGS	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylene
NRC	No regulatory criteria
PAH	Polynuclear aromatic hydrocarbon
TPH	Total petroleum hydrocarbons

Laboratory Qualifiers

U	Indicates 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 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)
			No Groundwater Samples Collected				
Applicable Standards[2]			5	1000	700	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)
			No Groundwater Samples Collected				
Applicable Standards[2]							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
NRC	No regulatory criteria
PAH	Polynuclear aromatic hydrocarbons

Laboratory Qualifiers

U	Indicates 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 the value for the compound is an estimated value.
=	Indicates the compound was detected at the concentration reported.

APPENDIX III

WATER RESOURCES SURVEY DOCUMENTATION

THIS PAGE INTENTIONALLY LEFT BLANK

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 Floridian) 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 214 SITE

A field potential receptor survey was conducted for the UST 214 site in May 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 214 Site

The UST 214 site is located approximately 2200 feet northwest (sidegradient) of Well #1. Therefore, the UST 214 site is classified as being located greater than 500 feet to a withdrawal point. The nearest downgradient water supply well is located in the city of Hinesville and is located more than 5280 feet southeast of the UST 214 site.

2.2 Surface Water Bodies Near the UST 214 Site

At the closest point to the site, Mill Creek is located approximately 1700 feet west of the site. In the direction of groundwater flow, a storm water drainage ditch is located approximately 200 feet south of the site and Mill Creek is located approximately 2000 feet southwest of the site. Based on the distances between the UST and the nearest surface water body, the site is classified as being located less than 500 feet to a downgradient surface water body.

2.3 Underground Utility Lines Near the UST 214 Site

A sanitary sewer line is located about 5 feet southeast of the former tank pit. The invert elevation of this line is estimated to be approximately 64.4 feet AMSL or approximately 11.0 feet BGS, which is below the water table, thus the sanitary sewer line is considered a preferential pathway.

Science Applications International Corporation

CONTACT REPORT

INDIVIDUAL CONTACTED, TITLE: Pam Babbs	ORIGINATOR: Patty Stoll
ORGANIZATION: Fort Stewart DPW - Water Resources	DATE CONTACTED: October 10, 1998
PHONE: 912 - 767 - 2281	TIME CONTACTED: 11:00 am
ADDRESS:	CONTACT TYPE: telephone

SUBJECT: Update Supply Well Information for Fort Stewart Supply Wells for Water Resources Survey

DISCUSSION:

During a telephone conversation with Pam Babbs on October 10, 1998 the following information on the supply wells at Fort Stewart was provided.

Well No.1 1750 gpm, CD = 451 ft, TD = 816 ft
Well No.2 1400 gpm, CD = 470 ft, TD = 808 ft
Well No.3 1400 gpm, CD = 436 ft, TD = 750 ft
Well No.5 1100 gpm, CD = 560 ft, TD = 779 ft
Well No.6A 500 gpm, CD = 374 ft, TD = 472 ft
Well No.6B 500 gpm, CD = 393 ft, TD = 508 ft
Evans Well 190 gpm, CD = 404 ft, TD = 600 ft
Camp Oliver Well 400 gpm, CD = 451 ft, TD = 706 ft

COMMENTS, ACTIONS, DATES

Incorporate new pumping rate data into the CAP Part A and B reports being prepared for Fort Stewart.

DISTRIBUTION: Melanie Little (Fort Stewart DPW)
Central Records (SAIC)
Project File (SAIC)

Science Applications International Corporation

CONTACT REPORT

INDIVIDUAL CONTACTED, TITLE: Jeff Barnes	ORIGINATOR: Patty Stoll
ORGANIZATION: Georgia Department of Natural Resources	DATE CONTACTED: October 1, 1997
PHONE: 912 - 353 - 3225	TIME CONTACTED: 11:00 am
ADDRESS:	CONTACT TYPE: telephone

SUBJECT: Update Supply Well Information for Liberty County Supply Wells for Water Resources Survey

DISCUSSION:	COMMENTS, ACTIONS, DATES
During a telephone conversation with the Ga DNR, regarding drinking water wells in Liberty County, it was suggested I contact Mr. Jeff Barnes. After being transfered to Mr. Jeff Barnes and explaining our needs, he agreed to send a printout of the permitted drinking water systems in Liberty County. On October 17, 1997 we received the list of permitted drinking water systems in Liberty County.	Review list of permitted drinking water supply wells for proximity to Fort Stewart CAP Part A and B sites.

DISTRIBUTION: Melanie Little (Fort Stewart DPW)
Central Records (SAIC)
Project File (SAIC)

APPENDIX IV

SOIL BORING LOGS

THIS PAGE INTENTIONALLY LEFT BLANK

HTRW DRILLING LOG

HOLE NUMBER 63-01

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)
	0–2	Sandy SILT, 15% sand, fine to medium grained, subrounded, soft, moist, reddish brown (5YR 4/4) mottled with brownish yellow (10YR 6/6) and dark brown (10YR 3/3)	10.3ppm		Soil Sample 63012I	
	2–4	No Recovery	N/A			▼ Wet below 4.0 FT BGS
	4–6	Sandy SILT, 15% sand, fine to medium grained, subrounded, soft, wet, black (10YR 2/1)	Oppm			
	6–8		Oppm			
	8–10	No Recovery				End of drilling at 8.0 FT Set piezometer

HTRW DRILLING LOG

HOLE NUMBER 63-02

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)
	1–2	Sandy SILT. 5% sand, fine to medium grained, subrounded, soft, dry. black (10YR 2/1)	0ppm		Soil Sample 630221	
	3	SAND. 10% medium grained. 90% very fine grained, very soft, dry, subrounded, light gray (10YR 7/1)	0ppm		Soil Sample 630211	
	4	No Recovery				
						▼ Wet below 4.5 FT BGS
	5	Sandy SILT. 5% sand, subrounded, fine grained, firm, wet, black (10YR 2/1)	0ppm			
	6–7		0ppm			
	8–9					Pushed to 11.0 FT and set piezometer
	10					

HTRW DRILLING LOG

HOLE NUMBER 63-03

PROJECT: Fort Stewart USTs | INSPECTOR 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)
	0–2	Sandy SILT (ML), 10% fine to medium grained sand, firm, moist, dark brown (10 YR 3/3)	35 ppm		Soil Sample 630321	
	2–4		6 ppm		Soil Sample 630311	
	4					▽ WET BELOW 4.3 FT BGS
	7–9	sandy SILT (ML), 10% fine to medium grained sand, firm, wet, brown (10 YR 4/3)				COLLECTED GROUNDWATER SAMPLE 630312 FROM TEMPORARY PIEZOMETER SCREENED AT 0 to 9.5 FT BGS (10 FT SCREEN)
	9.5					REFUSAL AT 9.5 FT BGS

HTRW DRILLING LOG

HOLE NUMBER 63-04

PROJECT: Fort Stewart USTs | INSPECTOR 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)
	0–2	sandy SILT (ML), 10% fine to medium grained sand, subrounded, soft, dry, black (10YR 2/1)	29ppm		Soil Sample 630411	
	2–4	silty SAND (SM), 10% silt, fine to medium grained, subrounded, soft, moist, brownish yellow (10YR 6/6)	386ppm		Soil Sample 630421	
	4–6	sandy SILT (ML), 10% medium grained sand, soft, moist, black (10YR 2/1)	52ppm			▽ WET BELOW 4.9 FT BGS
	6–8					COLLECTED GROUNDWATER SAMPLE 630412 FROM TEMPORARY PIEZOMETER SCREENED AT 0 TO 8.8 FT BGS (10 FT SCREEN)
	8–10					PUSHED TO 8.8 FT BGS TO SET TEMPORARY PIEZOMETER

HTRW DRILLING LOG

HOLE NUMBER 63-05

PROJECT: Fort Stewart USTs | INSPECTOR 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	ASPHALT				
		Sand & gravel base for asphalt				
	1	Sandy SILT (ML), 5% fine grained sand, soft, dry, dark gray (10YR4/1) to black (10YR2/1)	30ppm		Soil Sample 630521	▽ WET BELOW 1.3 FT BGS
	2					
	3					
	4					
	5					
	6					
	7					
	8					COLLECTED GROUNDWATER SAMPLE 630512 FROM TEMPORARY PIEZOMETER SCREENED AT 0 TO 8.15 FT BGS (10 FT SCREEN)
	9					
	10					PUSHED TO 9.5 FT BGS TO SET TEMPORARY PIEZOMETER

HTRW DRILLING LOG

HOLE NUMBER 63-06

PROJECT: Fort Stewart USTs | INSPECTOR 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	ASPHALT				
		sand & gravel base for asphalt				
	1	Sandy SILT (ML), 5% fine to medium grained sand, soft, moist, dark brown (10 YR 3/3)	74ppm		Soil Sample 630621	
	2					
	3	sandy SILT (ML) 15% fine to medium grained sand, soft, moist, brown (10YR4/3)	45ppm		Soil Sample 630611	
	4					▽ WET BELOW 4.0 FT BGS
	5					
	6					
	7					
	8					COLLECTED GROUNDWATER SAMPLE 630612 FROM TEMPORARY PIEZOMETER SCREENED AT 0 TO 9.6 FT BGS (10 FT SCREEN)
	9					
	10					PUSHED TO 9.6 FT BGS TO SET TEMPORARY PIEZOMETER

HTRW DRILLING LOG

HOLE NUMBER 63-07

PROJECT: Fort Stewart USTs | INSPECTOR J. Celeste | SHEET 1 OF 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	DID NOT COLLECT SOIL FOR LITHOLOGY DESCRIPTION. NO SOIL CUTTINGS FROM GEOPROBE.				
	1					
	2					
	3					
	4					
	5					
	6		10ppm		GW Sample 630712	Vertical profile screened from 6.0 to 10.0 ft BGS
	7					
	8					
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER 63-07

PROJECT: Fort Stewart USTs | INSPECTOR J. Celeste | SHEET 2 OF 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11					
	12					
	13					
			16ppm		GW Sample 630722	Vertical profile screened from 13.2 to 13.8 ft BGS
	14					
		REFUSAL @ 14.5 FT BGS				
	15					
	16					
	17					
	18					
	19					
	20					

APPENDIX V

SOIL LABORATORY REPORTS

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE V-A. Summary of Soil Analytical Results

Station:	GA UST	63-01	63-02	63-02	63-03	63-03
Sample ID:	Soil	630121	630211	630221	630311	630321
Sample Interval (ft BGS):	Threshold	0.0 - 2.0	2.0 - 4.0	0.0 - 2.0	2.0 - 4.0	0.0 - 2.0
Collection Date:	Level[1]	9-May-98	9-May-98	9-May-98	19-Sep-98	19-Sep-98
Units:	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
VOLATILE ORGANIC COMPOUNDS						
Benzene	0.008	0.0022 U	0.0042 U	0.0021 U	0.0022 U	0.0022 U
Toluene	6	0.0351 =	0.103 =	0.203 =	0.0022 U	0.0416 =
Ethylbenzene	10	0.0022 U	0.0042 U	0.0021 U	0.0022 U	0.0022 U
Xylenes, Total	700	0.0034 J	0.0125 U	0.0063 U	0.0066 U	0.0066 U
POLYNUCLEAR AROMATIC HYDROCARBONS						
2-Chloronaphthalene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Acenaphthene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Acenaphthylene	NRC	1.47 U	0.344 UJ	0.346 U	0.361 U	3.65 U
Anthracene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Benzo(a)anthracene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Benzo(a)pyrene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Benzo(b)fluoranthene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Benzo(g,h,i)perylene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Benzo(k)fluoranthene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Chrysene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Dibenzo(a,h)anthracene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Fluoranthene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Fluorene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Indeno(1,2,3-cd)pyrene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Naphthalene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Phenanthrene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
Pyrene	NRC	1.47 U	0.344 U	0.346 U	0.361 U	3.65 U
OTHER ANALYTES						
Lead	NRC	6.1 =		11.3 =		45.6 =
Total Petroleum Hydrocarbons	NRC	224 =	10.4 U	18.8 =	18 J	16.3 J

NOTE:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998. Thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

Analytical data for the UST closure is summarized in Appendix II, and the analytical data is included at the end of this appendix but not summarized in this table.

Analytical data for QA/QC sample 630313 (duplicate) are contained within this appendix but are not summarized in this table.

Elevated PAH detection limits are a result of associated organic content such as TPH. During extraction of the PAH compounds, all other organic compounds are extracted, causing a wide range of organic compounds to be present; thus, the target PAHs become small peaks in the chromatograph. As a result, the laboratory dilutes the concentrate, in turn elevating the detection limit.

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

Bold values exceed soil threshold levels

NRC No regulatory criteria

Laboratory Qualifiers

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

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

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

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

TABLE V-A. Summary of Soil Analytical Results (continued)

Station:	GA UST	63-04	63-04	63-05	63-06	63-06
Sample ID:	Soil	630411	630421	630521	630611	630621
Sample Interval (ft BGS):	Threshold	0.0 - 2.0	2.0 - 4.0	0.0 - 2.0	2.0 - 4.0	0.0 - 2.0
Collection Date:	Level[1]	19-Sep-98	19-Sep-98	19-Sep-98	19-Sep-98	19-Sep-98
Units:	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
VOLATILE ORGANIC COMPOUNDS						
Benzene	0.008	0.0022 U	0.0022 U	0.0021 U	0.0022 U	0.0025 U
Toluene	6	0.0027 =	0.0022 U	0.0021 U	0.0022 U	0.0025 U
Ethylbenzene	10	0.0022 U	0.0022 U	0.0021 U	0.0022 U	0.0025 U
Xylenes, Total	700	0.0065 U	0.0066 U	0.0064 U	0.0065 U	0.0074 U
POLYNUCLEAR AROMATIC HYDROCARBONS						
2-Chloronaphthalene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Acenaphthene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Acenaphthylene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Anthracene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Benzo(a)anthracene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Benzo(a)pyrene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Benzo(b)fluoranthene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Benzo(g,h,i)perylene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Benzo(k)fluoranthene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Chrysene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Dibenzo(a,h)anthracene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Fluoranthene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Fluorene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Indeno(1,2,3-cd)pyrene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Naphthalene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Phenanthrene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
Pyrene	NRC	0.358 U	0.365 U	0.35 U	0.358 U	1.64 U
OTHER ANALYTES						
Lead	NRC		3.7 =	7.1 =		36.5 =
Total Petroleum Hydrocarbons	NRC	10.5 UJ	9.44 J	14.6 J	2.87 UJ	17.3 J

NOTE:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998. Thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

Analytical data for the UST closure is summarized in Appendix II, and the analytical data is included at the end of this appendix but not summarized in this table.

Analytical data for QA/QC sample 630313 (duplicate) are contained within this appendix but are not summarized in this table.

Elevated PAH detection limits are a result of associated organic content such as TPH. During extraction of the PAH compounds, all other organic compounds are extracted, causing a wide range of organic compounds to be present; thus, the target PAHs become small peaks in the chromatograph. As a result, the laboratory dilutes the concentrate, in turn elevating the detection limit.

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

Bold values exceed soil threshold levels

NRC No regulatory criteria

Laboratory Qualifiers

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

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

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

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

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630121

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4004S

Matrix: (soil/water) SOIL Lab Sample ID: 9805292-04

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2I3037

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: not dec. 11 Date Analyzed: 05/14/98

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
108-88-3	Toluene	35.1		
100-41-4	Ethylbenzene	2.2	U	U
1330-20-7	Xylenes (total)	3.4	J	J

DATA VALIDATION COPY

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630121

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4004S

Matrix: (soil/water) SOIL Lab Sample ID: 9805292-04

Sample wt/vol: 30.5 (g/mL) G Lab File ID: 4T211

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: 11 decanted: (Y/N) N Date Extracted: 05/12/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 05/12/98

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	1470	U
91-58-7	2-chloronaphthalene	1470	U
208-96-8	acenaphthylene	1470	U
83-32-9	acenaphthene	1470	U
86-73-7	fluorene	1470	U
85-01-8	phenanthrene	1470	U
120-12-7	anthracene	1470	U
206-44-0	fluoranthene	1470	U
129-00-0	pyrene	1470	U
56-55-3	benzo(a)anthracene	1470	U
218-01-9	chrysene	1470	U
205-99-2	benzo(b)fluoranthene	1470	U
207-08-9	benzo(k)fluoranthene	1470	U
50-32-8	benzo(a)pyrene	1470	U
193-39-5	indeno(1,2,3-cd)pyrene	1470	U
53-70-3	dibenz(a,h)anthracene	1470	U
191-24-2	benzo(g,h,i)perylene	1470	U

U

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: May 20, 1998

Sample ID	: 630121
Lab ID	: 9805292-04
Matrix	: Soil
Date Collected	: 05/09/98
Date Received	: 05/11/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		224 = FØ1, FØ8	11.1	56.0	mg/kg	5.0	JLP	05/13/98	1100	122011	1

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).
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

9805292-04

347

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4004S

Method Type: Total Metals

Sample ID: 9805292-04

Client ID: 630121

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

Matrix: SOIL Date Received: 5/11/98 Level: LOW

% Solids: 89.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	6.1	mg/kg	=		P	0.10	TJA61 Trace ICPAES	980517-1

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

DATA VALIDATION COPY

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630211

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4004S

Matrix: (soil/water) SOIL Lab Sample ID: 9805292-12

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2I406

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: not dec. 4 Date Analyzed: 05/14/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 2.0

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	4.2	U	U
108-88-3	Toluene	103		=
100-41-4	Ethylbenzene	4.2	U	U
1330-20-7	Xylenes (total)	12.5	U	U

DATA VALIDATION COPY

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630211

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4004S

Matrix: (soil/water) SOIL

Lab Sample ID: 9805292-12

Sample wt/vol: 30.3 (g/mL) G Lab File ID: 4T219

Level: (low/med) LOW

Date Received: 05/11/98

% Moisture: 4 decanted: (Y/N) N

Date Extracted: 05/12/98

Concentrated Extract Volume: 1.00 (mL)

Date Analyzed: 05/13/98

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	344	U
91-58-7	2-chloronaphthalene	344	U
208-96-8	acenaphthylene	344	U
83-32-9	acenaphthene	344	U
86-73-7	fluorene	344	U
85-01-8	phenanthrene	344	U
120-12-7	anthracene	344	U
206-44-0	fluoranthene	344	U
129-00-0	pyrene	344	U
56-55-3	benzo(a)anthracene	344	U
218-01-9	chrysene	344	U
205-99-2	benzo(b)fluoranthene	344	U
207-08-9	benzo(k)fluoranthene	344	U
50-32-8	benzo(a)pyrene	344	U
193-39-5	indeno(1,2,3-cd)pyrene	344	U
53-70-3	dibenz(a,h)anthracene	344	U
191-24-2	benzo(g,h,i)perylene	344	U

U → UJ U C05

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: May 20, 1998

Sample ID	: 630211
Lab ID	: 9805292-12
Matrix	: Soil
Date Collected	: 05/09/98
Date Received	: 05/11/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry		10.4									
Total Rec. Petro. Hydrocarbons	J	~~4.99~~ U FØ1,FØ6	2.06	10.4	mg/kg	1.0	JLP	05/13/98	1100	122011	1

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).
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

9805292-12

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630221

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4004S

Matrix: (soil/water) SOIL Lab Sample ID: 9805292-02

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2I3015

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: not dec. 5 Date Analyzed: 05/13/98

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	U
108-88-3	Toluene	203		
100-41-4	Ethylbenzene	2.1	U	U
1330-20-7	Xylenes (total)	6.3	U	U

DATA VALIDATION COPY

FORM I VOA

27

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630221

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4004S

Matrix: (soil/water) SOIL Lab Sample ID: 9805292-02

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 4T209

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: 5 decanted: (Y/N) N Date Extracted: 05/12/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 05/12/98

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	346	U
91-58-7	2-chloronaphthalene	346	U
208-96-8	acenaphthylene	346	U
83-32-9	acenaphthene	346	U
86-73-7	fluorene	346	U
85-01-8	phenanthrene	346	U
120-12-7	anthracene	346	U
206-44-0	fluoranthene	346	U
129-00-0	pyrene	346	U
56-55-3	benzo(a)anthracene	346	U
218-01-9	chrysene	346	U
205-99-2	benzo(b)fluoranthene	346	U
207-08-9	benzo(k)fluoranthene	346	U
50-32-8	benzo(a)pyrene	346	U
193-39-5	indeno(1,2,3-cd)pyrene	346	U
53-70-3	dibenz(a,h)anthracene	346	U
191-24-2	benzo(g,h,i)perylene	346	U

U

[illegible]-10045

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)

DATA VALIDATION COPY

cc: SAIC00598

Report Date: May 20, 1998

Sample ID	: 630221
Lab ID	: 9805292-02
Matrix	: Soil
Date Collected	: 05/09/98
Date Received	: 05/11/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		18.8 = FØ1, FØ8	2.08	10.5	mg/kg	1.0	JLP	05/13/98	1100	122011	1

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).
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

9805292-02

346

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4004S

Method Type: Total Metals

Sample ID: 9805292-02

Client ID: 630221

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

Matrix: SOIL Date Received: 5/11/98 Level: LOW

% Solids: 95.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	11.3	mg/kg		=	P	0.09	TJA61 Trace ICPAES	980517-1

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

DATA VALIDATION COPY

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.: GAB013

PROJECT NAME: Fort Stewart New CAP Part A UST Investigation 9305

PROJECT NUMBER: 01-0331-04-9305-200

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	TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
660221	5/8/96	900	S:l				1		1				2	
~~660217~~	~~5/8/96~~	~~900~~												
630221	5/9/96	1045		1							1		2	
760211	5/8/96	1005					1	1					2	
630121	5/9/96	935		1							1		2	
660211	5/8/96	910					1	1					2	
750111	5/16/96	1335					1		1				2	
760221	5/16/96	1015					1		1				2	
750113	5/16/96	1335					1		1				2	
750121	5/16/96	1345					1	1					2	
760411	5/16/96	1310					1	1					2	
730211	5/10/96	1230		1						1			2	
630211	5/9/96	1045		1						1			2	

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time	TOTAL NUMBER OF CONTAINERS:	Cooler Temperature: 4°C
COMPANY NAME: SAIC	5/11/96 1130	COMPANY NAME:		Cooler ID: #165	FEDEX NUMBER:
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time		
COMPANY NAME: GEL	5/11/96 1130	COMPANY NAME:			
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time		
COMPANY NAME:		COMPANY NAME:			

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630311

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-06

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2C4014

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 9 Date Analyzed: 10/01/98

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	2.2	U
100-41-4	Ethylbenzene	2.2	U
1330-20-7	Xylenes (total)	6.6	U

U ↓

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630311

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-06

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 2M413

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 9 decanted: (Y/N) N Date Extracted:09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/24/98

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	361	U
91-58-7	2-chloronaphthalene	361	U
209-96-8	acenaphthylene	361	U
83-32-9	acenaphthene	361	U
86-73-7	fluorene	361	U
85-01-8	phenanthrene	361	U
120-12-7	anthracene	361	U
206-44-0	fluoranthene	361	U
129-00-0	pyrene	361	U
56-55-3	benzo(a)anthracene	361	U
218-01-9	chrysene	361	U
205-99-2	benzo(b)fluoranthene	361	U
207-08-9	benzo(k)fluoranthene	361	U
50-32-8	benzo(a)pyrene	361	U
193-39-5	indeno(1,2,3-cd)pyrene	361	U
53-70-3	dibenz(a,h)anthracene	361	U
191-24-2	benzo(g,h,i)perylene	361	U

U

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: October 08, 1998

Sample ID	: 630311
Lab ID	: 9809639-06
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry			J F01,F08,I02								
Total Rec. Petro. Hydrocarbons		18.0	2.18	11.0	mg/kg	1.0	AAT	10/06/98	1100	132776	1

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).
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

DUPLICATE

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630313

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-10

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2C3021

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 9 Date Analyzed: 09/30/98

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	2.2	U
108-88-3	Toluene	2.2	U
100-41-4	Ethylbenzene	2.2	U
1330-20-7	Xylenes (total)	6.6	U

U ↓

FORM I VOA

DUPLICATE

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630313

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-10

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 2M417

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 9 decanted: (Y/N) N Date Extracted: 09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/24/98

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	361	U
91-58-7	2-chloronaphthalene	361	U
209-96-8	acenaphthylene	361	U
83-32-9	acenaphthene	361	U
86-73-7	fluorene	361	U
85-01-8	phenanthrene	361	U
120-12-7	anthracene	361	U
206-44-0	fluoranthene	361	U
129-00-0	pyrene	361	U
56-55-3	benzo(a)anthracene	361	U
218-01-9	chrysene	361	U
205-99-2	benzo(b)fluoranthene	361	U
207-08-9	benzo(k)fluoranthene	361	U
50-32-8	benzo(a)pyrene	361	U
193-39-5	indeno(1,2,3-cd)pyrene	361	U
53-70-3	dibenz(a,h)anthracene	361	U
191-24-2	benzo(g,h,i)perylene	361	U

U

DUPLICATE

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: October 08, 1998

Sample ID	: 630313
Lab ID	: 9809639-10
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry			J FQ1, FQ8, IQ2								
Total Rec. Petro. Hydrocarbons		17.3	2.18	11.0	mg/kg	1.0	AAT	10/06/98	1100	132776	1

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).
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

9809639-10

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630321

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B04S

Matrix: (soil/water) SOIL Lab Sample ID: 9809641-04

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2B509

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 9 Date Analyzed: 09/25/98

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
108-88-3	Toluene	41.6		
100-41-4	Ethylbenzene	2.2	U	U
1330-20-7	Xylenes (total)	6.6	U	U

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630321

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B04S

Matrix: (soil/water) SOIL Lab Sample ID: 9809641-04

Sample wt/vol: 30.1 (g/mL) G Lab File ID: 7M605

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 9 decanted: (Y/N) N Date Extracted: 09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/25/98

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/KG	Q
91-20-3	naphthalene	3650	U
91-58-7	2-chloronaphthalene	3650	U
208-96-8	acenaphthylene	3650	U
83-32-9	acenaphthene	3650	U
86-73-7	fluorene	3650	U
85-01-8	phenanthrene	3650	U
120-12-7	anthracene	3650	U
206-44-0	fluoranthene	3650	U
129-00-0	pyrene	3650	U
56-55-3	benzo(a)anthracene	3650	U
218-01-9	chrysene	3650	U
205-99-2	benzo(b)fluoranthene	3650	U
207-08-9	benzo(k)fluoranthene	3650	U
50-32-8	benzo(a)pyrene	3650	U
193-39-5	indeno(1,2,3-cd)pyrene	3650	U
53-70-3	dibenz(a,h)anthracene	3650	U
191-24-2	benzo(g,h,i)perylene	3650	U

U

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: October 08, 1998

Sample ID	: 630321
Lab ID	: 9809641-04
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons	J	16.3	2.18	11.0	mg/kg	1.0	AAT	10/06/98	1100	132809	1

F01, F08, I02

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).
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

DATA VALIDATION COPY

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4B04S

Method Type: Total Metals

Sample ID: 9809641-04

Client ID: 630321

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

Matrix: SOIL Date Received: 9/21/98 Level: LOW

% Solids: 91.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run	
7439-92-1	Lead	45.6	mg/kg			P	0.16	TJA61 Trace2 ICPAES	980924-1	=

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630411

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-11

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2C4015

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 8 Date Analyzed: 10/01/98

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	U
108-88-3	Toluene	2.7		
100-41-4	Ethylbenzene	2.2	U	U
1330-20-7	Xylenes (total)	6.5	U	U

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630411

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-11

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 2M418

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 8 decanted: (Y/N) N Date Extracted:09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/24/98

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	358	U
129-00-0	pyrene	358	U
56-55-3	benzo(a)anthracene	358	U
218-01-9	chrysene	358	U
205-99-2	benzo(b)fluoranthene	358	U
207-08-9	benzo(k)fluoranthene	358	U
50-32-8	benzo(a)pyrene	358	U
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

U

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: October 08, 1998 Page 1 of 1

Sample ID	: 630411
Lab ID	: 9809639-11
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry			UJ F01, F06, I02								
Total Rec. Petro. Hydrocarbons	J	10.5	2.15	10.9	mg/kg	1.0	AAT	10/06/98	1100	132776	1

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).
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

9809639-11

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630421

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B04S

Matrix: (soil/water) SOIL Lab Sample ID: 9809641-07

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2C206

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 9 Date Analyzed: 09/29/98

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
108-88-3	Toluene	2.2	U	
100-41-4	Ethylbenzene	2.2	U	
1330-20-7	Xylenes (total)	6.6	U	

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630421

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B04S

Matrix: (soil/water) SOIL Lab Sample ID: 9809641-07

Sample wt/vol: 30.1 (g/mL) G Lab File ID: 7M517

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 9 decanted: (Y/N) N Date Extracted: 09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/24/98

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	365	U
91-58-7	2-chloronaphthalene	365	U
208-96-8	acenaphthylene	365	U
83-32-9	acenaphthene	365	U
86-73-7	fluorene	365	U
85-01-8	phenanthrene	365	U
120-12-7	anthracene	365	U
206-44-0	fluoranthene	365	U
129-00-0	pyrene	365	U
56-55-3	benzo(a)anthracene	365	U
218-01-9	chrysene	365	U
205-99-2	benzo(b)fluoranthene	365	U
207-08-9	benzo(k)fluoranthene	365	U
50-32-8	benzo(a)pyrene	365	U
193-39-5	indeno(1,2,3-cd)pyrene	365	U
53-70-3	dibenz(a,h)anthracene	365	U
191-24-2	benzo(g,h,i)perylene	365	U

U

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: October 08, 1998 Page 1 of 1

Sample ID	: 630421
Lab ID	: 9809641-07
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry			J F01, F07, I02								
Total Rec. Petro. Hydrocarbons	J	9.44	2.18	11.0	mg/kg	1.0	AAT	10/06/98	1100	132809	1

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).
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

217

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4B04S

Method Type: Total Metals

Sample ID: 9809641-07

Client ID: 630421

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

Matrix: SOIL Date Received: 9/21/98 Level: LOW

% Solids: 91.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	3.7	mg/kg			P	0.16	TJA61 Trace2 ICPAES	980924-1

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630521

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-20

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2C507

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 6 Date Analyzed: 10/02/98

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	U
108-88-3	Toluene	2.1	U	↓
100-41-4	Ethylbenzene	2.1	U	
1330-20-7	Xylenes (total)	6.4	U	

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630521

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-20

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 2M507

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 6 decanted: (Y/N) N Date Extracted: 09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/25/98

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	350	U
91-58-7	2-chloronaphthalene	350	U
209-96-8	acenaphthylene	350	U
83-32-9	acenaphthene	350	U
86-73-7	fluorene	350	U
85-01-8	phenanthrene	350	U
120-12-7	anthracene	350	U
206-44-0	fluoranthene	350	U
129-00-0	pyrene	350	U
56-55-3	benzo(a)anthracene	350	U
218-01-9	chrysene	350	U
205-99-2	benzo(b)fluoranthene	350	U
207-08-9	benzo(k)fluoranthene	350	U
50-32-8	benzo(a)pyrene	350	U
193-39-5	indeno(1,2,3-cd)pyrene	350	U
53-70-3	dibenz(a,h)anthracene	350	U
191-24-2	benzo(g,h,i)perylene	350	U

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: October 08, 1998

Sample ID	: 630521
Lab ID	: 9809639-20
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons	J FØ1, FØ8, IØ2	14.6	2.11	10.6	mg/kg	1.0	AAT	10/06/98	1100	132776	1

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).
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

9809639-20

226

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4B03S

Method Type: Total Metals

Sample ID: 9809639-20

Client ID: 630521

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

Matrix: SOIL Date Received: 9/21/98 Level: LOW

% Solids: 94.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	7.1	mg/kg			P	0.16	TJA61 Trace2 ICPAES	980924-1

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630611

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-09

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2C3020

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 8 Date Analyzed: 09/30/98

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	2.2	U
108-88-3	Toluene	2.2	U
100-41-4	Ethylbenzene	2.2	U
1330-20-7	Xylenes (total)	6.5	U

U ↓

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630611

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B03S

Matrix: (soil/water) SOIL Lab Sample ID: 9809639-09

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 2M416

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 8 decanted: (Y/N) N Date Extracted: 09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/24/98

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	358	U
129-00-0	pyrene	358	U
56-55-3	benzo(a)anthracene	358	U
218-01-9	chrysene	358	U
205-99-2	benzo(b)fluoranthene	358	U
207-08-9	benzo(k)fluoranthene	358	U
50-32-8	benzo(a)pyrene	358	U
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

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: October 08, 1998

Sample ID	: 630611
Lab ID	: 9809639-09
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons	J	2.87	UJ FQ1, FQ6, IQ2 2.15	10.9	mg/kg	1.0	AAT	10/06/98	1100	132776	1

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).
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

9809639-09

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630621

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B04S

Matrix: (soil/water) SOIL Lab Sample ID: 9809641-03

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 2B508

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. 19 Date Analyzed: 09/25/98

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	2.5	U
108-88-3	Toluene	2.5	U
100-41-4	Ethylbenzene	2.5	U
1330-20-7	Xylenes (total)	7.4	U

U

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630621

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B04S

Matrix: (soil/water) SOIL Lab Sample ID: 9809641-03

Sample wt/vol: 30.1 (g/mL) G Lab File ID: 7M604

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: 19 decanted: (Y/N) N Date Extracted: 09/23/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/25/98

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	1640	U
91-58-7	2-chloronaphthalene	1640	U
208-96-8	acenaphthylene	1640	U
83-32-9	acenaphthene	1640	U
86-73-7	fluorene	1640	U
85-01-8	phenanthrene	1640	U
120-12-7	anthracene	1640	U
206-44-0	fluoranthene	1640	U
129-00-0	pyrene	1640	U
56-55-3	benzo(a)anthracene	1640	U
218-01-9	chrysene	1640	U
205-99-2	benzo(b)fluoranthene	1640	U
207-08-9	benzo(k)fluoranthene	1640	U
50-32-8	benzo(a)pyrene	1640	U
193-39-5	indeno(1,2,3-cd)pyrene	1640	U
53-70-3	dibenz(a,h)anthracene	1640	U
191-24-2	benzo(g,h,i)perylene	1640	U

U

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: October 08, 1998

Sample ID	: 630621
Lab ID	: 9809641-03
Matrix	: Soil
Date Collected	: 09/19/98
Date Received	: 09/21/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons	J FØ1, FØ8, IØ2	17.3	2.45	12.4	mg/kg	1.0	AAT	10/06/98	1100	132809	1

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).
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

9809641 03

213

Form 1: Inorganic Analyses Data Sheet

SDG No.: FS4B04S DATA VALIDATION COPY

Method Type: Total Metals

Sample ID: 9809641-03

Client ID: 630621

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

Matrix: SOIL Date Received: 9/21/98 Level: LOW

% Solids: 81.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7439-92-1	Lead	36.5	mg/kg			P	0.18	TJA61 Trace2 ICPAES	980924-1

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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.: GAS08

PROJECT NAME: ~~16 SWMUs Investigations~~ CAP-A Options

PROJECT NUMBER: 01-0331-04-~~7328-200~~ 9805-210

PROJECT MANAGER: ~~Jeff Longaker~~ 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	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	PAH	BTEX	PAH, TPH	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
600722	9/20/98	1535	water						2			2		9809638-18
600312	9/20/98	1435	water						2			2		-19
580311	9/17/98	1316	Soil							1	1	2		9809639-01
600313	9/20/98	1739								1	1	2		-02
600311	9/20/98	1739								1	1	2		-03
600411	9/16/98	1044								1	1	2		-04
620511	9/16/98	1445								1	1	2		-05
630311	9/19/98	810								1	1	2		-06
620311	9/20/98	1013								1	1	2		-07
600611	9/18/98	1235								1	1	2		-08
630611	9/19/98	920								1	1	2		-09
630313	9/19/98	810								1	1	2		-10
630411	9/19/98	1620								1	1	2		-11

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
[signature] COMPANY NAME: SAIC	9/21/98 1145	[signature] COMPANY NAME: Gel	9/21/98 1545
RECEIVED BY: [signature] COMPANY NAME: GEL	9/21/98 1145	RELINQUISHED BY: COMPANY NAME:	Date/Time
RELINQUISHED BY: [signature] COMPANY NAME: GEL	9/21/98 1545	RECEIVED BY: COMPANY NAME:	Date/Time

TOTAL NUMBER OF CONTAINERS:

Cooler ID: #567, 3°C

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 2

CHAIN OF CUSTODY RECORD

COC NO.: GA5086

PROJECT NAME: ~~16 SWMUs Investigations~~ CAP-A Options

PROJECT NUMBER: 01-0331-04-~~2328-200~~ 9605-210

PROJECT MANAGER: ~~Jeff Longaker~~ 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	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	BTEX	PAH, TPH	PAH, TPH, Lead	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
600511	9/16/98	1140	Soil						1	1		2		9809639-12
625210	9/20/98	1225							1	1		2		-13
620621	9/20/98	8446							1		1	2		-14
625110	9/20/98	1205							1	1		2		-15
620611	9/20/98	845							1	1		2		-16
620421	9/20/98	1140							1		1	2		-17
600421	9/16/98	1040							1		1	2		-18
620521	9/16/98	1455							1		1	2		-18
630521	9/19/98	1733							1		1	2		-20
600621	9/16/98	1245							1		1	2		9809641-01
						9/21/98								

.1 .2 .1 .2 .1

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	9/21/98 1145	Franco	9/21/98 1545
COMPANY NAME: SAIC		COMPANY NAME: GEL	
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
GEL	9/21/98 1145		
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
GEL	9/21/98 1545		
COMPANY NAME:		COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 46

Cooler ID: #567, 3°C

Cooler Temperature: 4°C

FEDEX NUMBER:

1 of 5

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

CHAIN OF CUSTODY RECORD

COC NO.: GAS09

PROJECT NAME: ~~16 SWMUs Investigations~~ CAP-A Options

PROJECT NUMBER: 01-0331-04-~~7320-200~~ 92605-210

PROJECT MANAGER: ~~Jeff Longaker~~ 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

REQUESTED PARAMETERS

Sample ID	Date Collected	Time Collected	Matrix	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	BTEX	PAH, TPH, Lead	BTEX, GRO	PAH, DRO, Lead	PAH, DRO	No. of Bottles/ Vials	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
600321	9/20/98	1724	Soil						1	1				2		9809641-02
630621	9/19/98	915	↓						1	1				2		-03
630321	9/19/98	805							1	1				2		-04
600521	9/18/98	1150							1	1				2		-05
560321	9/17/98	1304							1	1				2		-06
630421	9/19/98	1622							1	1				2		-07
620321	9/20/98	1008							1	1				2		-08
620323	9/20/98	1008							1	1				2		-09
650321	9/17/98	913							[scribbled out]		1	1		2		-10
650421	9/17/98	1021									1	1		2		-11
650311	9/17/98	930									1		1	2		-12
650411	9/19/98	1023	↓								1		1	2		-13
630612	9/19/98	1030	Water						2					2		9809642-01

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time	TOTAL NUMBER OF CONTAINERS:	Cooler Temperature: 4°C
Laura Lumley	9/21/98 1145	Francis	9/21/98 1545	Cooler ID: # 406, 3°C	FEDEX NUMBER:
COMPANY NAME: SAIC		COMPANY NAME: GEL			
RECEIVED BY: [signature]	Date/Time 9-21-98 1145	RELINQUISHED BY:	Date/Time		
COMPANY NAME: GEL		COMPANY NAME:			
RELINQUISHED BY: [signature]	Date/Time 9/21/98 1545	RECEIVED BY:	Date/Time		
COMPANY NAME: GEL		COMPANY NAME:			

THIS PAGE INTENTIONALLY LEFT BLANK

SOIL ANALYTICAL DATA OBTAINED DURING UST 214 CLOSURE ACTIVITIES (August 1996)

THIS PAGE INTENTIONALLY LEFT BLANK

SPECIALIZED ASSAYS, INC.
2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

DIRECTOR U.S. ARMY CORPS ENG. 5394
CESAD LABORATORY
611 SOUTH COBB DRIVE
MARIETTA, GA 30060-3172

Lab Number: 96-A047532

Sample ID: 29681 8101-TK214-S1

Date Collected: 8/ 1/96

Project: CALL #124

Time Collected: 10:30

Project Name:

Date Received: 8/ 3/96

Sampler: BOBBI THORN

Time Received: 8:30

State Certification:

Sample Type: Soil

Site I.D.:

** QUALITY CONTROL DATA **

Surrogate Recoveries

Surrogate	% Recovery	Target Range
BNA Surrogate, Phenol d5	82.0	10 - 115
BNA Surrogate, 2-Fluorophenol	62.0	20 - 121
BNA Surrogate, 2,4,6-Tribromophenol	118.	19 - 122

Due to sample matrix, semivolatile results were elevated.

Report Approved By: Theodore J. Duello Report Date: 8/14/96

Theodore J. Duello, Ph.D.
Michael H. Dunn, M.S.
Danny B. Hale, M.S.

2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

DIRECTOR U.S. ARMY CORPS ENG. 5394
CESAD LABORATORY
611 SOUTH COBB DRIVE
MARIETTA, GA 30060-3172

Sample Location: 29681 8101-TK214-S1
FT. STEWART

Lab Number: 96-A047532

Sampler: BOBBI THORN

Date Collected: 8/ 1/96

Date Received: 8/ 3/96

Time Collected: 10:30

Time Received: 8:30

Sample type: Soil

UNDERGROUND STORAGE TANK RESULTS

/te	Result	Units	PQL	Dil Factor	Date	Time	Analyst	Method
Benzene	< 0.112	mg/kg	0.112	1	8/ 6/96	4:09	S. Wani	8020
Toluene	< 0.112	mg/kg	0.112	1	8/ 6/96	4:09	S. Wani	8020
Ethylbenzene	< 0.112	mg/kg	0.112	1	8/ 6/96	4:09	S. Wani	8020
Xylenes, total	< 0.112	mg/kg	0.112	1	8/ 6/96	4:09	S. Wani	8020
Petroleum Hydrocarbons,IR	394.	mg/kg	11.2	1	8/ 5/96	16:00	M.Himelick	418.1 M

Sample Extraction Data

BNA's Extracted: [illegible] Wt extracted: 10.0 gm Extract Volume: [illegible] ml

** QUALITY CONTROL DATA **

Surrogate Recoveries

Surrogate	% Recovery	Target Range
GRO Surrogate, soil	93.	50 - 150
[illegible] Surrogate, Nitrobenzene	68.0	23 - 120
[illegible] Surr., 2-Fluorobiphenyl	96.0	30 - 115
BNA Surrogate, Terphenyl d14	108.	18 - 140

2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

DIRECTOR U.S. ARMY CORPS ENG. 5394
CESAD LABORATORY
611 SOUTH COBB DRIVE
MARIETTA, GA 30060-3172

Sample Location: 29681 8101-TK214-S1
FT. STEWART

Lab Number: 96-A047532

Sampler: BOBBI THORN

Date Collected: 8/ 1/96

Date Received: 8/ 3/96

Time Collected: 10:30

Time Received: 8:30

Sample type: Soil

SEMIVOLATILE ORGANICS and PESTICIDE/PCB's

Analyte	Result	Flag	DF	Units	Date	Time	Analyst	Meth
Indeno(1,2,3-cd)pyrene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Isophorone	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2-Methylnaphthalene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2-Methylphenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
m,p-Methylphenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Naphthalene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2-Nitroaniline	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
3-Nitroaniline	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
4-Nitroaniline	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Nitrobenzene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2-Nitrophenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
4-Nitrophenol	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
N-nitrosodi-n-propylamine	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
N-nitrosodiphenylamine	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Pentachlorophenol	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Phenanthrene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Phenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Pyrene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Bis(2-ethylhexyl)phthalate	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
1,2,4-Trichlorobenzene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2,4,5-Trichlorophenol	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2,4,6-Trichlorophenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Extraction, BNA,s	Completed			ug/kg	8/ 5/96	14:44	C.Gerenser	3550

SPECIALIZED ASSAYS, INC.
2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

DIRECTOR U.S. ARMY CORPS ENG. 5394
CESAD LABORATORY
611 SOUTH COBB DRIVE
MARIETTA, GA 30060-3172

Sample Location: 29681 8101-TK214-S1
FT. STEWART

Lab Number: 96-A047532

Sampler: BOBBI THORN

Date Collected: 8/ 1/96

Date Received: 8/ 3/96

Time Collected: 10:30

Time Received: 8:30

Sample type: Soil

SEMIVOLATILE ORGANICS and PESTICIDE/PCB's

te	Result	Flag	DF	Units	Date	Time	Analyst	Metho
2-Chlorophenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
4-Chlorophenylphenylether	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Chrysene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Dibenzofuran	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Dibenz(a,h)anthracene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
1,2-Dichlorobenzene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
1,3-Dichlorobenzene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
1,4-Dichlorobenzene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
3,3'-Dichlorobenzidine	2250	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2,4-Dichlorophenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
[illegible]thalate	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2,4-Dimethylphenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Dimethylphthalate	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Di-n-butylphthalate	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
4,6-Dinitro-2-methylphenol	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2,4-Dinitrophenol	2810	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2,4-dinitrotoluene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2,6-Dinitrotoluene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Di-n-octylphthalate	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Fluoranthene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Fluorene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Hexachlorobenzene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
H[illegible]lorobutadiene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
he[illegible]nlorocyclopentadiene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Hexachloroethane	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B

SPECIALIZED ASSAYS, INC.
2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

DIRECTOR U.S. ARMY CORPS ENG. 5394
CESAD LABORATORY
611 SOUTH COBB DRIVE
MARIETTA, GA 30060-3172

Sample Location: 29681 8101-TK214-S1
FT. STEWART

Lab Number: 96-A047532

Sampler: BOBBI THORN

Date Collected: 8/ 1/96

Date Received: 8/ 3/96

Time Collected: 10:30

Time Received: 8:30

Sample type: Soil

---

ganics Reference Data

BNA Blank	57480SBB
[illegible] Tune, BNA	DF0809B
Calibration Check, BNA	CC0809B

Percent solids: 89.0

SEMIVOLATILE ORGANICS and PESTICIDE/PCB's

Analyte	Result	Flag	DF	Units	Date	Time	Analyst	Method
Acenaphthene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Acenaphthylene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Anthracene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Benzo(a)anthracene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Benzo(a)pyrene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Benzo(b)fluoranthene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Benzo(g,h,i)perylene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Benzo(k)fluoranthene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
4-Bromophenylphenylether	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Butylbenzylphthalate	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
Carbazole	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
4-Chloro-3-methylphenol	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
4-Chloroaniline	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
bis(2-Chloroethoxy)methane	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2-Chloroethyl)ether	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270
bis(2-Chloroisopropyl)ether	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B
2-Chloronaphthalene	1120	U	1	ug/kg	8/10/96	6:21	M.Goodrich	8270B

Temp 4c

SADD Labs

ANDERSON COLUMBIA ENVIRONMENTAL, INC.

CHAIN OF CUSTODY RECORD

Page 1 of 1

Job # 4052

Project No.	Project Name
8101	Ft Stewart DO-0101

Samplers (Signature)

Sample Number	Date	Time	Grab	Comp.	Sample Location	No. of Containers	Preservative	8020	8270	418.1				Remarks:
8101-TK215-S1	7/31/96	1530	✓		Soil	3	No	✓	✓	✓			78	Soil below UST
8101-TK207A-S1	8-1-96	0800	✓		Soil	3	No	✓	✓	✓			82	Soil below UST - northend
8101-TK207A-S2	8-1-96	0815	✓		Soil	3	No	✓	✓	✓			80	Soil below UST - southend
8101-TK214-S1	8-1-96	1030	✓		Soil	3	No	✓	✓	✓			81	Soil below UST
Temp Vial														

Relinquished by:	Date / Time	Received by:	Relinquished by:	Date / Time	Received by:
[signature]	8/1/96 1430				
Relinquished by:	Date / Time	Received by:	Relinquished by:	Date / Time	Remarks:
Relinquished by:	Date / Time	Received by:			

APPENDIX VI

ALTERNATE THRESHOLD LEVEL (ATL) CALCULATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

The contaminant concentrations in soil did not exceed their respective soil threshold levels except for the one closure sample with an elevated benzene detection limit. Thus, no alternate threshold levels were calculated.

The maximum benzene concentration in groundwater was 37.1 µg/L in May 1998. The modeling of benzene estimated dilution attenuation factors (DAFs) of 1.0 for the sanitary sewer, 371 for the drainage ditch, and infinity for Mill Creek. Thus, the benzene ACL associated with the sanitary sewer is 5 µg/L and the drainage ditch is 1855 µg/L. The results of fate and transport modeling are presented in Attachment C.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX VII

MONITORING WELL DETAILS

THIS PAGE INTENTIONALLY LEFT BLANK

Monitoring wells were not installed as part of the CAP-Part A investigation. Temporary piezometers were installed at the UST 214 site for the determination of free product. Refer to Figure 5 (Appendix I) for locations and screened intervals.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX VIII

GROUNDWATER LABORATORY RESULTS

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE VIII-A. Summary of Groundwater Analytical Results

Station:		In Stream	63-01	63-02	63-03	63-04
Sample ID:	Federal	Water	630112	630212	630312	630412
Screened Interval (ft BGS):	SDWA	Quality	3.0 - 8.0	1.0 - 11.0	0.0 - 9.5	0.0 - 8.8
Collection Date:	MCLs[1]	Standards[2]	9-May-98	9-May-98	19-Sep-98	19-Sep-98
Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILE ORGANIC COMPOUNDS						
Benzene	5	71.28	**37.1** =	**11.6** =	2 U	2 U
Toluene	1000	200000	18.9 =	2.3 =	2 U	2 U
Ethylbenzene	700	28718	27.2 =	2 U	2 U	2 U
Xylenes, Total	10000	NRC	209 =	4.5 J	6 U	6 U
POLYNUCLEAR AROMATIC HYDROCARBONS						
2-Chloronaphthalene	NRC	NRC	11.8 U	10.9 U	42.6 U	10.6 U
Acenaphthene	NRC	NRC	11.8 U	10.9 U	42.6 U	10.6 U
Acenaphthylene	NRC	NRC	11.8 U	10.9 U	42.6 U	10.6 U
Anthracene	NRC	110000	11.8 U	10.9 U	42.6 U	10.6 U
Benzo(a)anthracene	NRC	0.0311	11.8 U	10.9 U	42.6 U	10.6 U
Benzo(a)pyrene	0.2	0.0311	11.8 U	10.9 U	42.6 U	10.6 U
Benzo(b)fluoranthene	NRC	NRC	11.8 U	10.9 U	42.6 U	10.6 U
Benzo(g,h,i)perylene	NRC	NRC	11.8 U	10.9 U	42.6 U	10.6 U
Benzo(k)fluoranthene	NRC	0.0311	11.8 U	10.9 U	42.6 U	10.6 U
Chrysene	NRC	0.0311	11.8 U	10.9 U	42.6 U	10.6 U
Dibenzo(a,h)anthracene	NRC	0.0311	11.8 U	10.9 U	42.6 U	10.6 U
Fluoranthene	NRC	370	11.8 U	10.9 U	42.6 U	10.6 U
Fluorene	NRC	14000	0.5 J	10.9 U	42.6 U	10.6 U
Indeno(1,2,3-cd)pyrene	NRC	0.0311	11.8 U	10.9 U	42.6 U	10.6 U
Naphthalene	NRC	NRC	42.3 =	3.5 J	42.6 U	10.6 U
Phenanthrene	NRC	NRC	0.99 J	10.9 U	42.6 U	10.6 U
Pyrene	NRC	11000	11.8 U	10.9 U	42.6 U	10.6 U

NOTES:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998, thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

Analytical data for QA/QC sample 630714 (duplicate) are contained within this appendix, but are not summarized in this table.

Elevated PAH detection limits are a result of associated organic content such as TPH or other organic compounds. During extraction of the PAH compounds, all other organic compounds are extracted, causing a wide range of organic compounds to be present; thus, the target PAHs become small peaks in the chromatograph. As a result, the laboratory dilutes the concentrate, in turn elevating the detection limit.

[1] U.S. Environmental Protection Agency Safe Drinking Water Act Maximum Contaminant Level

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

Bold values exceed MCLs

Laboratory Qualifiers

U	Indicates the compound was not detected above the reported quantitation limit.
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 VIII-A. Summary of Groundwater Analytical Results (continued)

Station:		In Stream	63-05	63-06	63-07	63-07
Sample ID:	Federal	Water	630512	630612	630712	630722
Sample Interval:	SDWA	Quality	0.0 - 8.2	0.0 - 9.6	6.0 - 10.0	13.0 - 14.0
Collection Date:	MCLs[1]	Standards[2]	19-Sep-98	19-Sep-98	19-Sep-98	19-Sep-98
Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILE ORGANIC COMPOUNDS						
Benzene	5	71.28	2 U	2 U	**24.8 J**	2 U
Toluene	1000	200000	2 U	2 U	8.5 =	2 U
Ethylbenzene	700	28718	2 U	2 U	39 =	2 U
Xylenes, Total	10000	NRC	6 U	6 U	214 =	11.5 =
POLYNUCLEAR AROMATIC HYDROCARBONS						
2-Chloronaphthalene	NRC	NRC	11 UJ	10.6 U	42.6 U	10 U
Acenaphthene	NRC	NRC	11 UJ	10.6 U	42.6 U	10 U
Acenaphthylene	NRC	NRC	11 UJ	10.6 U	42.6 U	10 U
Anthracene	NRC	110000	11 UJ	10.6 U	42.6 U	10 U
Benzo(a)anthracene	NRC	0.0311	11 UJ	10.6 U	42.6 U	10 U
Benzo(a)pyrene	0.2	0.0311	11 UJ	10.6 U	42.6 U	10 U
Benzo(b)fluoranthene	NRC	NRC	11 UJ	10.6 U	42.6 U	10 U
Benzo(g,h,i)perylene	NRC	NRC	11 UJ	10.6 U	42.6 U	10 U
Benzo(k)fluoranthene	NRC	0.0311	11 UJ	10.6 U	42.6 U	10 U
Chrysene	NRC	0.0311	11 UJ	10.6 U	42.6 U	10 U
Dibenzo(a,h)anthracene	NRC	0.0311	11 UJ	10.6 U	42.6 U	10 U
Fluoranthene	NRC	370	11 UJ	10.6 U	42.6 U	10 U
Fluorene	NRC	14000	11 UJ	10.6 U	42.6 U	10 U
Indeno(1,2,3-cd)pyrene	NRC	0.0311	11 UJ	10.6 U	42.6 U	10 U
Naphthalene	NRC	NRC	11 UJ	10.6 U	68 =	7.1 J
Phenanthrene	NRC	NRC	11 UJ	10.6 U	42.6 U	10 U
Pyrene	NRC	11000	11 UJ	10.6 U	42.6 U	10 U

NOTES:

May 1998 sampling was performed prior to the new CAP-Part A guidance that was published in May 1998, thus, the new SW-846 analytical methods were not used during that sampling event.

Contract for September 1998 sampling event was issued prior to the new CAP-A guidance published in May 1998, thus the new SW-846 analytical methods were not used during that sampling event.

Analytical data for QA/QC sample 630714 (duplicate) are contained within this appendix, but are not summarized in this table.

Elevated PAH detection limits are a result of associated organic content such as TPH or other organic compounds. During extraction of the PAH compounds, all other organic compounds are extracted, causing a wide range of organic compounds to be present; thus, the target PAHs become small peaks in the chromatograph. As a result, the laboratory dilutes the concentrate, in turn elevating the detection limit.

[1] U.S. Environmental Protection Agency Safe Drinking Water Act Maximum Contaminant Level

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

Bold values exceed MCLs

Laboratory Qualifiers

U	Indicates the compound was not detected above the reported quantitation limit.
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.

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630112

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4013W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9805307-02

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2J1041

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: not dec. _____ Date Analyzed: 05/19/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 2.0

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	37.1	
108-88-3	Toluene	18.9	
100-41-4	Ethylbenzene	27.2	
1330-20-7	Xylenes (total)	209	

DATA VALIDATION COPY

ud 7/15/98

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630112

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4010W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9805302-14

Sample wt/vol: 850.0 (g/mL) ML Lab File ID: 2T421

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 05/12/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 05/15/98

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N DATA VALIDATION COPY

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	naphthalene	42.3	
91-58-7	2-chloronaphthalene	11.8	U
209-96-8	acenaphthylene	11.8	U
83-32-9	acenaphthene	11.8	U
86-73-7	fluorene	0.50	J
85-01-8	phenanthrene	0.99	J
120-12-7	anthracene	11.8	U
206-44-0	fluoranthene	11.8	U
129-00-0	pyrene	11.8	U
56-55-3	benzo(a)anthracene	11.8	U
218-01-9	chrysene	11.8	U
205-99-2	benzo(b)fluoranthene	11.8	U
207-08-9	benzo(k)fluoranthene	11.8	U
50-32-8	benzo(a)pyrene	11.8	U
193-39-5	indeno(1,2,3-cd)pyrene	11.8	U
53-70-3	dibenz(a,h)anthracene	11.8	U
191-24-2	benzo(g,h,i)perylene	11.8	U

FORM I SV-1 OLM03.0

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630212

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4013W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9805307-07

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2J1017

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: not dec. _____ Date Analyzed: 05/19/98

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	11.6	
108-88-3	Toluene	2.3	
100-41-4	Ethylbenzene	2.0	U
1330-20-7	Xylenes (total)	4.5	J

DATA VALIDATION COPY

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630212

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4010W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9805302-18

Sample wt/vol: 920.0 (g/mL) ML Lab File ID: 2T509

Level: (low/med) LOW Date Received: 05/11/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted:05/12/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 05/15/98

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/L	Q
91-20-3	naphthalene	3.5	J
91-58-7	2-chloronaphthalene	10.9	U
209-96-8	acenaphthylene	10.9	U
83-32-9	acenaphthene	10.9	U
86-73-7	fluorene	10.9	U
85-01-8	phenanthrene	10.9	U
120-12-7	anthracene	10.9	U
206-44-0	fluoranthene	10.9	U
129-00-0	pyrene	10.9	U
56-55-3	benzo(a)anthracene	10.9	U
218-01-9	chrysene	10.9	U
205-99-2	benzo(b)fluoranthene	10.9	U
207-08-9	benzo(k)fluoranthene	10.9	U
50-32-8	benzo(a)pyrene	10.9	U
193-39-5	indeno(1,2,3-cd)pyrene	10.9	U
53-70-3	dibenz(a,h)anthracene	10.9	U
191-24-2	benzo(g,h,i)perylene	10.9	U

J U

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

CHAIN OF CUSTODY RECORD

COC NO.: GAB007

PROJECT NAME: Fort Stewart New CAP Part A UST Investigation 9605

PROJECT NUMBER: 01-0331-04-9305-200

PROJECT MANAGER: Patty Stoll

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

Sample ID	Date Collected	Time Collected	Matrix	BTEX	PAH	TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	No. of Bottles/ Vials:
750225	5/8/98	1400	water					3					3
630112	5/9/98	1025			2								2
770212	5/8/98	1740			2								2
750212	5/8/98	1915			2								2
760514	5/8/98	1745			2								2
630212	5/9/98	1250			2								2

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod Charleston, SC 29417

PHONE NO: (803) 556-8171

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	5/11/98		
COMPANY NAME: SAIC	1130	COMPANY NAME:	
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
	5-11-98		
COMPANY NAME: GEL	1130	COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 13

Cooler Temperature: 4°C

Cooler ID: # 462

FEDEX NUMBER:

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

2045

CHAIN OF CUSTODY RECORD

COC NO.: GA3801/8

PROJECT NAME: Fort Stewart New CAP Part A UST Investigation 9405

PROJECT NUMBER: 01-0331-04-9305-200

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	TOC	BTEX, GRO	PAH, DRO	PAH, DRO, Lead	PAH, TPH	PAH, TPH, Lead	PAH, TPH, Lead, TOC	No. of Bottles/ Vials:	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
730112	5/10/98	1135	water	2									2	
[illegible]0112	5/10/98	1025		2									2	
760212	5/10/98	1150		2									2	Unpreserved
730412	5/10/98	1420		2									2	
760712	5/9/98	1840		2									2	Unpreserved
760612	5/9/98	1750		2									2	Unpreserved
630212	5/9/98	1250		2									2	
760212	5/6/98	1045		2									2	
730212	5/6/98	1740		2									2	
730412	5/6/98	1730		2									2	
750112	5/6/98	1400		2									2	
750212	5/6/98	1915		2									2	
750412	5/6/98	1640		2									2	

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time	TOTAL NUMBER OF CONTAINERS:	Cooler Temperature: 4°C
COMPANY NAME: SAIC	5/11/98 1130	COMPANY NAME:		Cooler ID: 388	FEDEX NUMBER:
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time		
COMPANY NAME: GEL	5/11/98 1130	COMPANY NAME:			
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time		
COMPANY NAME:		COMPANY NAME:			

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630312

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B05W

Matrix: (soil/water) WATER Lab Sample ID: 9809642-03

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2B208

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. _____ Date Analyzed: 09/22/98

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	

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630312

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B01W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9809637-18

Sample wt/vol: 940.0 (g/mL) ML Lab File ID: 4N209

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted:09/22/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/29/98

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/L	Q
91-20-3	naphthalene	42.6	U
91-58-7	2-chloronaphthalene	42.6	U
209-96-8	acenaphthylene	42.6	U
83-32-9	acenaphthene	42.6	U
86-73-7	fluorene	42.6	U
85-01-8	phenanthrene	42.6	U
120-12-7	anthracene	42.6	U
206-44-0	fluoranthene	42.6	U
129-00-0	pyrene	42.6	U
56-55-3	benzo(a)anthracene	42.6	U
218-01-9	chrysene	42.6	U
205-99-2	benzo(b)fluoranthene	42.6	U
207-08-9	benzo(k)fluoranthene	42.6	U
50-32-8	benzo(a)pyrene	42.6	U
193-39-5	indeno(1,2,3-cd)pyrene	42.6	U
53-70-3	dibenz(a,h)anthracene	42.6	U
191-24-2	benzo(g,h,i)perylene	42.6	U

U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630412

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B06W

Matrix: (soil/water) WATER Lab Sample ID: 9809645-17

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2B4010

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. _____ Date Analyzed: 09/24/98

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	

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630412

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9809638-12

Sample wt/vol: 940.0 (g/mL) ML Lab File ID: 8M521

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted:09/22/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/25/98

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	10.6	U
91-58-7	2-chloronaphthalene	10.6	U
208-96-8	acenaphthylene	10.6	U
83-32-9	acenaphthene	10.6	U
86-73-7	fluorene	10.6	U
85-01-8	phenanthrene	10.6	U
120-12-7	anthracene	10.6	U
206-44-0	fluoranthene	10.6	U
129-00-0	pyrene	10.6	U
56-55-3	benzo(a)anthracene	10.6	U
218-01-9	chrysene	10.6	U
205-99-2	benzo(b)fluoranthene	10.6	U
207-08-9	benzo(k)fluoranthene	10.6	U
50-32-8	benzo(a)pyrene	10.6	U
193-39-5	indeno(1,2,3-cd)pyrene	10.6	U
53-70-3	dibenz(a,h)anthracene	10.6	U
191-24-2	benzo(g,h,i)perylene	10.6	U

U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630512

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B05W

Matrix: (soil/water) WATER Lab Sample ID: 9809642-02

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2B207

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. _____ Date Analyzed: 09/22/98

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

C ↓

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630512RE

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9809638-03

Sample wt/vol: 905.0 (g/mL) ML Lab File ID: 1N408

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 09/29/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 10/01/98

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	11.0	U
91-58-7	2-chloronaphthalene	11.0	U
209-96-8	acenaphthylene	11.0	U
83-32-9	acenaphthene	11.0	U
86-73-7	fluorene	11.0	U
85-01-8	phenanthrene	11.0	U
120-12-7	anthracene	11.0	U
206-44-0	fluoranthene	11.0	U
129-00-0	pyrene	11.0	U
56-55-3	benzo(a)anthracene	11.0	U
218-01-9	chrysene	11.0	U
205-99-2	benzo(b)fluoranthene	11.0	U
207-08-9	benzo(k)fluoranthene	11.0	U
50-32-8	benzo(a)pyrene	11.0	U
193-39-5	indeno(1,2,3-cd)pyrene	11.0	U
53-70-3	dibenz(a,h)anthracene	11.0	U
191-24-2	benzo(g,h,i)perylene	11.0	U

UJ A01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630612

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B05W

Matrix: (soil/water) WATER Lab Sample ID: 9809642-01

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2B206

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. _____ Date Analyzed: 09/22/98

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

U ↓

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630612

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9809638-01

Sample wt/vol: 940.0 (g/mL) ML Lab File ID: 8M510

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted:09/22/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/25/98

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	10.6	U
91-58-7	2-chloronaphthalene	10.6	U
208-96-8	acenaphthylene	10.6	U
83-32-9	acenaphthene	10.6	U
86-73-7	fluorene	10.6	U
85-01-8	phenanthrene	10.6	U
120-12-7	anthracene	10.6	U
206-44-0	fluoranthene	10.6	U
129-00-0	pyrene	10.6	U
56-55-3	benzo(a)anthracene	10.6	U
218-01-9	chrysene	10.6	U
205-99-2	benzo(b)fluoranthene	10.6	U
207-08-9	benzo(k)fluoranthene	10.6	U
50-32-8	benzo(a)pyrene	10.6	U
193-39-5	indeno(1,2,3-cd)pyrene	10.6	U
53-70-3	dibenz(a,h)anthracene	10.6	U
191-24-2	benzo(g,h,i)perylene	10.6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630712

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B05W

Matrix: (soil/water) WATER Lab Sample ID: 9809642-04

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2B209

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. _____ Date Analyzed: 09/22/98

GC Column: J&W DB-624(PID) ID: 0.53 (mm) Dilution Factor: 5.0

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	24.8	P	J MOB =
108-88-3	Toluene	8.5		
100-41-4	Ethylbenzene	39.0		
1330-20-7	Xylenes (total)	214		

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630712

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B01W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9809637-20

Sample wt/vol: 940.0 (g/mL) ML Lab File ID: 4N211

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted:09/22/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/29/98

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/L	Q
91-20-3	naphthalene	68.0	
91-58-7	2-chloronaphthalene	42.6	U
209-96-8	acenaphthylene	42.6	U
83-32-9	acenaphthene	42.6	U
86-73-7	fluorene	42.6	U
85-01-8	phenanthrene	42.6	U
120-12-7	anthracene	42.6	U
206-44-0	fluoranthene	42.6	U
129-00-0	pyrene	42.6	U
56-55-3	benzo(a)anthracene	42.6	U
218-01-9	chrysene	42.6	U
205-99-2	benzo(b)fluoranthene	42.6	U
207-08-9	benzo(k)fluoranthene	42.6	U
50-32-8	benzo(a)pyrene	42.6	U
193-39-5	indeno(1,2,3-cd)pyrene	42.6	U
53-70-3	dibenz(a,h)anthracene	42.6	U
191-24-2	benzo(g,h,i)perylene	42.6	U

= U

DUPLICATE

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630714

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B05W

Matrix: (soil/water) WATER Lab Sample ID: 9809642-07

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2B2013

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. _____ Date Analyzed: 09/22/98

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	27.0	P	J MDB =
108-88-3	Toluene	10.2		
100-41-4	Ethylbenzene	44.6		
1330-20-7	Xylenes (total)	226		

FORM I VOA

DUPLICATE

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630714

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9809638-09

Sample wt/vol: 960.0 (g/mL) ML Lab File ID: 8M518

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 09/22/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/25/98

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	50.0	
91-58-7	2-chloronaphthalene	10.4	U
208-96-8	acenaphthylene	10.4	U
83-32-9	acenaphthene	10.4	U
86-73-7	fluorene	10.4	U
85-01-8	phenanthrene	10.4	U
120-12-7	anthracene	10.4	U
206-44-0	fluoranthene	10.4	U
129-00-0	pyrene	10.4	U
56-55-3	benzo(a)anthracene	10.4	U
218-01-9	chrysene	10.4	U
205-99-2	benzo(b)fluoranthene	10.4	U
207-08-9	benzo(k)fluoranthene	10.4	U
50-32-8	benzo(a)pyrene	10.4	U
193-39-5	indeno(1,2,3-cd)pyrene	10.4	U
53-70-3	dibenz(a,h)anthracene	10.4	U
191-24-2	benzo(g,h,i)perylene	10.4	U

U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630722

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B05W

Matrix: (soil/water) WATER Lab Sample ID: 9809642-05

Sample wt/vol: 10.00 (g/ml) ML Lab File ID: 2B2010

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: not dec. _____ Date Analyzed: 09/22/98

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)	11.5	

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

630722

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: FS4B02W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9809638-04

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 8M513

Level: (low/med) LOW Date Received: 09/21/98

% Moisture: _____ decanted: (Y/N)___ Date Extracted:09/22/98

Concentrated Extract Volume: 1.00(mL) Date Analyzed: 09/25/98

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	7.1	J
91-58-7	2-chloronaphthalene	10.0	U
208-96-8	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

U → J

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

CHAIN OF CUSTODY RECORD

COC NO.: GAS04

PROJECT NAME: ~~16 SWMUs Investigations~~ CAP-A Options

PROJECT NUMBER: 01-0331-04-~~7328-200~~ 9405-210

PROJECT MANAGER: ~~Jeff Longaker~~ Patty Stoll

Sampler (Signature) Laura Lumley (Printed Name)

Sample ID	Date Collected	Time Collected	Matrix	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	PAH	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
594ZZ	9/17/98	1620	water						1	1		
650312	9/17/98	1000							2	2		9809637-17
630312	9/19/98	850							2	2		-18
650412	9/17/98	1045							2	2		-19
630712	9/19/98	1230							2	2		-20
630612	9/19/98	1030	↓						2	2		9809638-01

35455 ↓ 35455

9/21/98

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	9/21/98	Frances	9/21/98
COMPANY NAME: SAIC	1145	COMPANY NAME: GEL	1545
RECEIVED BY: Pat Lochbaum	Date/Time 9-21-98	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL	1145	COMPANY NAME:	
RELINQUISHED BY: Pat Lochbaum	Date/Time 9/21/98	RECEIVED BY:	Date/Time
COMPANY NAME: GEL	1545	COMPANY NAME:	

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod Charleston, SC 29417

PHONE NO: (803) 556-8171

TOTAL NUMBER OF CONTAINERS: 11

Cooler ID: #40, 5C

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

CHAIN OF CUSTODY RECORD

COC NO.: GAS05

PROJECT NAME: ~~16 GWMUs Investigations~~ CAP-A Options

PROJECT NUMBER: 01-0331-04-~~7328-200~~ 9805-210

PROJECT MANAGER: ~~Jeff Longaker~~ 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	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	PAH	PAH, DRO	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
650325	9/17/98	920	water							3	3		980638-02
630512	9/19/98	1615							2		2		-03
630722	9/19/98	1450							2		2		-04
625219	9/20/98	1220							2		2		-05
620412	9/20/98	1205							2		2		-06

REQUESTED PARAMETERS

9/21/98

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	9/21/98 1145	[illegible]	9/21/98 1545
COMPANY NAME: SAIC		COMPANY NAME:	
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME:	9/21/98 1145	COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME:	9/21/98 1545	COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 11

Cooler ID: #349, 4°C

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

CHAIN OF CUSTODY RECORD

COC NO.: GAS 06

PROJECT NAME: ~~16 SWMUs Investigations~~ CAP-A Option

PROJECT NUMBER: 01-0331-04 ~~7320-200~~ 9805-210

PROJECT MANAGER: ~~Jeff Longaker~~ 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	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	PAH	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
600616	9/18/98	1253	water						N	2		9809638-07
560316	9/17/98	1335							N	2		-08
630714	9/19/98	1230							N	2		-09
950112	9/17/98	1445							N	2		-10
620616	9/20/98	910							N	2		-11
630412	9/19/98	1635	↓						I	1		-12

9/21/98

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	9/21/98 1145	[illegible]	9/21/98 1545
COMPANY NAME: SAIC		COMPANY NAME: GEL	
RECEIVED BY: [illegible]	9/21/98 1145	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL		COMPANY NAME:	
RELINQUISHED BY: [illegible]	9/21/98 1545	RECEIVED BY:	Date/Time
COMPANY NAME: GEL		COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 11

Cooler ID: #2, 4°C

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

2015

CHAIN OF CUSTODY RECORD

COC NO.: GAS09

PROJECT NAME: ~~16 SWMUs Investigations~~ CAP-A Options

PROJECT NUMBER: 01-0331-04 ~~7320-200~~ 9605-210

PROJECT MANAGER: ~~Jeff Longaker~~ Bobby Stell

Sampler (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	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	BTEX	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
630512	9/19/96	1915	water						2	2		9809642-02
630312	9/19/96	950							2	2		-03
630712	9/19/96	1230							2	2		-04
630722	9/19/96	1450							2	2		-05
620722	9/18/96	1640							2	2		-06
630714	9/19/96	1230							2	2		-07
650312	9/17/96	1000							2	2		-08
620732	9/18/96	1710							2	2		-09
590432	9/17/96	1720							2	2		-10
590412	9/17/96	1530							2	2		-11
590422	9/17/96	1620							2	2		-12
560312	9/17/96	1345							2	2		-13
650522	9/18/96	930							2	2		-14

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	9/21/98	D Franco	9/21/98
COMPANY NAME: SAIC	1145	COMPANY NAME: GEL	1545
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL	9/21/98 1145	COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME: GEL	9/21/98 1545	COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS:

Cooler ID: #406, 3C

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

CHAIN OF CUSTODY RECORD

COC NO.: GAS09

PROJECT NAME: ~~16 SWMUs Investigations~~ CAP-A Options

PROJECT NUMBER: 01-0331-04-~~7328-200~~ 9405-210

PROJECT MANAGER: ~~Jeff Longaker~~ Patty Stoll

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

Sample ID	Date Collected	Time Collected	Matrix	VOC	SVOC	TOTAL LEAD	FILTERED LEAD	RCRA METALS	BTEX	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
600312	9/20/98	1635	water						N	2		9809645-08
600712	9/20/98	1505							N	2		-09
600722	9/20/98	1535							N	2		-10
620612	9/20/98	920							N	2		-11
620616	9/20/98	910							N	2		-12
620312	9/20/98	1040							N	2		-13
600714	9/20/98	1505							N	2		-14
600732	9/20/98	1605							N	2		-15
625219	9/20/98	1220							N	2		-16
630412	9/19/98	1655							N	2		-17
620412	9/20/98	1205							N	2		-18
600612	9/16/98	1300							N	2		-19
TBB003	9/17/98	745	↓						N	2		-20

REQUESTED PARAMETERS

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Raod, Charleston, SC 29417

PHONE NO: (803) 556-8171

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Laura Lumley	9/21/98 1145	[illegible]	9/21/98 1545
COMPANY NAME: SAIC		COMPANY NAME: GEL	
RECEIVED BY: [illegible]	Date/Time 9/21/98 1145	RELINQUISHED BY:	Date/Time
COMPANY NAME: GEL		COMPANY NAME:	
RELINQUISHED BY: [illegible]	Date/Time 9/21/98 1545	RECEIVED BY:	Date/Time
COMPANY NAME: GEL		COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS:

Cooler ID: #406, 3°C

Cooler Temperature: 4°C

FEDEX NUMBER:

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX IX

CONTAMINATED SOIL DISPOSAL MANIFESTS

THIS PAGE INTENTIONALLY LEFT BLANK

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 Closure Report was not submitted to GA EPD in 1996 because review of the closure analytical data indicated that a CAP-Part A would be required (i.e., per requirements of GUST-9, Item 15, page 12, dated August 1995). However, all pertinent information (i.e., copies of analytical data, manifests, and maps) are provided in this CAP-Part A Report. Disposal manifests for the UST 214 site were submitted to GA EPD USTMP in September 1998 with the UST 207A (Facility ID#9-089039) Closure Report response to comments correspondence (Perez 1998). Approximately 22.67 tons of contaminated soil was excavated from the site.

I certify that the above information is true and accurate.

Name: Thomas C. Fry

Title: Acting Chief, ENRD

Signature: Thomas C. Fry

Date: 09/07/99

THIS PAGE INTENTIONALLY LEFT BLANK

Mel.

DEPARTMENT OF THE ARMY
HEADQUARTERS, 3D INFANTRY DIVISION (MECHANIZED) AND FORT STEWART
Directorate of Public Works
1557 Frank Cochran Drive
Fort Stewart, Georgia 31314-4928

REPLY TO
ATTENTION OF

SEP 15 1998

Directorate of Public Works

CERTIFIED MAIL
Z-098-024-167

Georgia Department of Natural Resources
Environmental Protection Division
Underground Storage Tank Management Program
Attention: Mr. William Logan, Environmental Specialist
4244 International Parkway, Suite 104
Atlanta, Georgia 30354

Dear Mr. Logan:

Fort Stewart is pleased to receive the Georgia Environmental Protection Division's correspondence dated August 14, 1998, in reference to the Closure Report submitted for Fort Stewart's former Underground Storage Tank (UST) #207A, Building 230, Facility Identification Number 9089039. As requested in that correspondence, the April 3, 1998 Closure Report Addendum should be amended to include the enclosed manifests for Anderson Columbia Environmental Delivery Order 101, which are provided for your use and convenience. These manifests include additional UST sites (as shown on the attached list). A total of 45 USTs were removed under this delivery order. In addition, this delivery order removed dispensing islands (note included on the provided list) from another 22 sites, for a total of 67 sites as noted in the Closure Report Addendum.

If you have any questions or comments, please contact Ms. Melanie Little or Ms. Tressa Rutland, Directorate of Public Works, Environmental Branch, at (405) 364-8461 or (912) 767-7919, respectively.

Sincerely,

Dale F. Kiefer
for Ovidio E. Perez
Colonel, U.S. Army
Director, Public Works

Enclosure

FORT STEWART UST Removal List for FY 1996

Anderson Columbia Delivery Order #101

TANK #	LOCATION	SIZE	FACILITY ID #
2	Bldg 1840: Diesel	25,000	9-089065
3	Bldg 1850: Mogas	5,000	9-089065
4	Bldg 1840: Waste Oil	2,500	9-089065
4A	Bldg 1840: Waste Oil	1,000	9-089065
5	Bldg 1824: Mogas	6,000	9-089066
6	Bldg 1824: Diesel	25,000	9-089066
22	Bldg 1720: Waste Oil	2,000	9-089011
24	Bldg 1720: Waste Oil	2,000	9-089011
28B	Bldg 1720: Waste Oil	2,000	9-089011
38	Bldg 1510/13: Waste Oil	1,000	9-089109
41	Bldg 1542: Waste Oil	1,000	9-089145
45	Bldg 1172: Waste Oil	500	9-089054
56	Bldg 1056: Waste Oil	2,000	9-089116
65	Bldg 927: Mogas	10,000	9-089091
66	Bldg 967: Diesel	10,000	9-089091
71	Bldg 1203: Waste Oil	1,000	9-089022
71A	Bldg 1260: Waste Oil	1,000	9-089023
74	Bldg 1280: Waste Oil	2,500	9-089072
79	Bldg 1224: Waste Oil	1,000	9-089026
87	Bldg 1245: Diesel	5,000	9-089073
88	Bldg 1245: Diesel	5,000	9-089073
93	Bldg 1330: Waste Oil	2,500	9-089112
94	Bldg 1320/23: Waste Oil	1,000	9-089076
94B	Bldg 1339: Waste Oil	1,000	9-089110
94C	Bldg 1339A: Waste Oil	1,000	9-089110
100A	Bldg 1349: Waste Oil	1,000	9-089080
100B	Bldg 1350: Waste Oil	1,000	9-089081
201A	Bldg 260: Waste Oil	1,000	9-089043
201B	Bldg 260: Waste Oil	1,000	9-089043
207	Bldg 232: Waste Oil	500	9-089038
207A	Bldg 230: Waste Oil	2,500	9-089039
214	Bldg 1503: Waste Oil	550	9-089015
215	Bldg 1503: Waste Oil	500	9-089015
216	Bldg 4502: Waste Oil	1,000	9-089060
224	Bldg 4528: Waste Oil	1,000	9-089063
225	Bldg 4529: Waste Oil	1,000	9-089090
238	Bldg 4586: Waste Oil	1,000	9-089044
241	Bldg 241: Waste Oil	2,000	9-089041
242	Bldg 241: Waste Oil	1,000	9-089041
243	Bldg 241: Waste Oil	1,000	9-089041
244	Bldg 241: Waste Oil	1,000	9-089041
261	Bldg 430 (AAFES):Waste Oil	500	9-089118
115	Bldg 15003 Em. Gen: Diesel	250	9-054005
118	Bldg 1239 Em. Gen: Diesel	1,000	9-089070
123	Bldg 933 Em. Gen: Diesel	1,000	9-089092

REYNOLDS CONSTRUCTION COMPANY
Highway 84 • P. O. Box 749
Ludowici, Georgia 31316
Office (912) 368-7488 • Plant (912) 876-8085

Date _____ 19__ Load No. 50

Triple R. Mart — HCS

Customer — Description

R.R. 104

Project Number

Location — County

45340 lb Net
21460 lb Tare
66800 lb+ Gross
12:06 PM AU 30 96

Signature of Weigher

TONS: 22.67 — TOTAL TONS: 918.56 ~~922.56~~

TRUCKER — TRUCK NO. 63

DRIVER

TICKET NO. 60162

VIP-1518-HV

NON-HAZARDOUS WASTE MANIFEST

Manifest Document No.

1. Page 1 of 1

GENERATOR

2. Generator's Name and Mailing Address
Ft. Stewart
Hinesville, GA 31313

3. Generator's Phone (912) 234-6579

4. Transporter 1 Company Name
Hendricks Hauling

5. Transporter 2 Company Name

6. Designated Facility Name and Site Address
Triple R Management, Inc. C/O Reynolds Construction Co.
Rt. 84
Ludowici GA 31316

A. Transporter's Phone
B. Transporter's Phone 912-427-6758
C. Facility's Phone 912-756-3655

7. Waste Shipping Name and Description	8. Containers No.	Type	9. Total Quantity	10. Unit Wt/Vol
a. Petroleum Contaminated Soil	1	TT	18.00	CY
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

11. Special Handling Instructions and Additional Information
8101
Tank# _____

12. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
Tom Fry	Tom Fry	08	30	96

TRANSPORTER

13. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Joe Yspell	Joe Yspell	08	30	96

14. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

15. Discrepancy Indication Space

16. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
Charles Pruitt	Charles Pruitt	8	30	96

ORIGINAL – RETURN TO GENERATOR

APPENDIX X

SITE RANKING FORM

THIS PAGE INTENTIONALLY LEFT BLANK

SITE RANKING FORM

Facility Name: UST 214, Building 1503 **Ranked by:** S. Stoller

County: Liberty **Facility ID #:** 9-089015 **Date Ranked:** 6/30/99

SOIL CONTAMINATION (based on Closure Data)

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

* Due to an elevated detection limit of 0.112 mg/kg in the closure sample.

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. 10) = (10) x (C. 10) = (D. 100)

GROUNDWATER CONTAMINATION (based on CAP-Part A groundwater data)

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. 5) = (G. 5)

Facility Name: UST 214, Building 1503 **County:** Liberty **Facility ID #:** 9-089015

POTENTIAL RECEPTORS (MUST BE FIELD-VERIFIED)

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

H. Public Water Supply

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

For lower susceptibility areas only:

☐	>1 mi	= 0

I. Non-Public Water Supply

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

For lower susceptibility areas only:

☐	>¼ mi	= 0

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

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

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

☒	Impacted	= 500
☐	≤500'	= 50
☐	>500' - 1,000'	= 5
☐	>1,000'	= 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. 500)+ (K. 0) = L. 500

(G. 5) x (L. 500) = M. 2500

(M. 2500)+ (D. 100) = N. 2600

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. 2600) x (P. 1) = (2600) + (Q. 0)

= 2600 (based on Closure soil data and CAP-Part A groundwater data)
ENVIRONMENTAL SENSITIVITY SCORE

ADDITIONAL 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 Item H of the Site Ranking Form and provides detailed information relating to the geologic and hydrogeologic conditions at Fort Stewart which supports Fort Stewart's determination that the water withdrawal point(s) located at Fort Stewart is (are) not hydraulically connected to the surficial aquifer.

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 150 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 1970 feet thick and dominated by clastics. The Tertiary section was found to be approximately 2170 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 (Herrick and Vochis 1963).

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 (Herrick and Vochis 1963).

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 (Herrick and Vochis 1963).

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: Coosawhatchie 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 Markshead 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 and limestone.

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.

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

APPENDIX XI

COPIES OF PUBLIC NOTIFICATION LETTERS AND CERTIFIED RECEIPTS OF NEWSPAPER NOTICE

THIS PAGE INTENTIONALLY LEFT BLANK

STATE OF GEORGIA
CHATHAM COUNTY

Affidavit of Publication
___Savannah Morning News
___Savannah Evening Press

Personnally appeared before me, Lynnette Tuck, to me known, who being sworn, deposes and says:

That he is the Class. Inside Sales Mgr. 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 6-27, 1999, 7-4, 1999, _____, 1999, _____, 1999, and finds that the following Advertisement, to-wit:

015 Miscellaneous Notices

PUBLIC NOTICE

Notification of Corrective Action Plan, Underground Storage Tank Releases, Fort Stewart Garrison Area, Fort Stewart, Ga.

The Georgia EPD (GEPD) has required Fort Stewart Directorate of Public Works to prepare a Corrective Action Plans Part-A to investigate and/or clean up contamination at the underground storage tank sites listed at the end of this notification. These plans will be submitted to the GEPD on or before September 30, 1999. If you want to examine a copy of one or more 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 will be mailed at a nominal fee.

Comments to the plan will be accepted until October 31, 1999, and should be directed to GEPD at 404-362-2687. Following is the mailing address:

GEPD USTMP, 4244 International Parkway, Suite 104, Atlanta, Ga. 30354

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

UST: Building; Facility ID#
2 & 3, 1840, 0-089065
5 & 6, 1824, 0-089066
28B, 1720, 9-089011
36 & 37m 1510, 9-089016
38, 1510/13, 9-089109
63 & 64, 1128, 9-089051
71, 1203, 9-089022
79, 1224, 9-089026
87 & 88, 1245, 9-089073
100B, 1350, 9-089081
122, 7705, 9-089083
123, 933, 9-089092
214, 1503, 9-089015
225, 4529, 9-089090
242 & 244, 241, 9-089041
248 & 249, 15016, 9-054006
4 & 5 NGTC, 9395, 0-890028
6 & 7 NGTC, 9795, 0-890028

appeared in each of said editions.

Lynnette Tuck
(Deponent)

Sworn to and subscribed before me this 7 day of July, 1999.

Zillie D. Ray
Notary Public, Chatham County, Georgia

Form 121 rev.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX XII

GUST TRUST FUND REIMBURSEMENT APPLICATION AND CLAIM FOR REIMBURSEMENT

THIS PAGE INTENTIONALLY LEFT BLANK

Fort Stewart is a federally owned facility and has funded the investigation for UST 214, Building 1503, Facility ID #9-089015, using Department of Defense Environmental Restoration Account Funds. Application for Georgia Underground Storage Tank Trust Fund reimbursement is not being pursued at this time.

THIS PAGE INTENTIONALLY LEFT BLANK

ATTACHMENT A

TECHNICAL APPROACH

THIS PAGE INTENTIONALLY LEFT BLANK

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.

During the May and June 1998 sampling events, 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.

Due to a change in the state regulations governing sample analysis, the collection of samples designated for volatile organic analyses was modified beginning with the November 1998 field effort. Soil samples designated for volatile organic analyses were collected using En Core™ samplers. The samplers were locked into an En Core T-Handle. Using the T-Handle, the sampler was pushed into the soil until the coring body of the sampler was full. Once the samplers were filled, caps were locked onto them insuring that no

headspace was present. The samplers were then removed from the handle and placed in an En Core zipper bag. Three encore samples are collected from each section 2.0-foot section.

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 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 were 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. During field activities in November 1998 or later, the temporary piezometers were screened from ground surface to the bottom of the borehole.

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 drilling 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 were decontaminated once they 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 for 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. For a detailed description of all field documentation, see section 4.5 of Attachment IV of the Work Plan.

3.0 SAMPLE HANDLING AND ANALYSIS

3.1 Analytical Program

Soil samples were screened for the presence of volatile vapors using a MiniRae organic vapor analyzer (PID). The MiniRae 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, TPH by method SW846-9073, and lead by method SW846-6010/7000, during the May and June 1998 field effort. Beginning in November 1998, BTEX was analyzed using method SW846-5035/8260B, while the analyses for the other contaminants remained the same. Groundwater samples were analyzed for BTEX by method SW846-8260 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 SW846-8020, PAH by method SW846-8270, TPH by method SW846-8015 (modified), and lead by method SW846-6010/7000. Groundwater samples were analyzed for BTEX by method SW846-8260 and PAH by method SW 846-8270. TPH analysis included both gasoline range organics (GRO) and diesel range organics (DRO). Beginning in November 1998, soil samples were analyzed for BTEX using method SW846-5035/8260B. 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/TPH-GRO	1 – 4 oz jar with Teflon®-lined cap (no headspace)	20 g	Cool, 4°C	14 d
BTEX (beginning 11/98)	3 – En Core™ Samplers	15 g	Cool, 0°C	48 hrs
TPH-GRO (beginning 11/98)	1 – 4 oz jar with Teflon®-lined cap (no headspace)	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

THIS PAGE INTENTIONALLY LEFT BLANK

Anderson Columbia Environmental Inc., 1996. Closure Report, *Gasoline and Diesel Tanks, Building 1503, Tank 214*, Facility ID: 9-089015, Fort Stewart, Georgia, November.

Arora, Ram, 1984. *Hydrologic Evaluation for Underground Injection Control in the Coastal Plain of Georgia*, Department of Natural Resources, Environmental Protection Division, Georgia Geological Survey.

GA EPD (Georgia Environmental Protection Division), 1992, *Groundwater Pollution Susceptibility Map of Georgia.*

Geraghty and Miller, 1993. *RCRA Facility Investigation Work Plan*, Fort Stewart, Georgia.

Herrick, S.M. and Vorchis, R.C. 1963. *Subsurface Geology of the Georgia Coastal Plain*, Georgia Geologic Survey Information Circular 25.

Looper, Edward E., 1980. *Soil Survey of Liberty and Long Counties, Georgia*, U.S. Department of Agriculture, Soil Conservation Service.

Miller, James A., 1990. *Groundwater Atlas of the United States*, U.S. Department of the Interior, U.S. Geological Survey, Hydrologic Inventory Atlas 730G.

Perez, Ovidio E. 1998. Letter to William Logan (Georgia Department of Natural Resources, Environmental Protection Division, Underground Storage Tank Management Program), September 15.

THIS PAGE INTENTIONALLY LEFT BLANK

ATTACHMENT C

SUPPLEMENTAL INFORMATION
RISK-BASED CORRECTIVE ACTION

THIS PAGE INTENTIONALLY LEFT BLANK

1. RISK-BASED CORRECTIVE ACTION

A risk-based approach was used to aid in the decision making process to determine the need for further action at the UST 214 site. Due to the nature of the contamination (petroleum hydrocarbon contamination of groundwater), the risk-based approach was limited to human health concerns. Ecological risk concerns are negligible because of the lack of habitat available for ecological receptors as a result of the 10 to 12 inches of concrete overlying the majority of the site.

The methods for assessing human health concerns for the site were derived from GUST CAP Part B guidance (GA EPD 1995) and recent GA EPD guidance (GA EPD 1996). These were supplemented by the additional guidance documents on risk assessment methods referenced in this section. In general, the risk-based corrective action approach is performed in two steps:

1. Results were screened against readily available regulatory levels and risk-based screening levels to identify chemicals of potential concern (COPCs).

2. Site-specific ACLs were developed for COPCs using the results of the fate and transport modeling and identified receptor locations.

The following sections present the conceptual model of the exposure setting and potential receptors as well as the general methodology employed to perform the screening for COPCs and the development of ACLs.

1.1 Potential receptor survey

The exposure assessment identifies any potentially complete pathways between the contaminant source and potential receptors. This involves identifying potential current and future receptors, release mechanisms through which contamination might come into contact with the receptors, and the routes of exposure through which the receptors might be exposed.

The UST 214 site is located within Fort Stewart, an active military installation, and within an access-controlled fence of a secured motorpool. The land use at the site is currently military industrial. In the direction of groundwater flow, an sanitary sewer line is located below the below table and approximately 5 feet southeast of the site, a drainage ditch is located approximately 200 feet south of the site, and Mill Creek is located approximately 2000 feet southwest of the site.

No connection between site contamination and current off-site receptors has been identified. Site contamination may migrate to the surficial aquifer. The Hawthorn Group separates the surficial aquifer from the deep drinking water aquifer, the Floridan aquifer, which is approximately 90 feet of clay. There appears to be no vertical migration from the surficial aquifer to the Floridan aquifer. However, the Hawthorn Group, a thick and highly effective confining unit, separates the water supply well from the surficial aquifer.

No current on-site receptors have been identified for the site. Potential future on-site receptors might include industrial workers and military residents.

Potential future on-site industrial receptors may come in direct contact with site soil contamination during construction or excavation activities. No near-term on-site receptors are likely to come into contact with groundwater, unless the surficial aquifer discharges into the drainage ditch.

1.2 Screening for Chemicals of Potential Concern

1.2.1 Screening Methodology

The purpose of a risk evaluation screen is to identify the COPCs and areas of concern at a site and possibly to identify sites for which no further action is needed. The first step in the risk process uses screening levels that are readily obtainable and that, due to their conservative nature, can be used with a high degree of confidence to indicate sites for which no further action is required.

An American Society of Testing and Materials (ASTM) (ASTM 1995) Tier 1–type risk evaluation process will be applied to the data collected for the UST 214 site to identify any COPCs and media for which no further action is needed. The risk evaluation screen involves the steps listed below.

- Identify potential migration and exposure pathways associated with the site, and identify potential exposure scenarios that should be used to select screening levels.
- Identify risk-based screening levels and regulatory based screening levels for each contaminant.
- Compare site-related concentrations to screening levels to determine if any potential COPCs exist at the site.
- Compare detection limits to screening levels to identify potential false negative screening results.

The screening levels for the UST 214 site data have been taken from the following sources based on GA EPD guidance (GA EPD 1996):

- federal MCLs (EPA 1989),
- GUST Soil Threshold Levels (i.e., Table A, Column 2),
- soil screening levels developed by the U.S. Environmental Protection Agency (EPA) (EPA 1996a), and
- soil and groundwater risk-based concentrations developed by EPA Region 3 (EPA 1996b).

These values reflect screening levels based on a combination of regulatory screening levels (i.e., MCLs and GUST soil threshold levels), and calculated risk-based values (i.e., EPA Region 3 risk-based concentrations).

Screening levels inherently incorporate assumptions about land use. In identifying COPCs, it is generally accepted that screening levels will reflect any potential future land uses, and thus, they usually reflect a conservative residential use scenario (EPA 1991; EPA 1996a; ASTM 1995). Based on GA EPD guidance, risk-based screening levels reflect residential land use for groundwater and industrial land use for deep soils (GA EPD 1996).

Default residential exposure scenarios for groundwater assume that use of the land could someday be residential and that the following exposures could occur:

- ingestion of groundwater and
- inhalation of volatiles during showering.

The default industrial exposure assumptions for deep soils assume that the following exposures could occur:

- incidental ingestion of soil and
- inhalation of volatiles and dust.

EPA's *Soil Screening Guidance* (EPA 1996a) provides two options for selecting soil values that address protection of groundwater. One value assumes no contaminant dilution or attenuation would occur between the soil and groundwater; a second value assumes a 20-fold dilution attenuation factor (DAF). A DAF of 20 was used to develop soil screening values protective of groundwater at the UST 214 site.

If ARAR- or risk-based values are not available, it generally means that (1) the chemical is not considered to be toxic except perhaps at extremely high concentrations (e.g., aluminum, sodium); (2) the dose-response data do not indicate a toxic effect; or (3) EPA is currently reviewing toxicity information, and no reference dose or cancer slope factor is currently available.

1.2.2 Screening Results

The risk screening process is a systematic screening of sample results to identify site-related COPCs. Constituent concentrations below risk- or regulatory-based screening levels are not considered COPCs and are not evaluated further. Table C-1 presents the results of the risk-based screening for the Part A SI soil data. Table C-2 presents the results of the risk-based screening for the Part A SI groundwater data.

No constituents were detected above screening levels for soil data collected during the Part A SI. Toluene, xylenes, lead, and TPH were detected below screening levels during the Part A sampling. No constituents were identified as a COPC for UST 214 site soils.

Detection limits for benzo(a)pyrene and dibenzo(a,h)anthracene exceeded risk-based screening levels for soils in three samples. The detection limit for benzo(a)anthracene exceeded the leaching to groundwater risk-based screening value in one of those samples. The elevated detection limits were the result of analytical dilutions of the samples to account for matrix interference during analysis. Detection limits represent levels of confidence where a reported value above the level is considered an accurate value. But estimated values may be detected and reported below the detection limits within the instrument's range of detection. No COPCs for soils were selected for the site based on the detection limit screening.

Benzene was detected in three groundwater samples from three temporary wells (63-01, 63-02, and 63-07) at concentrations above the risk-based screening level for benzene of 0.36 µg/L and above the federal MCL for benzene of 5 µg/L. Ethylbenzene, toluene, naphthalene, phenanthrene, and xylenes were detected below screening values for the Part A SI. Benzene was selected as a COPC for the UST 214 site groundwater.

Detection limits for several PAHs exceeded risk-based screening levels for the Part A groundwater data. For these constituents, risk-based values represent values below analytically achievable levels. The detection limits for one PAH, benzo(*a*)pyrene, also exceeded the federal MCL of 0.2 µg/L by two orders of magnitude. No additional COPCs were selected for groundwater based on the detection limit screening.

1.3 Site-Specific Levels

Detections exceeding the conservative generic screening levels are considered COPCs. ACLs are developed, when appropriate, for the COPCs using site-specific information from the fate and transport

modeling and available regulatory screening levels. When regulatory screening levels were not available, then ACLs were developed based on risk-based levels. No risk-based ACLs were developed for UST 214.

1.3.1 Alternate Threshold Levels

No COPCs were identified for UST 214 site soils for the CAP-Part A investigation; thus, no alternate threshold levels were developed for soils. Closure data was not used to evaluate the site because the more recent CAP-Part A data was more reflective of current site conditions.

1.3.2 Alternative Concentration Limits

Benzene was identified as a COPC for groundwater at the site. Benzene was modeled to three potential downgradient locations where a receptor may come in contact with migrating site contamination. These three locations were a sanitary sewer 5 feet downgradient, a drainage ditch 800 feet downgradient, and Mill Creek 2000 feet downgradient from the site. Fate and transport modeling was used to develop site-specific dilution attenuation factors (DAF) between the source and the receptor locations (see 1.3.3 below). The modeling results estimated DAFs for benzene of 1.0 for the sanitary sewer, 371 for the drainage ditch, and infinity for Mill Creek. The MCL for benzene is 5 µg/L. Adjusting this regulatory level using the site-specific DAF identified for the potential migration of contamination from the site to the sanitary sewer results in an ACL for benzene of 5µg/L (i.e., 1.0 × 5 µg/L) and to the drainage ditch results in an ACL for benzene of 1855 µg/L (i.e. 317 × 5 µg/L). The modeling estimated an infinite DAF for Mill Creek indicating that the contamination will never reach the creek.

1.3.3 Fate and transport model

1.3.3.1 Model Selection

Site-specific dilution attenuation factors between the source and the receptor locations were developed. The DAF is a numerical value that represents the attempt to mathematically quantify the natural physical, chemical, and biological processes (e.g., advection-dispersion, sorption-retardation, biodegradation, volatilization) that result in the decrease of a chemical concentration in an environmental medium. In simple terms, the DAF is the ratio of chemical concentration at the source (or the point of origin) to the concentration at the exposure point. The DAFs reflect the natural attenuation concepts outlined in the ASTM's Risk Based Corrective Action (RBCA) protocol (ASTM 1995).

Fate and transport models are used as tools for developing DAFs. The application of fate and transport models at any release site must ensure that the modeling results are protective of human health and the environment. Therefore, the selection process of a predictive model at a release site must consider its performance, characteristics, and applicability to the site being considered. The following characteristics were considered before selecting an appropriate model for Fort Stewart:

- the model provides conservative predictions,
- the model is technically sound,
- the model is a public-domain model or is readily available,
- the model has received adequate peer review,
- the model has been applied to other similar sites, and
- the model is easy to use.

The Analytical Transient 1-, 2-, 3-Dimensional Model (AT123D) meets all of the above criteria, and was selected for performing fate and transport analysis for this site. AT123D is a well-known and commonly used analytical groundwater pollutant fate and transport model. It computes the spatial-temporal concentration distribution of chemicals in the aquifer system and predicts the transient spread of a chemical plume through a groundwater aquifer. The fate and transport processes accounted for in AT123D are advection, dispersion, adsorption/retardation, and decay. This model can be used as a tool for estimating the dissolved concentration of a chemical in one, two, or three dimensions in the groundwater, resulting from a mass release (either continuous or instant or depleting source) over a source area (i.e., point, line, area, or volume source).

1.3.3.2 Fate and Transport Results

The AT123D model was used to determine the impact of dissolved hydrocarbons on potential receptors. A steady-state AT123D model was developed by calibrating the model against observed maximum concentrations in the groundwater (i.e., 37.1 µg/L) beneath the UST 214 site. Site-specific geotechnical information was collected during the CAP-Part A investigation and is presented in Table C-3. Modeling of the leaching of soil contamination to the groundwater was not performed because the additional contaminant contribution to the groundwater was negligible compared to the existing groundwater contamination. Potential receptors are a sanitary sewer located 5 feet southeast of the site, a drainage ditch located 200 feet south of the site, and Mill Creek located approximately 2000 feet southwest of the site. The invert elevation of the sanitary sewer is approximately 5.0 feet below the water table and is considered a potential preferrential pathway.

Vertical migration of the contaminant plume through the confining unit to the Principal Artesian aquifer is improbable. The confining unit has a vertical hydraulic conductivity on the order of 10^{-8} cm/sec and ranges from 15 to 90 feet in thickness. Assuming a vertical gradient of 1.0 ft/ft and an effective porosity of 0.06 (Mills et al. 1985) for the confining unit, the groundwater travel time is estimated to be 87 years. However, benzene will not travel at the same speed as water because of retardation due to adsorption. The retardation factor for benzene through the confining unit is 5.05. Therefore, the travel time for benzene through the confining unit (15 feet thick) is greater than 400 years (i.e., 87 years × 5.05 = 439 years). The surficial aquifer in which the contaminant plume is located is not used as a source of drinking water.

The fate and transport modeling results are provided in Table C-4 and Section 1.5. Three potential downgradient locations, a sanitary sewer, a drainage ditch, and Mill Creek, at which a receptor might encounter migrating groundwater contamination, were modeled. These are the nearest possible locations at which a receptor might encounter migrating groundwater contamination due to a possible hydraulic connection between the groundwater and the surface water in the ditch and the creek. Contaminant fate and transport simulations were performed to predict the maximum concentrations at these receptor locations over a simulation period of 100 years. The modeling results indicate that the maximum benzene concentrations at the sanitary sewer, drainage ditch, and Mill Creek are predicted to be 30 µg/L, 0.1 µg/L, and 0 µg/L, respectively. Therefore, surface water will not be impacted at concentrations above MCLs by the current site conditions at the UST 214 site, Facility ID #: 9-089015. The sanitary sewer line is located within the plume and below the water table and may be impacted by current site conditions.

Based on modeling results, the estimated DAFs for at the sanitary sewer, drainage ditch, and Mill Creek are 1.0, 371, and infinity, respectively. Infinite DAFs indicate that the predicted concentrations at the specific receptor is zero. Simulations were not performed to predict the maximum concentrations of

benzene over a simulation period of two years because there are no permanent monitoring wells at the site to confirm the model predictions. This simulation will be performed during the long-term monitoring at the site.

1.4 Conclusions and recommendations

The conclusions below are based on a fate and transport modeling assuming a continuous source of contamination of infinite duration at the site based on the maximum observed benzene concentration (i.e. 37.1 µg/L) in groundwater during the CAP-Part A investigation.

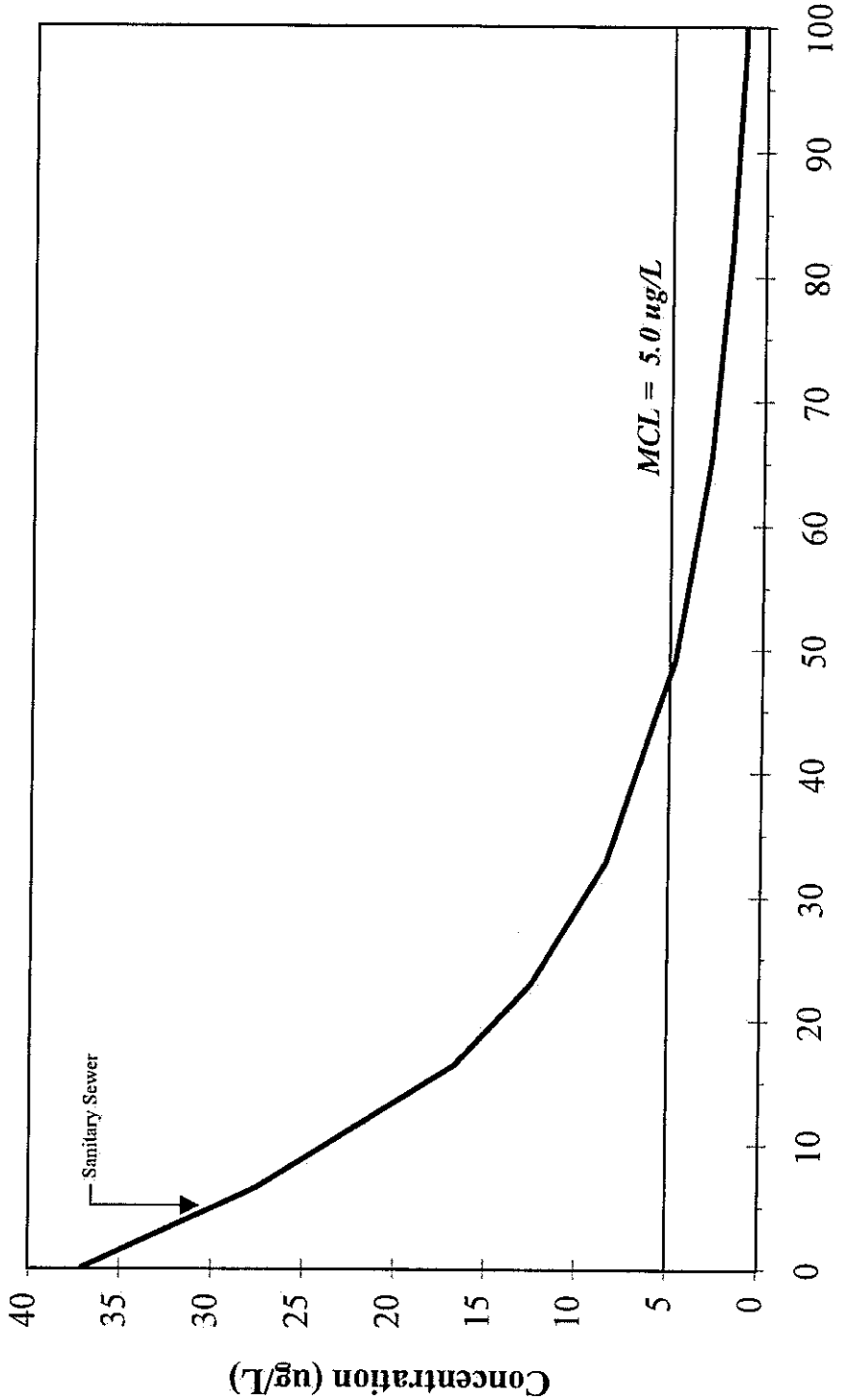
- Risk-based screening results show that benzene concentrations in groundwater exceed the initial screening levels.
- The modeling of benzene estimated a DAF of 1.0 for the sanitary sewer resulting in an ACL equal to the MCL of 5 µg/L. Benzene concentrations at the site during the CAP-Part A investigation exceeded the MCL.
- The modeling of benzene estimated a DAF of 371 for the drainage ditch resulting in an ACL 1855 µg/L. Benzene concentrations at the site during the CAP-Part A investigation did not exceed the ACL for the drainage ditch.
- The modeling of benzene estimated an infinite DAF at Mill Creek indicating that contamination will never reach this location, thus no ACLs were developed for Mill Creek.
- The horizontal and vertical extent of soil and groundwater contamination was determined during the CAP-Part A investigation.
- Fate and transport modeling of benzene indicates that contamination does not exceed MCLs at the conservatively defined downgradient receptors, a drainage ditch and Mill Creek.

Considering the site characteristics, a monitoring only plan is recommended to confirm that natural attenuation is taking place at the site.

1.5 Fate and Transport Model Output Results

Following are the data for fate and transport modeling.

Figure C-1. AT123D modeled maximum concentration of benzene in the groundwater versus downgradient distance from the source (UST 214)



Ft Stewart UST 214 Benzene (calibrated plume)

NO. OF POINTS IN X-DIRECTION	9
NO. OF POINTS IN Y-DIRECTION	5
NO. OF POINTS IN Z-DIRECTION	1
NO. OF ROOTS: NO. OF SERIES TERMS	400
NO. OF BEGINNING TIME STEP	13
NO. OF ENDING TIME STEP	220
NO. OF TIME INTERVALS FOR PRINTED OUT SOLUTION	12
INSTANTANEOUS SOURCE CONTROL = 0 FOR INSTANT SOURCE	1
SOURCE CONDITION CONTROL = 0 FOR STEADY SOURCE	0
INTERMITTENT OUTPUT CONTROL = 0 NO SUCH OUTPUT	1
CASE CONTROL =1 THERMAL, = 2 FOR CHEMICAL, = 3 RAD	2

AQUIFER DEPTH, = 0.0 FOR INFINITE DEEP (METERS) ...	0.1036E+02
AQUIFER WIDTH, = 0.0 FOR INFINITE WIDE (METERS) ...	0.0000E+00
BEGIN POINT OF X-SOURCE LOCATION (METERS)	-0.5500E+01
END POINT OF X-SOURCE LOCATION (METERS)	0.0000E+00
BEGIN POINT OF Y-SOURCE LOCATION (METERS)	-0.1850E+01
END POINT OF Y-SOURCE LOCATION (METERS)	0.1850E+01
BEGIN POINT OF Z-SOURCE LOCATION (METERS)	0.0000E+00
END POINT OF Z-SOURCE LOCATION (METERS)	0.2000E+01

POROSITY	0.2000E+00
HYDRAULIC CONDUCTIVITY (METER/HOUR)	0.2592E-01
HYDRAULIC GRADIENT	0.1080E-01
LONGITUDINAL DISPERSIVITY (METER)	0.5000E+01
LATERAL DISPERSIVITY (METER)	0.1500E+01
VERTICAL DISPERSIVITY (METER)	0.5000E+00
DISTRIBUTION COEFFICIENT, KD (M**3/KG)	0.1620E-03
HEAT EXCHANGE COEFFICIENT (KCAL/HR-M**2-DEGREE C)..	0.0000E+00

MOLECULAR DIFFUSION MULTIPLY BY POROSITY (M**2/HR)	0.3530E-05
DECAY CONSTANT (PER HOUR)	0.4015E-04
BULK DENSITY OF THE SOIL (KG/M**3)	0.1980E+04
ACCURACY TOLERANCE FOR REACHING STEADY STATE	0.1000E-02
DENSITY OF WATER (KG/M**3)	0.1000E+04
TIME INTERVAL SIZE FOR THE DESIRED SOLUTION (HR) ..	0.7300E+03
DISCHARGE TIME (HR)	0.8760E+06
WASTE RELEASE RATE (KCAL/HR), (KG/HR), OR (CI/HR) .	0.3914E-06

RETARDATION FACTOR	0.2604E+01
RETARDED DARCY VELOCITY (M/HR)	0.5376E-03
RETARDED LONGITUDINAL DISPERSION COEF. (M**2/HR) ..	0.2695E-02
RETARDED LATERAL DISPERSION COEFFICIENT (M**2/HR) .	0.8131E-03
RETARDED VERTICAL DISPERSION COEFFICIENT (M**2/HR).	0.2756E-03

LIST OF Z-EIGENVALUES

0.3032E+00	0.6065E+00	0.9097E+00	0.1213E+01	0.1516E+01	0.1819E+01	0.2123E+01	0.2426E+01	0.2729E+01	0.3032E+01
0.3336E+01	0.3639E+01	0.3942E+01	0.4245E+01	0.4549E+01	0.4852E+01	0.5155E+01	0.5458E+01	0.5762E+01	0.6065E+01
0.6368E+01	0.6671E+01	0.6975E+01	0.7278E+01	0.7581E+01	0.7884E+01	0.8188E+01	0.8491E+01	0.8794E+01	0.9097E+01
0.9401E+01	0.9704E+01	0.1001E+02	0.1031E+02	0.1061E+02	0.1092E+02	0.1122E+02	0.1152E+02	0.1183E+02	0.1213E+02
0.1243E+02	0.1274E+02	0.1304E+02	0.1334E+02	0.1365E+02	0.1395E+02	0.1425E+02	0.1456E+02	0.1486E+02	0.1516E+02
0.1547E+02	0.1577E+02	0.1607E+02	0.1638E+02	0.1668E+02	0.1698E+02	0.1728E+02	0.1759E+02	0.1789E+02	0.1819E+02
0.1850E+02	0.1880E+02	0.1910E+02	0.1941E+02	0.1971E+02	0.2001E+02	0.2032E+02	0.2062E+02	0.2092E+02	0.2123E+02
0.2153E+02	0.2183E+02	0.2214E+02	0.2244E+02	0.2274E+02	0.2305E+02	0.2335E+02	0.2365E+02	0.2396E+02	0.2426E+02
0.2456E+02	0.2487E+02	0.2517E+02	0.2547E+02	0.2578E+02	0.2608E+02	0.2638E+02	0.2669E+02	0.2699E+02	0.2729E+02
0.2760E+02	0.2790E+02	0.2820E+02	0.2850E+02	0.2881E+02	0.2911E+02	0.2941E+02	0.2972E+02	0.3002E+02	0.3032E+02
0.3063E+02	0.3093E+02	0.3123E+02	0.3154E+02	0.3184E+02	0.3214E+02	0.3245E+02	0.3275E+02	0.3305E+02	0.3336E+02
0.3366E+02	0.3396E+02	0.3427E+02	0.3457E+02	0.3487E+02	0.3518E+02	0.3548E+02	0.3578E+02	0.3609E+02	0.3639E+02
0.3669E+02	0.3700E+02	0.3730E+02	0.3760E+02	0.3791E+02	0.3821E+02	0.3851E+02	0.3882E+02	0.3912E+02	0.3942E+02
0.3972E+02	0.4003E+02	0.4033E+02	0.4063E+02	0.4094E+02	0.4124E+02	0.4154E+02	0.4185E+02	0.4215E+02	0.4245E+02
0.4276E+02	0.4306E+02	0.4336E+02	0.4367E+02	0.4397E+02	0.4427E+02	0.4458E+02	0.4488E+02	0.4518E+02	0.4549E+02
0.4579E+02	0.4609E+02	0.4640E+02	0.4670E+02	0.4700E+02	0.4731E+02	0.4761E+02	0.4791E+02	0.4822E+02	0.4852E+02
0.4882E+02	0.4913E+02	0.4943E+02	0.4973E+02	0.5004E+02	0.5034E+02	0.5064E+02	0.5094E+02	0.5125E+02	0.5155E+02
0.5185E+02	0.5216E+02	0.5246E+02	0.5276E+02	0.5307E+02	0.5337E+02	0.5367E+02	0.5398E+02	0.5428E+02	0.5458E+02
0.5489E+02	0.5519E+02	0.5549E+02	0.5580E+02	0.5610E+02	0.5640E+02	0.5671E+02	0.5701E+02	0.5731E+02	0.5762E+02
0.5792E+02	0.5822E+02	0.5853E+02	0.5883E+02	0.5913E+02	0.5944E+02	0.5974E+02	0.6004E+02	0.6035E+02	0.6065E+02
0.6095E+02	0.6126E+02	0.6156E+02	0.6186E+02	0.6216E+02	0.6247E+02	0.6277E+02	0.6307E+02	0.6338E+02	0.6368E+02
0.6398E+02	0.6429E+02	0.6459E+02	0.6489E+02	0.6520E+02	0.6550E+02	0.6580E+02	0.6611E+02	0.6641E+02	0.6671E+02
0.6702E+02	0.6732E+02	0.6762E+02	0.6793E+02	0.6823E+02	0.6853E+02	0.6884E+02	0.6914E+02	0.6944E+02	0.6975E+02
0.7005E+02	0.7035E+02	0.7066E+02	0.7096E+02	0.7126E+02	0.7157E+02	0.7187E+02	0.7217E+02	0.7247E+02	0.7278E+02
0.7308E+02	0.7338E+02	0.7369E+02	0.7399E+02	0.7429E+02	0.7460E+02	0.7490E+02	0.7520E+02	0.7551E+02	0.7581E+02
0.7611E+02	0.7642E+02	0.7672E+02	0.7702E+02	0.7733E+02	0.7763E+02	0.7793E+02	0.7824E+02	0.7854E+02	0.7884E+02
0.7915E+02	0.7945E+02	0.7975E+02	0.8006E+02	0.8036E+02	0.8066E+02	0.8097E+02	0.8127E+02	0.8157E+02	0.8188E+02
0.8218E+02	0.8248E+02	0.8279E+02	0.8309E+02	0.8339E+02	0.8369E+02	0.8400E+02	0.8430E+02	0.8460E+02	0.8491E+02
0.8521E+02	0.8551E+02	0.8582E+02	0.8612E+02	0.8642E+02	0.8673E+02	0.8703E+02	0.8733E+02	0.8764E+02	0.8794E+02
0.8824E+02	0.8855E+02	0.8885E+02	0.8915E+02	0.8946E+02	0.8976E+02	0.9006E+02	0.9037E+02	0.9067E+02	0.9097E+02
0.9128E+02	0.9158E+02	0.9188E+02	0.9219E+02	0.9249E+02	0.9279E+02	0.9310E+02	0.9340E+02	0.9370E+02	0.9401E+02
0.9431E+02	0.9461E+02	0.9491E+02	0.9522E+02	0.9552E+02	0.9582E+02	0.9613E+02	0.9643E+02	0.9673E+02	0.9704E+02
0.9734E+02	0.9764E+02	0.9795E+02	0.9825E+02	0.9855E+02	0.9886E+02	0.9916E+02	0.9946E+02	0.9977E+02	0.1001E+03
0.1004E+03	0.1007E+03	0.1010E+03	0.1013E+03	0.1016E+03	0.1019E+03	0.1022E+03	0.1025E+03	0.1028E+03	0.1031E+03
0.1034E+03	0.1037E+03	0.1040E+03	0.1043E+03	0.1046E+03	0.1049E+03	0.1052E+03	0.1055E+03	0.1058E+03	0.1061E+03
0.1064E+03	0.1067E+03	0.1070E+03	0.1073E+03	0.1077E+03	0.1080E+03	0.1083E+03	0.1086E+03	0.1089E+03	0.1092E+03
0.1095E+03	0.1098E+03	0.1101E+03	0.1104E+03	0.1107E+03	0.1110E+03	0.1113E+03	0.1116E+03	0.1119E+03	0.1122E+03
0.1125E+03	0.1128E+03	0.1131E+03	0.1134E+03	0.1137E+03	0.1140E+03	0.1143E+03	0.1146E+03	0.1149E+03	0.1152E+03
0.1155E+03	0.1158E+03	0.1161E+03	0.1164E+03	0.1167E+03	0.1171E+03	0.1174E+03	0.1177E+03	0.1180E+03	0.1183E+03
0.1186E+03	0.1189E+03	0.1192E+03	0.1195E+03	0.1198E+03	0.1201E+03	0.1204E+03	0.1207E+03	0.1210E+03	0.1213E+03

LIST OF Z-COEFFICIENTS

0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00

0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00
0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00	0.1931E+00

LIST OF ZS-SERIES

0.1880E+01	0.1544E+01	0.1065E+01	0.5409E+00	0.7186E-01	-0.2622E+00	-0.4207E+00	-0.4082E+00	-0.2691E+00	-0.7143E-01
0.1135E+00	0.2304E+00	0.2536E+00	0.1894E+00	0.7072E-01	-0.5676E-01	-0.1502E+00	-0.1826E+00	-0.1500E+00	-0.6973E-01
0.2654E-01	0.1050E+00	0.1409E+00	0.1255E+00	0.6848E-01	-0.7688E-02	-0.7557E-01	-0.1126E+00	-0.1083E+00	-0.6696E-01
-0.5159E-02	0.5456E-01	0.9179E-01	0.9505E-01	0.6519E-01	0.1438E-01	-0.3867E-01	-0.7550E-01	-0.8421E-01	-0.6319E-01
-0.2121E-01	0.2616E-01	0.6221E-01	0.7494E-01	0.6096E-01	0.2633E-01	-0.1603E-01	-0.5102E-01	-0.6675E-01	-0.5853E-01
-0.3016E-01	0.7674E-02	0.4139E-01	0.5937E-01	0.5590E-01	0.3298E-01	-0.7019E-03	-0.3297E-01	-0.5259E-01	-0.5310E-01
-0.3497E-01	-0.5153E-02	0.2553E-01	0.4629E-01	0.5015E-01	0.3628E-01	0.1008E-01	-0.1890E-01	-0.4039E-01	-0.4707E-01
-0.3700E-01	-0.1421E-01	0.1297E-01	0.3484E-01	0.4387E-01	0.3722E-01	0.1764E-01	-0.7650E-02	-0.2961E-01	-0.4059E-01
-0.3700E-01	-0.2046E-01	0.2889E-02	0.2466E-01	0.3723E-01	0.3638E-01	0.2272E-01	0.1363E-02	-0.2000E-01	-0.3383E-01
-0.3542E-01	-0.2449E-01	-0.5143E-02	0.1560E-01	0.3041E-01	0.3417E-01	0.2579E-01	0.8479E-02	-0.1148E-01	-0.2698E-01
-0.3265E-01	-0.2668E-01	-0.1139E-01	0.7617E-02	0.2358E-01	0.3090E-01	0.2717E-01	0.1391E-01	-0.4025E-02	-0.2021E-01
-0.2896E-01	-0.2732E-01	-0.1605E-01	0.7019E-03	0.1691E-01	0.2686E-01	0.2714E-01	0.1782E-01	0.2350E-02	-0.1369E-01
-0.2463E-01	-0.2667E-01	-0.1924E-01	-0.5129E-02	0.1057E-01	0.2229E-01	0.2593E-01	0.2034E-01	0.7633E-02	-0.7575E-02
-0.1987E-01	-0.2495E-01	-0.2111E-01	-0.9864E-02	0.4711E-02	0.1740E-01	0.2375E-01	0.2159E-01	0.1182E-01	-0.1998E-02
-0.1491E-01	-0.2236E-01	-0.2179E-01	-0.1351E-01	-0.5514E-03	0.1242E-01	0.2082E-01	0.2172E-01	0.1492E-01	0.2924E-02
-0.9950E-02	-0.1913E-01	-0.2141E-01	-0.1607E-01	-0.5111E-02	0.7524E-02	0.1733E-01	0.2087E-01	0.1697E-01	0.7101E-02
-0.5161E-02	-0.1544E-01	-0.2012E-01	-0.1761E-01	-0.8889E-02	0.2882E-02	0.1349E-01	0.1919E-01	0.1802E-01	0.1047E-01
-0.7019E-03	-0.1149E-01	-0.1809E-01	-0.1819E-01	-0.1184E-01	-0.1362E-02	0.9478E-02	0.1684E-01	0.1814E-01	0.1299E-01
0.3296E-02	-0.7464E-02	-0.1546E-01	-0.1788E-01	-0.1394E-01	-0.5088E-02	0.5470E-02	0.1398E-01	0.1743E-01	0.1467E-01
0.6728E-02	-0.3517E-02	-0.1241E-01	-0.1680E-01	-0.1519E-01	-0.8205E-02	0.1622E-02	0.1077E-01	0.1601E-01	0.1551E-01
0.9514E-02	0.1977E-03	-0.9097E-02	-0.1507E-01	-0.1564E-01	-0.1065E-01	-0.1927E-02	0.7394E-02	0.1400E-01	0.1558E-01
0.1161E-01	0.3553E-02	-0.5686E-02	-0.1282E-01	-0.1534E-01	-0.1238E-01	-0.5062E-02	0.3989E-02	0.1154E-01	0.1493E-01
0.1298E-01	0.6445E-02	-0.2322E-02	-0.1019E-01	-0.1436E-01	-0.1340E-01	-0.7691E-02	0.7017E-03	0.8772E-02	0.1366E-01
0.1365E-01	0.8795E-02	0.8576E-03	-0.7316E-02	-0.1282E-01	-0.1373E-01	-0.9749E-02	-0.2341E-02	0.5836E-02	0.1187E-01
0.1364E-01	0.1055E-01	0.3737E-02	-0.4348E-02	-0.1082E-01	-0.1340E-01	-0.1120E-01	-0.5033E-02	0.2869E-02	0.9688E-02
0.1301E-01	0.1168E-01	0.6218E-02	-0.1415E-02	-0.8485E-02	-0.1249E-01	-0.1202E-01	-0.7285E-02	0.2317E-06	0.7230E-02
0.1183E-01	0.1220E-01	0.8227E-02	0.1361E-02	-0.5937E-02	-0.1107E-01	-0.1223E-01	-0.9037E-02	-0.2655E-02	0.4623E-02
0.1020E-01	0.1212E-01	0.9712E-02	0.3871E-02	-0.3302E-02	-0.9251E-02	-0.1187E-01	-0.1025E-01	-0.4999E-02	0.1991E-02
0.8223E-02	0.1149E-01	0.1065E-01	0.6028E-02	-0.7016E-03	-0.7135E-02	-0.1099E-01	-0.1091E-01	-0.6951E-02	-0.5513E-03
0.6000E-02	0.1037E-01	0.1103E-01	0.7761E-02	0.1755E-02	-0.4834E-02	-0.9660E-02	-0.1102E-01	-0.8453E-02	-0.2898E-02
0.3650E-02	0.8857E-02	0.1088E-01	0.9024E-02	0.3970E-02	-0.2462E-02	-0.7977E-02	-0.1062E-01	-0.9470E-02	-0.4961E-02
0.1283E-02	0.7031E-02	0.1024E-01	0.9792E-02	0.5862E-02	-0.1268E-03	-0.6033E-02	-0.9757E-02	-0.9988E-02	-0.6666E-02
-0.9951E-03	0.4995E-02	0.9172E-02	0.1006E-01	0.7368E-02	0.2071E-02	-0.3930E-02	-0.8497E-02	-0.1001E-01	-0.7961E-02
-0.3090E-02	0.2851E-02	0.7743E-02	0.9851E-02	0.8444E-02	0.4042E-02	-0.1771E-02	-0.6920E-02	-0.9578E-02	-0.8814E-02
-0.4920E-02	0.7014E-03	0.6040E-02	0.9200E-02	0.9069E-02	0.5714E-02	0.3455E-03	-0.5115E-02	-0.8724E-02	-0.9210E-02
-0.6418E-02	-0.1359E-02	0.4155E-02	0.8160E-02	0.9240E-02	0.7027E-02	0.2327E-02	-0.3174E-02	-0.7516E-02	-0.9160E-02
-0.7537E-02	-0.3242E-02	0.2183E-02	0.6801E-02	0.8975E-02	0.7944E-02	0.4094E-02	-0.1192E-02	-0.6026E-02	-0.8689E-02
-0.8248E-02	-0.4874E-02	0.2147E-03	0.5200E-02	0.8309E-02	0.8446E-02	0.5577E-02	0.7396E-03	-0.4336E-02	-0.7842E-02
-0.8540E-02	-0.6196E-02	-0.1660E-02	0.3442E-02	0.7294E-02	0.8530E-02	0.6726E-02	0.2538E-02	-0.2532E-02	-0.6674E-02
-0.8421E-02	-0.7163E-02	-0.3363E-02	0.1614E-02	0.5992E-02	0.8216E-02	0.7505E-02	0.4128E-02	-0.7012E-03	-0.5257E-02

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.0000E+00 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

	X								
Y	0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.8760E+04 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

	X								
Y	0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.377E-02	0.340E-02	0.233E-02	0.161E-02	0.801E-03	0.174E-03	0.243E-04	0.121E-06	0.000E+00
4.	0.696E-02	0.596E-02	0.380E-02	0.252E-02	0.120E-02	0.250E-03	0.340E-04	0.165E-06	0.000E+00
3.	0.125E-01	0.987E-02	0.569E-02	0.363E-02	0.166E-02	0.331E-03	0.443E-04	0.212E-06	0.000E+00
2.	0.206E-01	0.149E-01	0.774E-02	0.476E-02	0.209E-02	0.407E-03	0.535E-04	0.252E-06	0.000E+00
0.	0.313E-01	0.212E-01	0.999E-02	0.594E-02	0.254E-02	0.479E-03	0.623E-04	0.290E-06	0.000E+00

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1752E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.597E-02	0.578E-02	0.474E-02	0.387E-02	0.264E-02	0.119E-02	0.443E-03	0.336E-04	0.133E-07
4.	0.970E-02	0.892E-02	0.678E-02	0.532E-02	0.347E-02	0.149E-02	0.542E-03	0.402E-04	0.156E-07
3.	0.158E-01	0.134E-01	0.923E-02	0.694E-02	0.434E-02	0.179E-02	0.636E-03	0.462E-04	0.177E-07
2.	0.243E-01	0.189E-01	0.117E-01	0.848E-02	0.511E-02	0.204E-02	0.713E-03	0.510E-04	0.194E-07
0.	0.354E-01	0.256E-01	0.144E-01	0.100E-01	0.586E-02	0.227E-02	0.782E-03	0.552E-04	0.208E-07

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.2628E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.672E-02	0.664E-02	0.572E-02	0.489E-02	0.367E-02	0.206E-02	0.104E-02	0.192E-03	0.132E-05
4.	0.106E-01	0.990E-02	0.790E-02	0.648E-02	0.464E-02	0.248E-02	0.122E-02	0.219E-03	0.148E-05
3.	0.167E-01	0.145E-01	0.105E-01	0.822E-02	0.562E-02	0.288E-02	0.138E-02	0.243E-03	0.162E-05
2.	0.253E-01	0.201E-01	0.131E-01	0.986E-02	0.650E-02	0.321E-02	0.152E-02	0.261E-03	0.172E-05
0.	0.365E-01	0.268E-01	0.158E-01	0.115E-01	0.732E-02	0.351E-02	0.163E-02	0.277E-03	0.181E-05

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.3504E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.701E-02	0.697E-02	0.612E-02	0.533E-02	0.414E-02	0.255E-02	0.147E-02	0.408E-03	0.112E-04
4.	0.109E-01	0.103E-01	0.833E-02	0.696E-02	0.516E-02	0.301E-02	0.169E-02	0.455E-03	0.123E-04
3.	0.171E-01	0.149E-01	0.109E-01	0.873E-02	0.618E-02	0.345E-02	0.189E-02	0.495E-03	0.131E-04
2.	0.257E-01	0.205E-01	0.135E-01	0.104E-01	0.708E-02	0.381E-02	0.205E-02	0.527E-03	0.138E-04
0.	0.368E-01	0.272E-01	0.163E-01	0.121E-01	0.793E-02	0.413E-02	0.218E-02	0.553E-03	0.144E-04

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.4380E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.713E-02	0.711E-02	0.629E-02	0.552E-02	0.436E-02	0.279E-02	0.172E-02	0.590E-03	0.355E-04
4.	0.110E-01	0.104E-01	0.851E-02	0.716E-02	0.539E-02	0.328E-02	0.196E-02	0.650E-03	0.383E-04
3.	0.172E-01	0.150E-01	0.111E-01	0.895E-02	0.643E-02	0.373E-02	0.217E-02	0.701E-03	0.406E-04
2.	0.258E-01	0.206E-01	0.137E-01	0.106E-01	0.734E-02	0.410E-02	0.234E-02	0.741E-03	0.423E-04
0.	0.370E-01	0.274E-01	0.165E-01	0.123E-01	0.819E-02	0.443E-02	0.249E-02	0.774E-03	0.438E-04

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.5256E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.718E-02	0.717E-02	0.636E-02	0.560E-02	0.446E-02	0.292E-02	0.186E-02	0.714E-03	0.694E-04
4.	0.111E-01	0.105E-01	0.859E-02	0.725E-02	0.550E-02	0.341E-02	0.211E-02	0.782E-03	0.741E-04
3.	0.173E-01	0.151E-01	0.112E-01	0.904E-02	0.654E-02	0.387E-02	0.232E-02	0.839E-03	0.780E-04
2.	0.259E-01	0.207E-01	0.138E-01	0.107E-01	0.745E-02	0.424E-02	0.250E-02	0.883E-03	0.810E-04
0.	0.370E-01	0.274E-01	0.166E-01	0.124E-01	0.831E-02	0.458E-02	0.265E-02	0.920E-03	0.834E-04

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.6132E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.720E-02	0.720E-02	0.639E-02	0.564E-02	0.451E-02	0.298E-02	0.193E-02	0.791E-03	0.104E-03
4.	0.111E-01	0.105E-01	0.863E-02	0.729E-02	0.555E-02	0.347E-02	0.218E-02	0.862E-03	0.110E-03
3.	0.173E-01	0.151E-01	0.112E-01	0.908E-02	0.659E-02	0.393E-02	0.240E-02	0.922E-03	0.116E-03
2.	0.259E-01	0.207E-01	0.139E-01	0.108E-01	0.750E-02	0.431E-02	0.258E-02	0.969E-03	0.119E-03
0.	0.370E-01	0.275E-01	0.166E-01	0.124E-01	0.836E-02	0.464E-02	0.273E-02	0.101E-02	0.123E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.7008E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.721E-02	0.721E-02	0.641E-02	0.566E-02	0.453E-02	0.301E-02	0.197E-02	0.835E-03	0.133E-03
4.	0.111E-01	0.105E-01	0.864E-02	0.731E-02	0.557E-02	0.350E-02	0.222E-02	0.909E-03	0.141E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.910E-02	0.661E-02	0.396E-02	0.244E-02	0.971E-03	0.147E-03
2.	0.259E-01	0.207E-01	0.139E-01	0.108E-01	0.753E-02	0.434E-02	0.262E-02	0.102E-02	0.152E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.839E-02	0.468E-02	0.277E-02	0.106E-02	0.155E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.7884E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.721E-02	0.721E-02	0.642E-02	0.567E-02	0.454E-02	0.302E-02	0.199E-02	0.861E-03	0.155E-03
4.	0.111E-01	0.105E-01	0.865E-02	0.732E-02	0.558E-02	0.352E-02	0.224E-02	0.935E-03	0.163E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.911E-02	0.663E-02	0.398E-02	0.246E-02	0.998E-03	0.170E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.754E-02	0.436E-02	0.264E-02	0.105E-02	0.175E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.840E-02	0.469E-02	0.279E-02	0.109E-02	0.180E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.8760E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.303E-02	0.199E-02	0.875E-03	0.170E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.732E-02	0.559E-02	0.353E-02	0.225E-02	0.949E-03	0.179E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.663E-02	0.399E-02	0.247E-02	0.101E-02	0.186E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.265E-02	0.106E-02	0.192E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.470E-02	0.280E-02	0.110E-02	0.196E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.9636E+05 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.303E-02	0.200E-02	0.882E-03	0.180E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.225E-02	0.957E-03	0.189E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.663E-02	0.399E-02	0.248E-02	0.102E-02	0.197E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.265E-02	0.107E-02	0.202E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.280E-02	0.111E-02	0.207E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1051E+06 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.303E-02	0.200E-02	0.887E-03	0.186E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.225E-02	0.961E-03	0.196E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.664E-02	0.399E-02	0.248E-02	0.102E-02	0.203E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.265E-02	0.107E-02	0.209E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.281E-02	0.111E-02	0.214E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1139E+06 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.303E-02	0.200E-02	0.889E-03	0.190E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.226E-02	0.964E-03	0.200E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.664E-02	0.399E-02	0.248E-02	0.103E-02	0.207E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.266E-02	0.108E-02	0.213E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.281E-02	0.112E-02	0.218E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1226E+06 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.303E-02	0.200E-02	0.890E-03	0.192E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.226E-02	0.965E-03	0.202E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.664E-02	0.399E-02	0.248E-02	0.103E-02	0.210E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.266E-02	0.108E-02	0.216E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.281E-02	0.112E-02	0.220E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1314E+06 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.304E-02	0.200E-02	0.891E-03	0.194E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.226E-02	0.966E-03	0.203E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.664E-02	0.399E-02	0.248E-02	0.103E-02	0.211E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.266E-02	0.108E-02	0.217E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.281E-02	0.112E-02	0.222E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1402E+06 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.304E-02	0.201E-02	0.891E-03	0.195E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.226E-02	0.966E-03	0.204E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.664E-02	0.399E-02	0.248E-02	0.103E-02	0.212E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.266E-02	0.108E-02	0.218E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.281E-02	0.112E-02	0.223E-03

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1489E+06 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)
Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.304E-02	0.201E-02	0.891E-03	0.195E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.226E-02	0.966E-03	0.205E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.664E-02	0.399E-02	0.248E-02	0.103E-02	0.213E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.266E-02	0.108E-02	0.218E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.281E-02	0.112E-02	0.223E-03

STEADY STATE SOLUTION HAS NOT BEEN REACHED BEFORE FINAL SIMULATING TIME

DISTRIBUTION OF DISSOLVED CHEMICALS IN PPM AT 0.1577E+06 HRS
(ADSORBED CHEMICAL CONC. = 0.1620E+00 * DISSOLVED CHEMICAL CONC.)

Z = 0.00

Y	X 0.	2.	5.	7.	10.	15.	20.	30.	50.
5.	0.722E-02	0.722E-02	0.642E-02	0.567E-02	0.455E-02	0.304E-02	0.201E-02	0.891E-03	0.195E-03
4.	0.111E-01	0.105E-01	0.866E-02	0.733E-02	0.559E-02	0.353E-02	0.226E-02	0.966E-03	0.205E-03
3.	0.173E-01	0.151E-01	0.113E-01	0.912E-02	0.664E-02	0.399E-02	0.248E-02	0.103E-02	0.213E-03
2.	0.259E-01	0.208E-01	0.139E-01	0.108E-01	0.755E-02	0.437E-02	0.266E-02	0.108E-02	0.219E-03
0.	0.371E-01	0.275E-01	0.167E-01	0.125E-01	0.841E-02	0.471E-02	0.281E-02	0.112E-02	0.224E-03

1.6 References

ASTM, 1995, *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*, ASTM E 1739-95, approved September 10, 1995.

EPA (U.S. Environmental Protection Agency), 1989, "Environmental Protection Agency National Primary Drinking Water Regulations," *40 CAR 141*, as amended by 54FR27526,27562, June 29, 1989 and 54FR30001, July 17, 1989, The Bureau of National Affairs, Inc., Washington, DC.

EPA, 1991, "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors, Interim Final," OSWER Directive 9285.6-03, EPA, Office of Emergency and Remedial Response, Washington, DC.

EPA, 1994, *Supplemental Guidance to RAGS: Region IV Bulletin: Development of Health based Preliminary Remediation Goals, Remedial Options and Remediation Levels*, U.S. EPA Region IV, Waste Management Division.

EPA, 1996a, *Soil Screening Guidance*, Office of Solid Waste and Emergency Response, EPA/540/R-94/101, available from U.S. Government Printing Office, Washington, DC.

GA EPD (Georgia Environmental Protection Division), 1992, *Groundwater Pollution Susceptibility Map of Georgia.*

GA EPD, 1995, *Guidance Document for the Preparation of an Underground Storage Tank Corrective Action Plan, Part B,* Feburary.

GA EPD, 1996, *Guidance for Selecting Media Remediation Levels at RCRA Solid Waste Management Units*, Georgia Environmental Division, Atlanta, GA, November 1996.

Mills, W.B., D.B. Porcella, M.J. Ungs, S.A. Gherini, K.V. Summers, G.L. Rupp, and G.L. Buvois, 1985. *Water Quality Assessment: A Screening Procedure for Toxic and Convention of Pollutants; Parts 1, 2 and 3*, EPA/600/6-85/002, EPA Environment Research Laboratory, Office of Research and Development, Athens, Georgia.

Table C-1. Comparison of Fort Stewart CAP-Part A UST 214 Soil Results to Screening Level

Station:	Screening Levels			63-01	63-02	63-02	63-03	63-03
Sample ID:	GA UST	Risk-based		630121	630211	630221	630311	630321
Sample Interval (ft BGS):	Soil Threshold	Screening	Leaching to	0.0 - 2.0	2.0 - 4.0	0.0 - 2.0	2.0 - 4.0	0.0 - 2.0
Collection Date:	Levels[a]	Level[b]	Groundwater[c]	09-May-98	09-May-98	09-May-98	19-Sep-98	19-Sep-98
Units:	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
VOLATILE ORGANIC COMPOUNDS								
Benzene	8	200000	30	2.2 U	4.2 U	2.1 U	2.2 U	2.2 U
Toluene	6000	410000000	12000	35.1 =	103 =	203 =	2.2 U	41.6 =
Ethylbenzene	10000	200000000	13000	2.2 U	4.2 U	2.1 U	2.2 U	2.2 U
Xylenes, Total	700000	1000000000	190000	3.4 J	12.5 U	6.3 U	6.6 U	6.6 U
POLYNUCLEAR AROMATIC HYDROCARBONS								
2-Chloronaphthalene[d]	N/A[e]	82000000	84000	1470 U	344 U	346 U	361 U	3650 U
Acenaphthene	N/A[e]	120000000	570000	1470 U	344 U	346 U	361 U	3650 U
Acenaphthylene	N/A[e]	61000000	4200000	1470 U	344 UJ	346 U	361 U	3650 U
Anthracene	N/A[e]	610000000	12000000	1470 U	344 U	346 U	361 U	3650 U
Benzo(a)anthracene	N/A[e]	7800	2000	1470 U	344 U	346 U	361 U	3650 U
Benzo(a)pyrene	N/A[e]	780	8000	*1470 U*	344 U	346 U	361 U	*3650 U*
Benzo(b)fluoranthene	N/A[e]	7800	5000	1470 U	344 U	346 U	361 U	3650 U
Benzo(g,h,i)perylene	N/A[e]	--	--	1470 U	344 U	346 U	361 U	3650 U
Benzo(k)fluoranthene	N/A[e]	78000	49000	1470 U	344 U	346 U	361 U	3650 U
Chrysene	N/A[e]	780000	160000	1470 U	344 U	346 U	361 U	3650 U
Dibenzo(a,h)anthracene	N/A[e]	780	2000	*1470 U*	344 U	346 U	361 U	*3650 U*
Fluoranthene	N/A[e]	82000000	4300000	1470 U	344 U	346 U	361 U	3650 U
Fluorene	N/A[e]	82000000	560000	1470 U	344 U	346 U	361 U	3650 U
Indeno(1,2,3-cd)pyrene	N/A[e]	7800	14000	1470 U	344 U	346 U	361 U	3650 U
Naphthalene	N/A[e]	61000000	4200000	1470 U	344 U	346 U	361 U	3650 U
Phenanthrene[f]	N/A[e]	61000000	4200000	1470 U	344 U	346 U	361 U	3650 U
Pyrene	N/A[e]	82000000	84000	1470 U	344 U	346 U	361 U	3650 U
OTHER ANALYTES								
Lead	--	5000000	--	6100 =		11300 =		45600 =
Total Petroleum Hydrocarbons	--	--	--	224000 =	10400 U	18800 =	18000 J	16300 J

[a] Average or higher groundwater pollution susceptibility area (where public water supply is within 2.0 mi.).
[b] Protective of soil exposure during Industrial Land Use.
[c] Protective of groundwater ingestion. Used a dilution attenuation factor of 20.
[d] Values based on naphthalene as a surrogate chemical.
[e] Not applicable. The screening level exceeds the expected soil concentration under free product condition.
[f] Values based on pyrene as a surrogate chemical.

Bold values indicate results exceeding Georgia UST action levels

Italicized values indicate results exceeding risk-based screening levels.
Underlined values indicate results exceeding leaching to groundwater screening levels.

U Indicates that the compound was not detected above the reported sample quantitation limit.
J Indicates that the value for the compound was an estimated value.
UJ Indicates that the sample was not detected above an approximate sample quantitation limit.
R Indicates that the sample results are unusable and the presence or absence of the compound could not be verified.
= Indicates that the compound was detected at the concentration reported.

Table C-3. S

Site
Boring
Sample ID
Sample De
Grain Size
Grain Size
Grain Size
Liquid Lim
Plastic Lim
Plasticity I
Moisture C
Permeabili
Porosity
Specific Gr

NP = nonpl

Table C-4. Na

Distanc from the so (ft)
0.0
6.6
16.4
23.0
32.8
49.2
65.6
82.0
98.4
131.2
164.0
200.0
328.1
2000.0

Ethylt

Ethylt		[illegible]	209 =	4.5 J	6 U	6 U	6 U	6 U	214 =	11.5 =	
POLYNUCLEAR AROMATIC HYDROCARBONS											
2-Chloronaphthalene[b]	-	1500	11.8 U	10.9 U	42.6 U	10.6 U	11 UJ	10.6 U	42.6 U	10 U	
Acenaphthene	-	2200	11.8 U	10.9 U	42.6 U	10.6 U	11 UJ	10.6 U	42.6 U	10 U	
Acenaphthylene	-	1100	11.8 U	10.9 U	42.6 U	10.6 U	11 UJ	10.6 U	42.6 U	10 U	
Anthracene	-	11000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Fluorene	N/A[e]	82000000	560000	358 U	365 U	350 U	358 U	1640 U
Indeno(1,2,3-cd)pyrene	N/A[e]	7800	14000	358 U	365 U	350 U	358 U	1640 U
Naphthalene	N/A[e]	61000000	4200000	358 U	365 U	350 U	358 U	1640 U
Phenanthrene[f]	N/A[e]	61000000	4200000	358 U	365 U	350 U	358 U	1640 U
Pyrene	N/A[e]	82000000	84000	358 U	365 U	350 U	358 U	1640 U
OTHER ANALYTES								
Lead	--	5000000	--		3700 =	7100 =		36500 =
Total Petroleum Hydrocarbons	--	--	--	10500 UJ	9440 J	14600 J	2870 UJ	17300 J

[a] Average or higher groundwater pollution susceptibility area (where public water supply is within 2.0 mi.).
[b] Protective of soil exposure during Industrial Land Use.
[c] Protective of groundwater ingestion. Used a dilution attenuation factor of 20.
[d] Values based on naphthalene as a surrogate chemical.
[e] Not applicable. The screening level exceeds the expected soil concentration under free product condition.
[f] Values based on pyrene as a surrogate chemical.

Bold values indicate results exceeding Georgia UST action levels

Italicized values indicate results exceeding risk-based screening levels.
Underlined values indicate results exceeding leaching to groundwater screening levels.
U Indicates that the compound was not detected above the reported sample quantitation limit.
J Indicates that the value for the compound was an estimated value.
UJ Indicates that the sample was not detected above an approximate sample quantitation limit.
R Indicates that the sample results are unusable and the presence or absence of the compound could not be verified.
= Indicates that the compound was detected at the concentration reported.