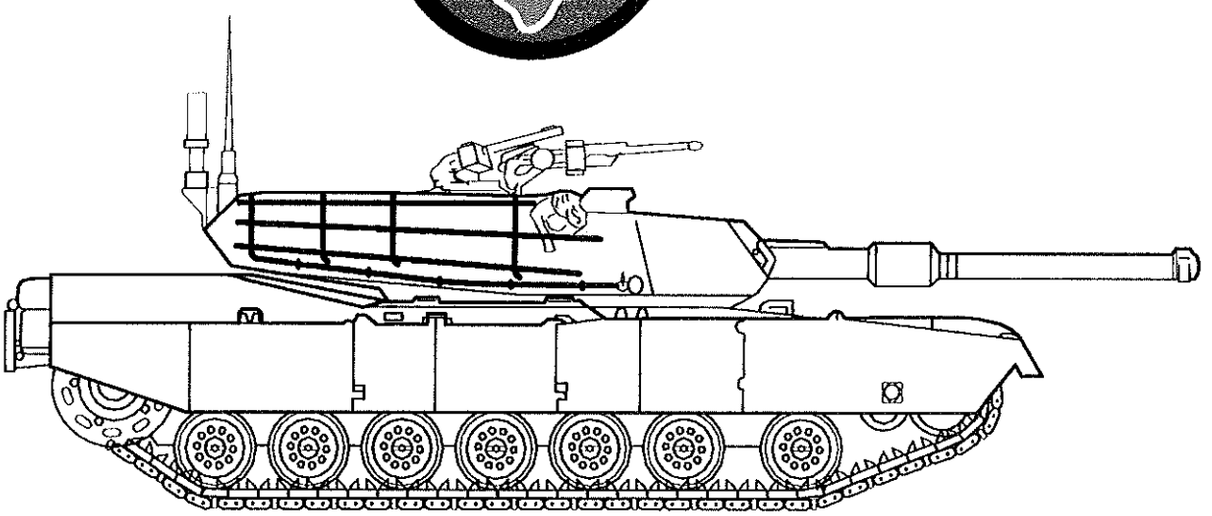
Corrected Final
Phase I RCRA Facility Investigation Report
For 24 Solid Waste Management Units
At Fort Stewart, Georgia

Volume I of III



May 1996

Job No. 87528.000

Prepared For

US Army Corps of Engineers
Savannah District

Prepared By

RUST ENVIRONMENT & INFRASTRUCTURE

DOCUMENT 5

CORRECTED FINAL

PHASE I
RCRA FACILITY INVESTIGATION REPORT
FOR 24 SOLID WASTE MANAGEMENT UNITS
AT FORT STEWART, GEORGIA
VOLUME I OF III

Prepared For

UNITED STATES ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract DACA21-93-D-0029
Delivery Order 0005
Rust Project No. 87528.000
May 1996

Prepared By
RUST ENVIRONMENT AND INFRASTRUCTURE
2694 Lake Park Drive
Charleston, South Carolina 29406
803/572-5600

1.0 INTRODUCTION

This Corrected Final Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for 24 Solid Waste Management Units (SWMUs) provides the results of implementation of the Phase I RFI Work Plan performed at Fort Stewart, Georgia. This Corrected Final Phase I RFI Report has been prepared by RUST Environment and Infrastructure, Inc. (RUST E&I) for the United States Army Corps of Engineers (USACE), Savannah District, Contract No. DACA21-93-D-0029, Delivery No. 0005.

The information provided in this report is based upon data provided by the USACE and Geraghty and Miller, Inc. Environmental Services (G&M). The field activities were completed in accordance with the Corrected Final Phase I RFI Work Plan (April, 1993) prepared by G&M. The Corrected Final Phase I RFI Report has been prepared in accordance with the USACE Scope of Work dated August 17, 1993 and is presented in the same format as the Corrected Final Phase I RFI Work Plan.

Twenty-four (24) SWMUs are discussed in this report. Two (2) SWMUs not included in this report are SWMU8 EOD Area (FST-008) and SWMU13 Fire Training Pit (FST-013) which are being addressed under other contracts.

The G&M field activities included the installation of 30 new ground-water monitoring wells at various SWMUs throughout the installation. During well drilling, G&M collected soil samples for analysis. The USACE completed all other sampling (ground-water, soil, sediment, surface soil, surface water, wastewater and sludge).

The soil samples for the G&M field investigations were analyzed by Savannah Laboratories in Savannah, Georgia and the Quality Assurance (QA) soil samples were analyzed by the USACE South Atlantic Division (SAD) Laboratory in Marietta, Georgia. The soil samples for the USACE field investigations were analyzed by James H. Carr and Associates, Inc.

(Carr Laboratory) in Columbia, South Carolina and International Technology Corporation Analytical Services (IT Laboratory) in Knoxville, Tennessee. The USACE QA samples were also submitted to the SAD Laboratory. All raw data from the laboratories has been included in Volume III, Appendix U of this Corrected Final Phase I RFI Report.

A Quality Control Summary Report (QCSR) and Analytical Package was prepared by G&M for the work completed by G&M in one (1) 3-ring notebook (1994). A QCSR was also prepared by USACE for the work completed by USACE in three (3) 3-ring notebooks (Volumes I, II and III)(1994).

With the exception of the following changes, the sampling program adhered to the approved Corrected Final Phase I RFI Work Plan (1993).

- Two (2) up-gradient surface water samples were collected at SWMU1, instead of the proposed one (1) up-stream and one (1) down-stream samples. The proposed down-gradient surface water sample was mistakenly taken in an up-gradient location.
- Due to drought, one (1) surface soil sample was collected at the Tac-X Landfill SWMU3 in lieu of surface water and leachate samples.
- Based on the field records, soil samples were not collected below six feet below land surface or to the water table in the location chosen for soil boring MW4 at Burn Pit SWMU4B because of sustained OVA readings above the health and safety action levels. This soil boring was abandoned and the monitoring well SWMU4B, MW4(b) was later installed by the USACE.
- Four (4) extra surface soil samples were taken at EOD Area SWMU12.
- One (1) extra surface water sample and one (1) extra QA surface water sample were collected at the Industrial Wastewater Treatment Plant SWMU18.
- No sludge sample was available at the Radiator Shop SWMU24A.
- Five (5) extra ground-water samples and five (5) extra soil samples were collected at the Waste Oil Tanks SWMU25.

- Two (2) extra soil samples and two (2) surface soil samples were collected at the 724th Tanker Purging Station SWMU26.
- Field duplicated soil samples were mistakenly collected and submitted by G&M for laboratory analysis by pH and specific conductance at SWMU2, SWMU4A through 4F, and SWMU14.
- The analytical methods used to analyze the ground-water samples were inadvertently switched by the laboratory from SW-846 Method 8080 to Method 608. During all future sampling and analyses, it will be ensured that only SW-846 methods will be utilized.
- The detection limits for vinyl chloride and toxaphene were inadvertently higher than their MCLs, SMCLs, and/or action levels. During all future sample analyses, it will be ensured that the detection limits for all parameters are less than, or equal to, their MCLs, SMCLs, and/or action levels.

5.6 Inactive EOD Area SWMU10(FST-010)

5.6.1 Site Description

The inactive EOD Area SWMU10(FST-010) is located 4 miles north of the cantonment area and 1 mile east of Georgia Highway 119 (see Figure 5-91). According to the RFP work plan (G&M, 1993), the EOD Area FST-010 was operated from 1975 to 1980 where open detonation of unexploded ordinance took place. There is one trench with a total area of 2 acres. As indicated in the initial RFA (U.S. Army Environmental Hygiene Agency 1988), the craters in the ground contained no solid waste, other than small bits of shrapnel, and no evidence of ashes or charred ground from explosions.

The soil sample locations for EOD Area SWMU10(FST-010) are shown in Figure 5-92. Photographs form a recent site inspection (November 16, 1993) are shown in Figure 5-93. According to Mr. Thomas Houston (personal communication, 1993), this EOD Area is no longer active.

5.6.2 Work Completed

Six (6) surface soil samples in the blast craters were collected by the USACE and analyzed for pH, specific conductance, VOCs, RCRA total metals, and explosive residue. A summary of the analytical results is presented in Section 5.6.5.

5.6.3 Site Characterization

The EOD Area (SWMU10) soil sample location map is provided in Figure 5-92. Soil descriptions were not reported. Contaminant distributions are discussed in Section 5.6.5.

5.6.4 Waste Characterization

Material characterization for the EOD Area (FST-010) includes: excess artillery powder bags, small arms rounds, artillery and mortar rounds, illuminating projectiles, pyrotechnics, bulk explosives, rockets, propellant, and regular and smoke grenades. No records or information indicating disposal of CB agents, acids, solvents, or other hazardous or toxic substances are reported (G&M, 1993).

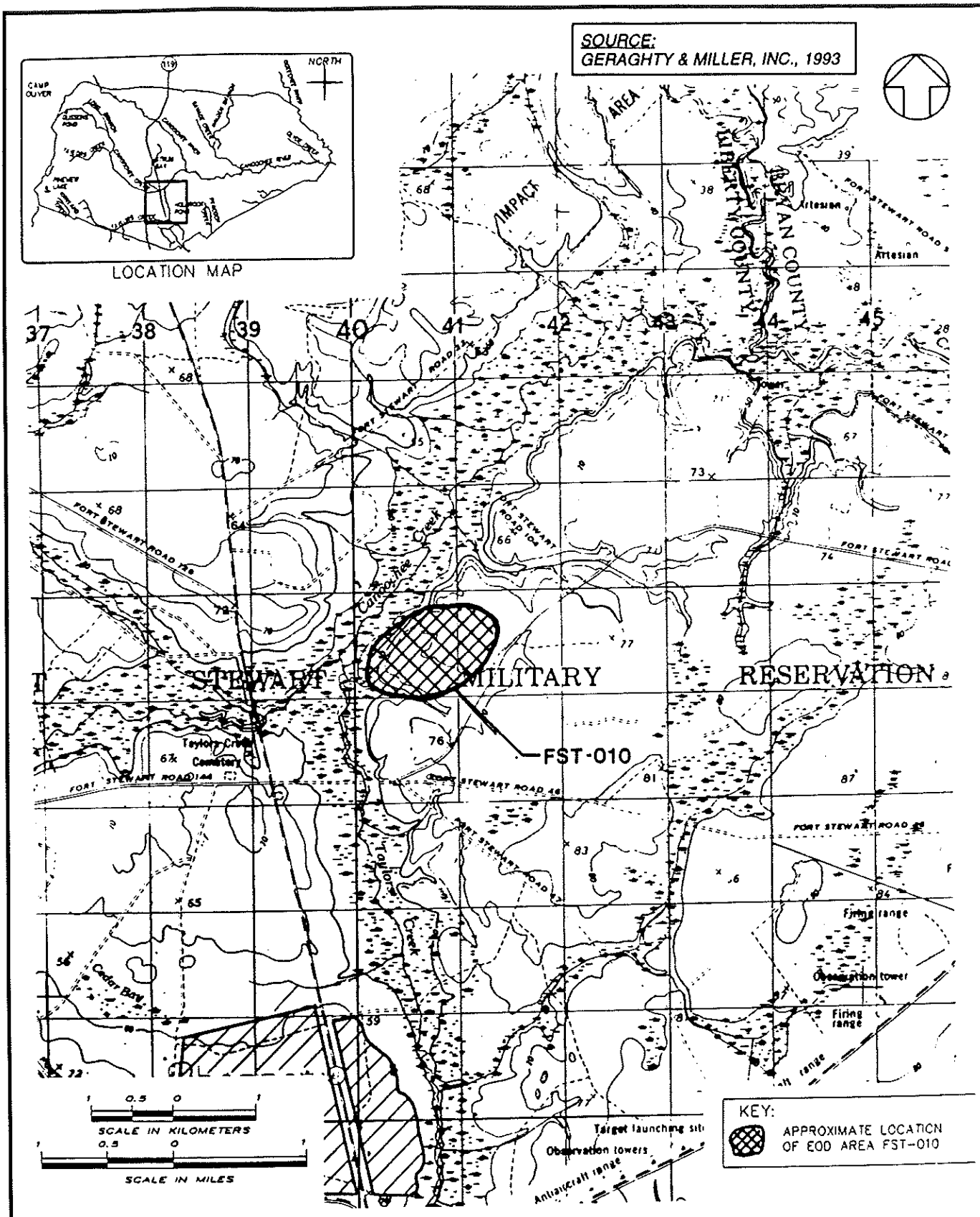


FIGURE 5-91

LOCATION MAP
SWMU-10 (FST-010)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000

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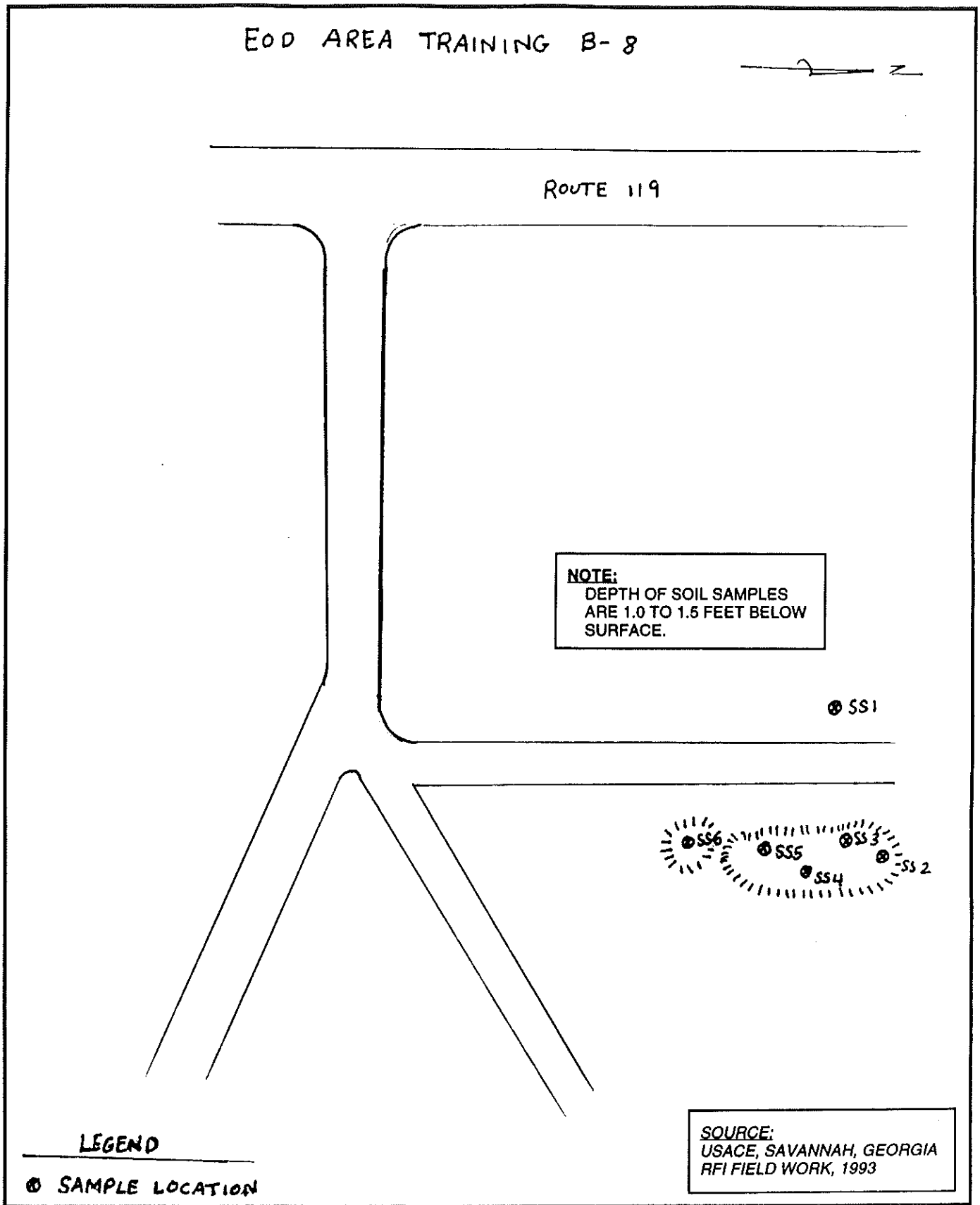

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FIGURE 5-92

SOIL SAMPLE LOCATIONS
SWMU-10 (FST-010)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000

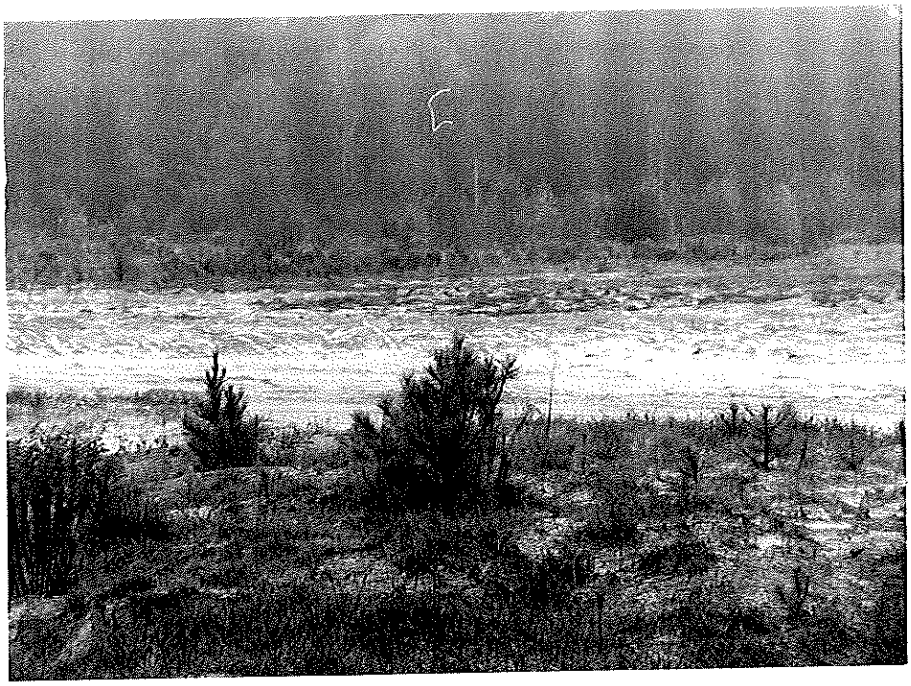

PHOTO WESTWARD

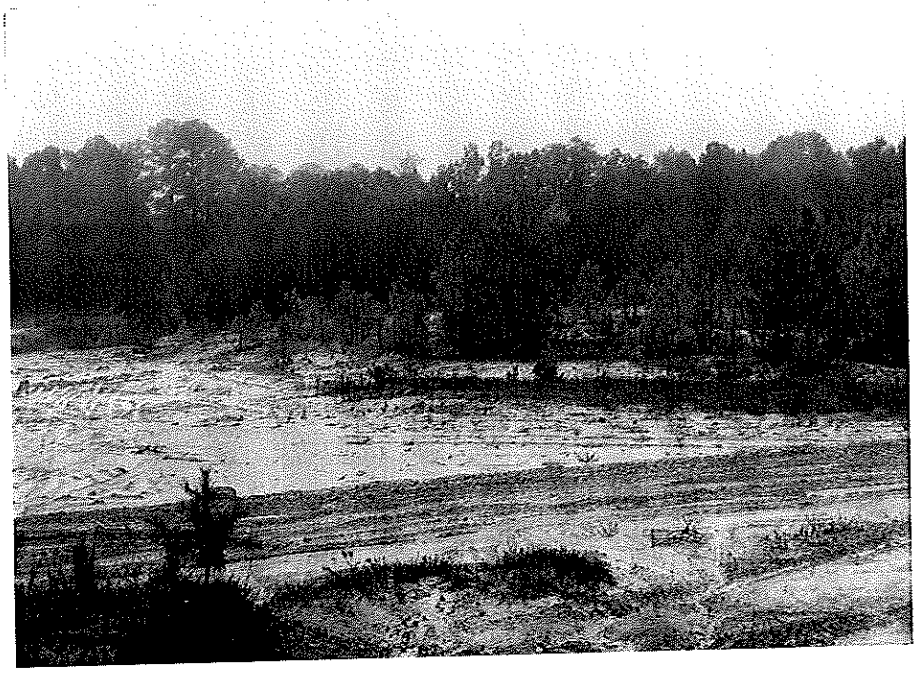

PHOTO WESTWARD

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FIGURE 5-93

PHOTOGRAPHS
SWMU-10 (FST-010)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000

5.6.5 Analytical Results

The following section provides a brief summary of the results of the laboratory analyses of the surface soil samples collected at the inactive EOD Area SWMU10. Surface soil samples were collected from six (6) locations at depths of 1.0 to 1.5 feet shown in Figure 5-91. The surface soil samples were collected by the USACE on November 4, 1993 and analyzed for VOCs, RCRA total metals, explosive residue, specific conductance and pH.

5.6.5.1 Action Levels and Clean-Up Standards

Table 5-18 summaries the analytical results for the surface soil samples collected at the EOD Area SWMU10. This table highlights, in bold, those parameters detected above GAEPD guidelines or site-specific background concentrations (for unregulated parameters). The complete analytical results are included in the G&M QCSR (1994) and Appendix U of this report.

5.6.5.2 Surface Soil

Volatile Organic Compounds

VOC concentrations were not reported above the detection limit in the surface soil samples.

Metals

As noted in Table 5-18, arsenic, barium, chromium, and lead were detected above site-specific background concentrations (SS1). Figure 5-94 shows the metal concentration distribution in surface soils at EOD Area SWMU10.

Explosive Residue

Explosive residue concentrations were undetected in the surface soil samples.

Specific Conductance and pH

The specific conductance in the surface soil samples ranged from 2.7 to 56.4. The pH ranged from 4.57 to 5.46.

TABLE 5-18
SUMMARY OF SOIL ANALYTICAL RESULTS
SWMU10(FST-010) - EOD AREA
NOVEMBER 4, 1993

ID	Volatile Organic Compounds (mg/kg)	Metals (mg/kg)	Explosives (mg/kg)	Specific Conductance	pH
SS1 (Background)	BDL	Ba 9.21 Pb 3.37	U	2.8	5.18
SS2	BDL	**Ba 29.5** **Cr 38.9** **Pb 8.55**	U	5.2	4.79
SS3	BDL	**Ba 16.0** **Cr 2.66** **Pb 6.06**	U	4.0	4.83
SS4/SS4 (DUP)	BDL/BDL	**Ar 6.02/3.56** **Ba 20.2/18.62** **Cr 5.14/5.0** **Pb 12.0/7.57**	U/U	4.5/ND	4.57/ND
SS5	BDL	Ba 9.2 **Pb 4.25**	U	2.7	5.46
SS6	BDL	**Ar 2.8** **Ba 42.0** **Cr 6.98** **Pb 9.56**	U	56.4	5.02

NOTES:

BDL = Below Detection Level
Ar = Arsenic
Ba = Barium
Cr = Chromium
Pb = Lead
ND = No Data
U = Undetected
Dup = Duplicate

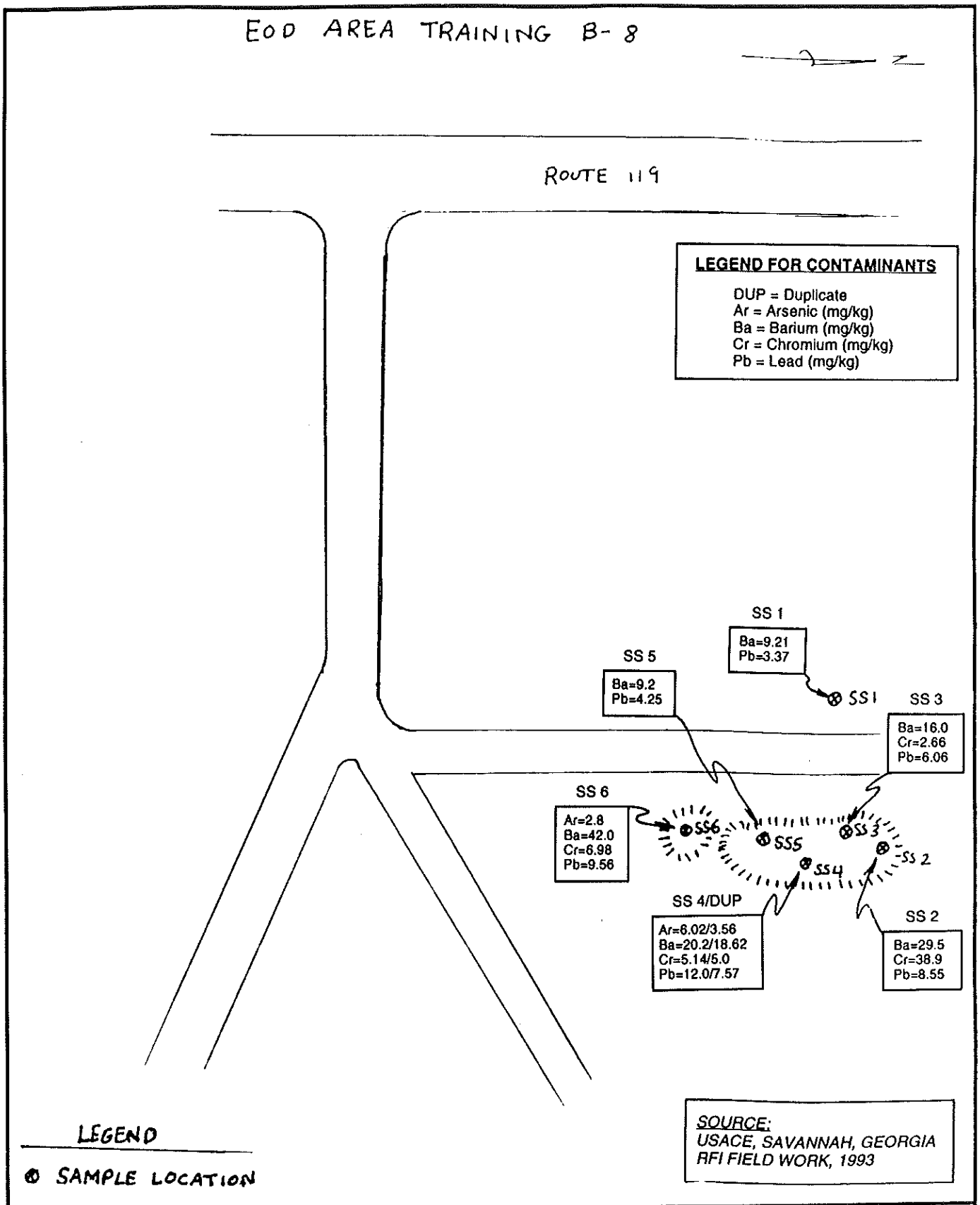

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FIGURE 5-94

METAL CONTAMINANT DISTRIBUTION IN SOILS
SWMU-10 (FST-010)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000

5.6.5.3 Data Evaluation

The USACE QCSR (February, 1994) states that both the data quality objectives and completeness criteria were met in SWMU 10, and that the data met the project objectives.

5.6.6 Evidence of Release form the Site

The analytical results indicate that the metal concentrations of arsenic, barium, chromium, and lead appear to be above background concentrations in surface soil samples at the inactive EOD Area SWMU10, which may indicate that a release has occurred at the site.

5.6.7 Health and Environmental Assessment

The objective of the Health and Environmental Assessment (HEA) is to provide information necessary to evaluate the need for appropriate interim corrective measures or for a Corrective Measures Study (CMS). The following sections describe transport pathways and potential exposure routes for the receiving media of concern, human health and environmental toxicity criteria, and the preliminary risk evaluation for constituents and media of potential concern. Following the identification of exposure routes, constituent concentrations detected in each medium were compared to exposure-limit criteria developed for selected exposure pathways. Human and ecological exposure criteria were developed using procedures described in Chapter 8 of the *Interim Final RCRA Facility Investigation (RFI) Guidance - Development of an RFI Work Plan and General Considerations for RCRA Facility Investigations* (USEPA, 1989a).

5.6.7.1 Human Health Assessment

Transport Mechanisms and Exposure Pathways

Following release from a source, contaminants may migrate in environmental media by any of several transport mechanisms, including:

- Resuspension and airborne dispersal of contaminated soil particulates,
- Volatilization of organics from soil, surface water, or ground-water,
- Uptake of contaminants by biota,

- Stormwater runoff to surface water and sediments,
- Infiltration/percolation of soil contaminants to ground-water, and
- Discharge of ground-water to surface water and sediments.

For the purposes of this assessment, all potentially contaminated media were considered, however, only those media considered to present the most significant exposure potential were quantitatively evaluated. At SWMU10 soil samples were collected from areas of probable contamination. The resulting data were used in quantitatively evaluating the following potential mechanisms of contaminant migration: stormwater runoff to surface water of Canoochee Creek swamp, infiltration and/or percolation of soil contaminants to ground-water, and discharge of ground-water into surface water of the swamp.

A complete exposure pathway includes a contaminant source, a transport mechanism, an exposure point where contact by a receptor with the contaminated medium may occur, and a route of intake of the contaminated medium at the exposure point.

Potential human exposure pathways at SWMU10 include: ingestion of and dermal contact with soil, ground-water, surface water, and sediment; inhalation of contaminated soil particulates; and ingestion of contaminated biota. All pathways considered to be complete were addressed and those that represented the greatest potential for risk were quantitatively evaluated. The ingestion of soil was the potential exposure pathway quantitatively evaluated for human receptors.

Toxicity Criteria

The primary element of the human health assessment is the set of criteria (risk-based constituent concentrations) used to evaluate constituent concentrations associated with SWMU10. Human health criteria were based on EPA-established chronic exposure limits.

The health-based criteria for carcinogens, calculated from Risk-Specific Doses (RSDs), were developed in accordance with EPA RCRA Facility Investigation (RFI) Guidance (USEPA,

1989a). The RSD is an upper bound estimate of the average daily dose of a carcinogen corresponding to an excess cancer risk for lifetime exposure of 10^{-6} for Class A and B carcinogens, or 10^{-5} for Class C carcinogens. The criteria, presented in Appendix T, were calculated from RSDs as follows:

$$C_i = (R/SF) \times (W/I) \qquad \text{(Equation 1)}$$

where:

C_i = criterion concentration for the constituent of concern,

R = risk level (10^{-6} for Class A and B, 10^{-5} for Class C carcinogens) ,

SF = carcinogenic slope factor $(mg/kg\text{-}day)^{-1}$,

(R/SF) = the RSD,

W = assumed weight of the exposed individual (receptor), and

I = intake amount for a given time period.

The most current slope factors (SFs) were obtained from EPA's Integrated Risk Information System (IRIS) database (USEPA, 1994). When SFs were not available in IRIS, they were selected from the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1993). If SFs could not be obtained from HEAST, provisional values supplied by the Superfund Health Risk Technical Support Center of the EPA Environmental Criteria and Assessment Office (SHRTSC-ECAO) were used.

The values (from USEPA 1989a) for the assumed weight (W) and intake rate (I) used in the calculation of soil ingestion were 0.1 g/day for 70 kg person (70 year exposure period

for carcinogens).

The human health-based criteria for noncarcinogens, calculated from the Reference Dose (RfD), are an estimate of the daily exposure that an individual (including sensitive individuals) can experience without appreciable risk of adverse health effects during a lifetime exposure. The criteria, shown in Appendix T, were calculated using the following equation:

$$C_i = (RfD) \times (W/I) \qquad \text{(Equation 2)}$$

where:

C_i = criterion concentration for the constituent of concern,

RfD = reference dose in mg/kg-day,

W = assumed weight of the exposed individual (receptor), and

I = intake amount for a given time period.

The most current RfDs were obtained, in order of priority, from EPA's IRIS, HEAST, or SHRTSC-ECAO. For soil ingestion, the assumed intake rate of 0.2 g/day was based on a 5-year exposure period for a 16-kg child.

For a given constituent of potential concern associated with systemic health effects, the noncarcinogen criteria for soil (ingestion) was used.

Preliminary Risk Evaluation

Following the calculation of exposure-limit criteria ("action levels"), comparisons were made between the action levels and the constituent concentrations present at the SWMU.

TABLE 5-18A
COMPARISON OF INDIVIDUAL CONSTITUENT CONCENTRATIONS
WITH HUMAN HEALTH CRITERIA
SWMU10(FST-010) - EOD AREA

Exposure Medium	Units	Constituent Released	Release Concentration	Criterion Type Used	Criterion Value	Release Concentrations Exceed Criterion?
SOIL	mg/kg	Arsenic	6.02E+00	C	4.00E-01	Yes
		Barium	4.20E+01	NC	5.60E+03	No
		Chromium	3.89E+01	NC	4.00E+02	No
		Lead	1.20E+01	EPA	5.00E+02	No

* Release concentration represents the maximum detected concentration for each constituent

EPA - Environmental Protection Agency's Interim Soil Cleanup Level, OSWER Directive # 9355.4-02.
NC - Noncarcinogen

Maximum detected concentrations were used for the comparison. Concentrations that exceeded human health exposure action levels are shown in Table 5-18A.

Four metals were detected in the six soil samples collected from SWMU10. Of the four metals detected, arsenic exceeded the oral exposure criteria value. Although the ingestion of soil was considered to represent the most significant exposure pathway for human receptors, the presence of metals indicate that airborne dispersal of contaminated particulates, uptake of contaminants by biota, stormwater runoff to surface water and sediments associated with Canoochee Creek, and the infiltration/percolation of contaminants to ground-water are potential pathways which could result in human exposures. Potential exposures to human receptors could include: dermal contact with soil; ingestion of and dermal contact with ground-water, surface water, and sediment; inhalation of particulates; and ingestion of contaminated biota.

5.6.7.2 Environmental Assessment

Transport Mechanisms and Exposure Pathways

Potential transport mechanisms and complete exposure pathways for ecological receptors are the same as those described in Section 5.6.7.1for human receptors, except for direct exposure to ground-water. All potentially complete exposure pathways were considered. Those that represented the greatest potential for risk were quantitatively evaluated unless the human health assessment had already indicated that further SWMU assessment for that pathway would be required.

Preliminary Risk Evaluation

Contaminants in soils at SWMU10 were found to be of concern based on comparison to human toxicity criteria, therefore, these media were considered likely to be of concern for ecological receptors as well, and ecological toxicity was not evaluated separately. The available human toxicity criteria are generally better substantiated, more consistent, and more reliable than the toxicity data available for ecological receptors, resulting in less uncertainty associated with the validity of conclusions based on human toxicity. Also,

ecological receptors may be more susceptible than humans to the toxic effects of contaminants due to greater sensitivity or extent of exposure. Therefore, where human health was found to be of concern, potential ecological effects should be quantitively evaluated as part of additional risk evaluation at the unit, including potential effects from exposure to contaminants that may be transported to Canoochee Creek swamp and from ingestion of contaminated biota.

5.6.8 Potential for Phase II Investigation

As stated in Section 5.6.6,the analytical results indicate that a release may have occurred at SWMU10. Based on the Phase I results, a Phase II investigation is recommended. The Phase II investigation would include collecting additional surface soil samples (to evaluate the vertical extent of contamination) and installing four (4) monitoring wells, collecting soil samples during drilling and collecting ground-water samples. The soil and ground-water samples would be analyzed for metals, pH and specific conductance. It is also recommended that an HEA of the site be completed.

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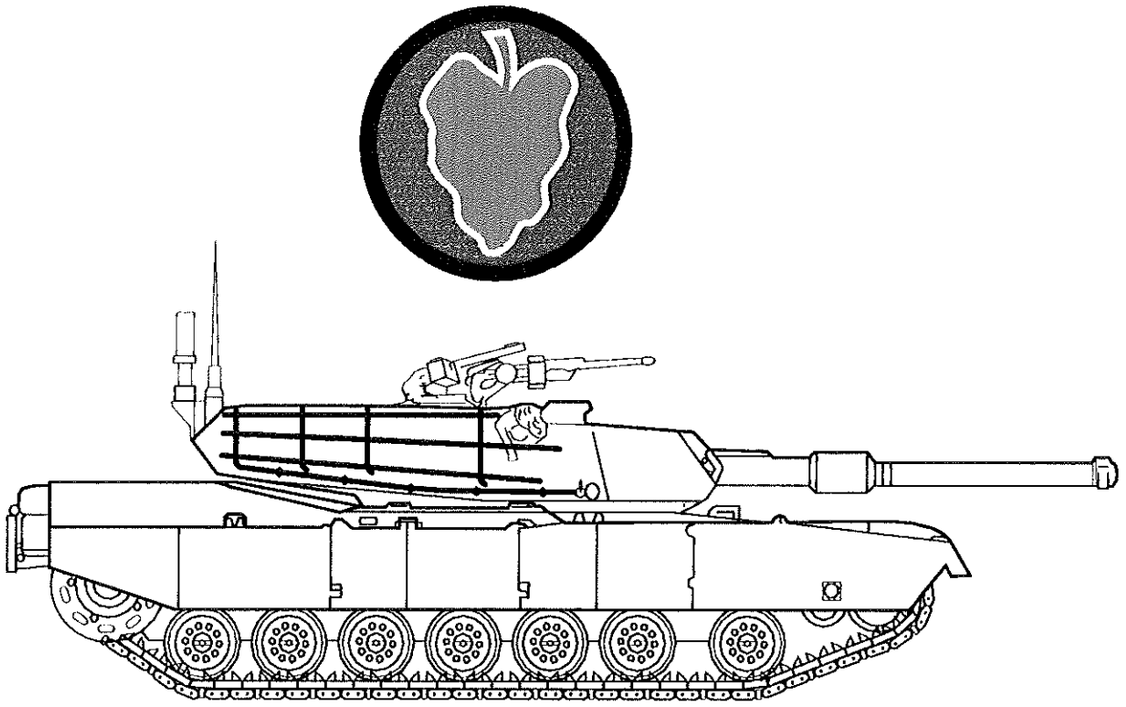

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2694 Lake Park Drive
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803/572-5600

James H. Carr & Associates, Inc.

Office & Laboratories
P.O. Box 90209
Columbia, SC 29290
(803) 776-7789
(800) 435-3995

11/24/93

Ms. Toni Nicholson
Corps of Engineers
PO Box 889
Savannah, GA 31402

Dear Ms. Nicholson:

The following are the results of the parameters you requested we check on your FST-010 samples listed below.

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/04/93 In House # 11-7998-93 Source: SS1-11-93 Location: FT.STEWART							
Metals Sample Prep - nonaqueous	VB	11/13/93	12:00	0.000		0.00	
Lab pH	TW	11/09/93	12:00	5.180	pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/09/93	12:30	2.800	umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	CW	11/18/93	04:03	< 2.500	mg/kg	2.50 mg/kg	206.2
Selenium - solid	CW	11/17/93	14:50	< 2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	KAH	11/18/93	16:28	9.210	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	KAH	11/18/93	16:28	< 1.000	mg/kg	1.00 mg/kg	200.7
Chromium - solid	KAH	11/18/93	16:28	< 2.500	mg/kg	2.50 mg/kg	200.7
Lead - solid	CW	11/17/93	21:13	3.370	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	11/19/93	10:55	< 2.500	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	11/19/93	17:00	< 0.020	mg/kg	0.02 mg/kg	245.5
% Solids	ALM	11/08/93	09:00	96.700	%	0.01 %	160.3
Chloroethane - solid	KG	11/12/93	10:12	< 10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	KG	11/12/93	10:12	< 10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	KG	11/12/93	10:12	< 10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	KG	11/12/93	10:12	< 10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	KG	11/12/93	10:12	< 10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	KG	11/12/93	10:12	< 10.000	ug/kg	10.00 ug/kg	8240
Bromoform - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	KG	11/12/93	10:12	< 0.200	mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	KG	11/12/93	10:12	< 5.000	ug/kg	5.00 ug/kg	8240
Xylene - solid	KG	11/12/93	10:12	< 10.000	ug/kg	10.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/04/93 In House # 11-7998-93		Source: SS1-11-93 - CONTINUED -		Location: FT.STEWART			
2-Butanone - solid	KG	11/12/93 10:12	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	KG	11/12/93 10:12	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	KG	11/12/93 10:12	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	KG	11/12/93 10:12	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	KG	11/12/93 10:12	<	5.000	ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	KG	11/12/93 10:12	<	10.000	ug/kg	10.00 ug/kg	8240

Comments:
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 16:31.

Sample Date: 11/04/93 In House # 11-7999-93		Source: SS2-11-93		Location: FT.STEWART			
Metals Sample Prep - nonaqueous	VB	11/13/93 12:00		0.000		0.00	
Lab pH	TW	11/09/93 12:00		4.790	pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/09/93 12:30		5.200	umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	CW	11/18/93 04:29	<	2.500	mg/kg	2.50 mg/kg	206.2
Selenium - solid	CW	11/17/93 15:12	<	2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	KAH	11/18/93 16:37		29.500	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	KAH	11/18/93 16:37	<	1.000	mg/kg	1.00 mg/kg	200.7
Chromium - solid	KAH	11/18/93 16:37		38.900	mg/kg	2.50 mg/kg	200.7
Lead - solid	CW	11/17/93 21:40		8.550	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	11/19/93 16:37	<	2.500	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	11/19/93 17:00	<	0.020	mg/kg	0.02 mg/kg	245.5
% Solids	ALM	11/08/93 09:00		86.000	%	0.01 %	160.3
Chloroethane - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Bromoform - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
Carbon tetrachloride - solid	KG	11/12/93 10:14	<	0.200	mg/kg	0.20 mg/kg	8240
Xylene - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
2-Butanone - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240
2-Hexanone - solid	KG	11/12/93 10:14	<	5.000	ug/kg	5.00 ug/kg	8240
	KG	11/12/93 10:14	<	10.000	ug/kg	10.00 ug/kg	8240

Comments:
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 18:00.

Sample Date: 11/04/93 In House # 11-8000-93 Source: SS3-11-93 Location: FT.STEWART

Metals Sample Prep - nonaqueous	VB	11/13/93	12:00		0.000	0.00	
Lab pH	TW	11/09/93	12:00		4.830 pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/09/93	12:30		4.000 umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	CW	11/18/93	04:45	<	2.500 mg/kg	2.50 mg/kg	206.2
Selenium - solid	CW	11/17/93	15:18	<	2.500 mg/kg	2.50 mg/kg	270.2
Barium - solid	KAH	11/18/93	16:39		16.000 mg/kg	2.50 mg/kg	200.7
Cadmium - solid	KAH	11/18/93	16:39	<	1.000 mg/kg	1.00 mg/kg	200.7
Chromium - solid	KAH	11/18/93	16:39		2.660 mg/kg	2.50 mg/kg	200.7
Lead - solid	CW	11/17/93	21:58		6.060 mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	11/19/93	10:53	<	2.500 mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	11/19/93	17:00	<	0.020 mg/kg	0.02 mg/kg	245.5
% Solids	ALM	11/08/93	09:00		79.800 %	0.01 %	160.3
Chloroethane - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Chloromethane - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Bromomethane - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Benzene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Bromoform - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Toluene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Chloroform - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Acetone - solid	KG	11/12/93	10:15	<	0.200 mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
Xylene - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
2-Butanone - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Styrene - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	KG	11/12/93	10:15	<	5.000 ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	KG	11/12/93	10:15	<	10.000 ug/kg	10.00 ug/kg	8240

Comments:
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 18:30.

Sample Date: 11/04/93 In House # 11-8001-93 Source: SS4-11-93 Location: FT.STEWART

Metals Sample Prep - nonaqueous	VB	11/13/93	12:00		0.000	0.00	
Lab pH	TW	11/09/93	12:00		4.570 pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/09/93	12:30		4.500 umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	CW	11/18/93	04:38		6.020 mg/kg	2.50 mg/kg	206.2
Selenium - solid	CW	11/17/93	15:25	<	2.500 mg/kg	2.50 mg/kg	270.2
Barium - solid	KAH	11/18/93	16:42		20.200 mg/kg	2.50 mg/kg	200.7
Cadmium - solid	KAH	11/18/93	16:42	<	1.000 mg/kg	1.00 mg/kg	200.7
Chromium - solid	KAH	11/18/93	16:42		5.140 mg/kg	2.50 mg/kg	200.7
Lead - solid	CW	11/17/93	21:49		12.000 mg/kg	2.50 mg/kg	239.2

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/04/93 In House # 11-8001-93		Source: SS4-11-93		Location: FT.STEWART			
		- CONTINUED -					
Silver - solid	CW	11/18/93	16:42 <	2.500	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	11/19/93	17:00 <	0.020	mg/kg	0.02 mg/kg	245.5
% Solids	ALM	11/08/93	09:00	92.200	%	0.01 %	160.3
Chloroethane - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Bromoform - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	11/12/93	10:17 <	0.200	mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
Xylene - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
2-Butanone - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	11/12/93	10:17 <	5.000	ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	JCF	11/12/93	10:17 <	10.000	ug/kg	10.00 ug/kg	8240

Comments:
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 19:00.

Sample Date: 11/04/93 In House # 11-8002-93		Source: SEECOMMENT		Location: FT.STEWART			
Metals Sample Prep - nonaqueous	VB	11/13/93	12:00	0.000		0.00	
Arsenic - solid	CW	11/18/93	04:54	3.560	mg/kg	2.50 mg/kg	206.2
Selenium - solid	CW	11/17/93	15:32 <	2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	KAH	11/18/93	16:45	18.620	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	KAH	11/18/93	16:45 <	1.000	mg/kg	1.00 mg/kg	200.7
Chromium - solid	KAH	11/18/93	16:45	5.000	mg/kg	2.50 mg/kg	200.7
Lead - solid	CW	11/17/93	22:07	7.570	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	11/19/93	11:03 <	2.500	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	11/19/93	17:00 <	0.020	mg/kg	0.02 mg/kg	245.5
% Solids	ALM	11/08/93	09:00	92.200	%	0.01 %	160.3
Chloroethane - solid	JCF	11/12/93	10:19 <	10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	11/12/93	10:19 <	10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	11/12/93	10:19 <	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	11/12/93	10:19 <	10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	11/12/93	10:19 <	5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	11/12/93	10:19 <	10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	11/12/93	10:19 <	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	11/12/93	10:19 <	5.000	ug/kg	5.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/04/93 In House # 11-8002-93	Source: SEECOMMENT - CONTINUED -			Location: FT.STEWART			
Trans 1,2-Dichloroethene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Trichloroethene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Benzene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Bromoform - solid	JCF	11/12/93 10:19	<	10.000 ug/kg		10.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Toluene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Chlorobenzene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Ethylbenzene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Chloroform - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Acetone - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
Carbon tetrachloride - solid	JCF	11/12/93 10:19	<	0.200 mg/kg		0.20 mg/kg	8240
Xylene - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
2-Butanone - solid	JCF	11/12/93 10:19	<	10.000 ug/kg		10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	11/12/93 10:19	<	10.000 ug/kg		10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	11/12/93 10:19	<	10.000 ug/kg		10.00 ug/kg	8240
Styrene - solid	JCF	11/12/93 10:19	<	10.000 ug/kg		10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	11/12/93 10:19	<	10.000 ug/kg		10.00 ug/kg	8240
2-Hexanone - solid	JCF	11/12/93 10:19	<	5.000 ug/kg		5.00 ug/kg	8240
	JCF	11/12/93 10:19	<	10.000 ug/kg		10.00 ug/kg	8240

Comments:
Location: SS4-DUP-11-93
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 19:47.

Sample Date: 11/04/93 In House # 11-8003-93		Source: SS5-11-93		Location: FT.STEWART			
Metals Sample Prep - nonaqueous	VB	11/13/93 12:00		0.000		0.00	
Lab pH	TW	11/09/93 12:00		5.460 pH Units		0.00 pH Units	150.1
Lab Conductivity	TW	11/09/93 12:30		2.700 umhos/cm		1.00 umhos/cm	120.1
Arsenic - solid	CW	11/18/93 05:01	<	2.500 mg/kg		2.50 mg/kg	206.2
Selenium - solid	CW	11/17/93 15:38	<	2.500 mg/kg		2.50 mg/kg	270.2
Barium - solid	KAH	11/18/93 16:49		9.200 mg/kg		2.50 mg/kg	200.7
Cadmium - solid	KAH	11/18/93 16:49	<	1.000 mg/kg		1.00 mg/kg	200.7
Chromium - solid	KAH	11/18/93 16:49	<	2.500 mg/kg		2.50 mg/kg	200.7
Lead - solid	CW	11/17/93 22:07		4.250 mg/kg		2.50 mg/kg	239.2
Silver - solid	CW	11/19/93 11:05	<	2.500 mg/kg		2.50 mg/kg	200.7
Mercury - solid	VTB	11/19/93 17:00	<	0.020 mg/kg		0.02 mg/kg	245.5
% Solids	ALM	11/08/93 09:00		85.400 %		0.01 %	160.3
Chloroethane - solid	JCF	11/12/93 10:20	<	10.000 ug/kg		10.00 ug/kg	8240
Chloromethane - solid	JCF	11/12/93 10:20	<	10.000 ug/kg		10.00 ug/kg	8240
Bromomethane - solid	JCF	11/12/93 10:20	<	10.000 ug/kg		10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	11/12/93 10:20	<	10.000 ug/kg		10.00 ug/kg	8240
Methylene Chloride - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	11/12/93 10:20	<	10.000 ug/kg		10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
Trichloroethene - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	11/12/93 10:20	<	5.000 ug/kg		5.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/04/93 In House # 11-8003-93		Source: SS5-11-93		Location: FT.STEWART			
		· CONTINUED ·					
1,1,2-trichloroethane - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	11/12/93 10:20	<	10.000	ug/kg	10.00 ug/kg	8240
Bromoform - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	11/12/93 10:20	<	0.200	mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
Xylene - solid	JCF	11/12/93 10:20	<	10.000	ug/kg	10.00 ug/kg	8240
2-Butanone - solid	JCF	11/12/93 10:20	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	11/12/93 10:20	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	11/12/93 10:20	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	11/12/93 10:20	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	11/12/93 10:20	<	5.000	ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	JCF	11/12/93 10:20	<	10.000	ug/kg	10.00 ug/kg	8240

Comments:
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 20:18.

Sample Date: 11/04/93 In House # 11-8004-93		Source: SS6-11-93		Location: FT.STEWART			
Metals Sample Prep - nonaqueous	VB	11/13/93 12:00		0.000		0.00	
Lab pH	TW	11/09/93 12:00		5.020	pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/09/93 12:30		56.400	umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	CW	11/18/93 05:26		2.800	mg/kg	2.50 mg/kg	206.2
Selenium - solid	CW	11/17/93 16:01	<	2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	KAH	11/19/93 16:52		42.000	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	KAH	11/19/93 16:52	<	1.000	mg/kg	1.00 mg/kg	200.7
Chromium - solid	KAH	11/19/93 16:52		6.980	mg/kg	2.50 mg/kg	200.7
Lead - solid	CW	11/17/93 22:40		9.560	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	11/19/93 11:10	<	2.500	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	11/19/93 17:00	<	0.020	mg/kg	0.02 mg/kg	245.5
% Solids	ALM	11/08/93 09:00		85.200	%	0.01 %	160.3
Chloroethane - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Bromoform - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/04/93 In House # 11-8004-93		Source: SS6-11-93		Location: FT.STEWART			
		- CONTINUED -					
Ethylbenzene - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	11/12/93 10:21	<	0.200	mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
Xylene - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
2-Butanone - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	11/12/93 10:21	<	5.000	ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	JCF	11/12/93 10:21	<	10.000	ug/kg	10.00 ug/kg	8240

Comments:
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 20:48.

Laboratory ID # 40111

Very truly yours,

James H. Carr, Jr.
Chemist

FT. STEWART Number Key
JOB NUMBER FST-010

Carr Lab No.	FT STEWART ID
11-7998-93	SS1-11-93
11-7999-93	SS2-11-93
11-8000-93	SS3-11-93
11-8001-93	SS4-11-93
11-8002-93	SS4-11-93DUP
11-8003-93	SS5-11-93
11-8004-93	SS6-11-93

LEGEND

QC SAmple Number: The identifying number on a sample or known which makes unique identification of each sample possible.

Val. 1, Val. 2: Concentrations of duplicate samples, presented for precision information. * indicates a spiked duplicate sample if this information is not presented elsewhere.

RPD: Relative Percent Difference:

$$RPD = \frac{abs(D_1 - D_2)}{(D_1 + D_2)/2} * 100$$

Spike Conc.: The concentration of spike material added to the sample to produce the spiked sample.

True Value: The target concentration for the spiked sample:

TV = Sample Conc. - Spike Conc.

Observed Value: The concentration observed in the spiked sample upon analysis.

Percent Recovery: A measure of the concentration of the spiked sample relative to the spiked concentration:

$$\% \text{ Recovery} = \frac{\text{Conc. spiked sample - Conc. unspiked sample}}{\text{spike concentration}}$$

QUALITY CONTROL FOR LEAD ANALYSIS

SAMPLES NUMBERED: 11-7998-93 through 11-8004-93 analyzed 11/17/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
11/17/93	WP28-2					30.0	34.2	114
11/17/93	DIG.STD.					50.0	53.0	106
11/17/93	7998	72.8	73.6	10.9	15.0	29.6	28.6	93
11/17/93	8008*	39.6	40.0	1.0	15.0	41.0	40.0	93

* Indicates a spiked duplicate sample.

QUALITY CONTROL FOR ARSENIC ANALYSIS

SAMPLES NUMBERED: 11-7998-93 through 11-8004-93 analyzed 11/18/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
11/18/93	WP28-2					86.0	92.3	107
11/18/93	DIG.STD.					50.0	49.9	100
11/18/93	7998	<5.0	<5.0	0	15.0	15.0	15.5	103
11/18/93	8008*	35.7	36.1	1.1	15.0	35.7	35.7	100

QUALITY CONTROL FOR SELENIUM ANALYSIS

SAMPLES NUMBERED: 11-7998-93 through 11-8004-93 analyzed 11/17/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
11/17/93	WP28-2					11.0	11.6	105
11/17/93	DIG.STD.					50.0	49.7	99
11/17/93	7998	9.6	11.2	15.4	15.0	16.9	16.4	97
11/17/93	8010*	16.8	16.0	4.9	15.0	18.0	16.8	92

QUALITY CONTROL FOR ICP ANALYSIS

SAMPLES NUMBERED: 11-7998-93 through 11-8004 analyzed 11/18/93-11/19/93;

Date	Elem	QC Sample Number	Val. 1 (mg/l)	Val. 2 (mg/l)	% RPD	Spike Conc.	True Value	Obs. Val	Percent Recovery
10/18/93	Ba	ICP-07					1.00	1.01	101
10/18/93	Cr	ICP-19					1.00	0.84	84
10/18/93	Cd	ICP-19					1.00	1.02	102
10/18/93	Cr	7998	<.05	<.05	0	0.10	0.10	0.854	85
10/18/93	Cd	7998	<.01	<.01	0	0.10	0.10	0.076	76
10/18/93	Ba	7998	0.100	0.095	5.1	0.10	0.200	0.203	101
10/19/93	Ag	ICP-07					1.00	0.83	83
10/19/93	Ag	8004	<.05	<.05	0	0.10	0.10	0.091	91
10/19/93	Ag	8031	0.058	0.059	1.7	0.10	0.158	0.146	88

4-479

QUALITY CONTROL FOR MERCURY ANALYSIS

SAMPLES NUMBERED: 11-7998-93 through 11-8004-93 analyzed 11/19/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
11/19/93	EPA					2.00	2.17	109
11/19/93	8007	<.2	<.2	0	1.0	1.00	1.22	122

QUALITY CONTROL FOR VOLATILES

SAMPLES NUMBERED: 11-7998-93 through 11-8004-93 analyzed 11/12-13/93;

DATE: 11/12/93
SPIKE QC SAMPLE NUMBER: 11799893 SPIKED DUPLICATE

Analyte	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
1,1 Dichloroethene	39.9	49.4	27.4	50	50.0	49.4	99
Trichloroethene	41.8	49.8	17.5	50	50.0	49.8	100
Benzene	45.1	51.3	12.9	50	50.0	51.3	103
Toluene	34.6	44.9	25.9	50	50.0	44.9	90
Chlorobenzene	33.5	43.5	26.0	50	50.0	43.5	87

BLANK DATA FOR VOLATILES

All analytes on all dates <5 ug/L.

U-dec

SURROGATE RECOVERIES FOR VOLATILES, PERCENT RECOVERY

Sample Date	Sample Number	1,2 dichloro-ethane d-4	Toluene d-8	Bromofloro benzene
11/13/93	BLANK	103	79	74
11/13/93	11-7999-93	113	70	55
11/13/93	11-8000-93	100	75	57
11/13/93	11-8001-93	131	97	78
11/13/93	11-8002-93	100	77	61
11/13/93	11-8003-93	104	75	55
11/13/93	11-8004-93	127	91	66
11/13/93	11-7998-93	88	64	56
11/13/93	11-7998SPK	103	70	59
11/13/93	11-7998SPKDUP	95	70	52

U-481

CARR LABORATORIES

CHAIN OF CUSTODY RECORD

Client CESAS | Project No. FST-010

Contact Toni Nicholson | Phone No. 912-652-5312

Address P.O Box 889, Savannah, Ga 31402 | Fax No. 912-652-5311

Collected By Judson Smith | Client P.O.# ___

MT (Matrix Type)	AP (Analytical Program)
L=Liquid	W=Wastewater
(S)=Soil	G=Groundwater
O=Oil	D=Drinking Water
X=Other	(S)=Solid/Haz. Waste
	N=Nonregulated

Carr's Lab No.	Sample Source	Location	Date/Time	Well	Grab	Composite	MT	AP	Number of Containers	Preserved Y or N	Analyses Requested
FST-010-SS1-11-93	Ft Stewart	FST-010	11/4/93 / 0850		X		S		3	N	pH, SPC, VOC 8240, RCRA TOTAL METALS 11-7998-93
FST-010-SS2-11-93	Ft Stewart	FST-010	11/4/93 / 0910		X		S		3	N	" " " " 7999
FST-010-SS3-11-93	Ft Stewart	FST-010	11/4/93 / 0932		X		S		3	N	" " " " 8000
FST-010-SS4-11-93	Ft Stewart	FST-010	11/4/93 / 1000		X		S		3	N	" " " " 8001
FST-010-SS4-D-P-W-93	Ft Stewart	FST-010	11/4/93 / 1000		X		S		2	N	VOC 8240, RCRA TOTAL METALS 8002
FST-010-SS5-11-93	Ft Stewart	FST-010	11/4/93 / 1030		X		S		3	N	pH, SPC, VOC 8240, RCRA TOTAL METALS 8003
FST-010-SS6-11-93	Ft Stewart	FST-010	11/4/93 / 1100		X		S		3	N	" " " " 8004

CI-483

Relinquished By	Received By	Date	Time
1.	Henry Barton	5 Nov 93	1446
2. Henry Barton	Cook Indiana	11/5/93	1840
3.			
Received In Lab By		11-5-93	1840

JAMES H. CARR & ASSOCIATES, INC.
Office and Laboratories
P.O. Box 90209
Columbia, South Carolina 29290
(803) 776-7789 Fax: 783-2192

temp of vial = 19°C - ice visible

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

U.S. Army Corps of Engineers
100 West Oglethorpe Ave.
Savannah, GA 31402

January 12, 1994

Attn: Toni Nicholson/EN-GH

Job Number: AYCC 55431 (Amended Certificate)

P.O. Number: DACA21-93-M0762

This is the Certificate of Analysis for the following samples:

Client Project ID:	CESAS-FSTO10
Date Received by Lab:	11/05/93
Number of Samples:	Seven (7)
Sample Type:	Soils

I. Introduction

On 11/05/93, seven (7) soil samples arrived at the ITAS-Knoxville, Tennessee, laboratory from U. S. Army Corps of Engineers, Savannah, Georgia, in support of the CESASIFSTO10 project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that the data are not blank corrected.

This certificate of analysis has corrected results for several compounds on page number 13.

The samples were analyzed for nitroexplosives by high performance liquid chromatography (HPLC) based on draft EPA method 8330.

Reviewed and Approved:

Robert L. Curry
Project Manager

III. **Quality Control**

Routine laboratory level II QC was followed.

The samples were analyzed for nitroexplosives on 10/03/93 to 11/28/93. No problems were encountered. Matrix spike/matrix spike duplicate analyses were performed using sample FST-010-SS6-11-93. All QC results were acceptable.

U-4856

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 55431

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS6-11-93 MSD
Lab Sample ID: AB0097

Compounds	Results
HMX	0.68
RDX	0.58
1,3,5-trinitrobenzene	0.64
1,3-dinitrobenzene	0.64
tetryl	0.73
nitrobenzene	0.75
2,4,6-trinitrotoluene	0.70
2,6-dinitrotoluene	0.60
2,4-dinitrotoluene	0.72
2-nitrotoluene	0.75
3-nitrotoluene	0.87
4-nitrotoluene	0.63

Analysis Date: 11/10/93

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate
Job Number: AYCC 55(

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS6-11-93 MS
Lab Sample ID: AB0096

Compounds	Results
HMX	0.68
RDX	0.60
1,3,5-trinitrobenzene	0.62
1,3-dinitrobenzene	0.60
tetryl	0.68
nitrobenzene	0.75
2,4,6-trinitrotoluene	0.66
2,6-dinitrotoluene	0.66
2,4-dinitrotoluene	0.73
2-nitrotoluene	0.70
3-nitrotoluene	0.74
4-nitrotoluene	0.69

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 55431

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS6-11-93
Lab Sample ID: AB0095

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
tetryl	0.65	U
nitrobenzene	0.26	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificat
Job Number: AYCC 554

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS5-11-93
Lab Sample ID: AB0094

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
tetryl	0.65	U
nitrobenzene	0.26	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 55431

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS4-11-93 DUP
Lab Sample ID: AB0093

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
tetryl	0.65	U
nitrobenzene	0.26	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS4-11-93
Lab Sample ID: AB0092

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
tetryl	0.65	U
nitrobenzene	0.26	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 55431

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS3-11-93
Lab Sample ID: AB0091

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
tetryl	0.65	U
nitrobenzene	0.26	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 554

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-0102-SS2-11-93
Lab Sample ID: AB0090

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
tetryl	0.65	U
nitrobenzene	0.26	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

CI-494

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 55431

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-010-SS1-11-93
Lab Sample ID: AB0089

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
tetryl	0.65	U
nitrobenzene	0.26	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/10/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificat
Job Number: AYCC 55

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: Method Spike
Lab Sample ID: F1956

Compounds	Results
HMX	0.78
RDX	0.72
1,3,5-trinitrobenzene	0.72
1,3-dinitrobenzene	0.72
nitrobenzene	0.84
tetryl	0.78
2,4,6-trinitrotoluene	0.72
2,6-dinitrotoluene	0.72
2,4-dinitrotoluene	0.78
2-nitrotoluene	0.78
3-nitrotoluene	0.84
4-nitrotoluene	0.72

Analysis Date: 11/10/93

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 55431

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: Method Blank
Lab Sample ID: F1955

Compounds	Results	
HMX	0.29	U
RDX	0.42	U
1,3,5-trinitrobenzene	0.25	U
1,3-dinitrobenzene	0.25	U
nitrobenzene	0.26	U
tetryl	0.65	U
2,4,6-trinitrotoluene	0.25	U
2,6-dinitrotoluene	0.25	U
2,4-dinitrotoluene	0.26	U
2-nitrotoluene	0.25	U
3-nitrotoluene	0.22	U

Analysis Date: 11/02/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

CL-497

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 554

SOIL/WATER SURROGATE PERCENT RECOVERY SUMMARY

		EXPLOSIVES
Client Sample ID	Lab Sample ID	4-Nitrotoluene (21-178%)
FST-010-SS6-11-93 MSD	AB0097	NA
FST-010-SS6-11-93 MS	AB0096	NA
FST-010-SS6-11-93	AB0095	123
FST-010-SS5-11-93	AB0094	112
FST-010-SS4-11-93 DUP	AB0093	101
FST-010-SS4-11-93	AB0092	115
FST-010-SS3-11-93	AB0091	103
FST-010-SS2-11-93	AB0090	58
FST-010-SS1-11-93	AB0089	106
Method Spike	F1956	NA
Method Blank	F1955	135

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certificate)
Job Number: AYCC 55431

SPIKED BLANK ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: Blank Spike
Lab Sample ID: F1956

Compound	Conc. Spike Added	Conc. Blank Spike	% Rec.
HMX	0.78	0.7	90
RDX	0.72	0.5	69
1,3,5-trinitrobenzene	0.72	0.65	90
1,3-dinitrobenzene	0.72	0.65	90
tetryl	0.78	0.8	103
nitrobenzene	0.84	0.8	95
2,4,6-trinitrotoluene	0.72	0.7	97
2,6-dinitrotoluene	0.72	0.8	111
2,4-dinitrotoluene	0.78	0.85	109
2-nitrotoluene	0.78	0.8	103
4-nitrotoluene	0.72	0.94	131
3-nitrotoluene	0.84	0.95	113

Anlaysis Date: 11/02/93

\SPIKE-BL.FRM

U.S. Army Corps of Engineers
January 12, 1994

Client Project ID: CESAS/FST-O10

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended Certific
Job Number: AYCC 5

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: SOIL

Client Sample ID: FST-010-SS6-11-93
Lab Sample ID: AB0096, AB0097 MS, AB0098 MSD

Compound	Orig Sample Result		Conc. Spike Added	Conc. MS	% Rec.	Conc. MSD	% Rec.	RPD
HMX	0.29	U	0.78	0.68	87	0.68	87	0
RDX	0.42	U	0.72	0.6	83	0.58	81	3
1,3,5-trinitrobenzene	0.25	U	0.72	0.62	86	0.64	89	3
1,3-dinitrobenzene	0.25	U	0.72	0.6	83	0.64	89	6
tetryl	0.65	U	0.78	0.68	87	0.73	94	7
nitrobenzene	0.26	U	0.84	0.75	89	0.75	89	0
2,4,6-trinitrotoluene	0.25	U	0.72	0.66	92	0.7	97	6
2,6-dinitrotoluene	0.26	U	0.72	0.66	92	0.6	83	10
2,4-dinitrotoluene	0.25	U	0.78	0.73	94	0.72	92	1
2-nitrotoluene	0.25	U	0.78	0.7	90	0.75	96	7
4-nitrotoluene	0.22	U	0.72	0.69	96	0.63	88	9
3-nitrotoluene	0.28	U	0.84	0.74	88	0.87	104	16

Analysis Date: 11/09/93

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

\REC\MS-MSD\H-TCLP.I

U-500

~~CARR~~ IT
LABORATORIES

CHAIN OF CUSTODY RECORD

Client CESAS — Project No. FST-010

Contact Toni Nicholson — Phone No. 912 652-5312

Address P O Box 889, Savannah Ga 31402 — Fax No. 912-652-5311

Collected By Judson Smith — Client P.O.# ____

MT (Matrix Type)	AP (Analytical Program)
L=Liquid	W=Wastewater
S=Soil	G=Groundwater
O=Oil	D=Drinking Water
X=Other	S=Solid/Haz. Waste
	N=Nonregulated

Carr's Lab No.	Sample Source	Sample Location	Date/Time	Well	Grab	Composite	MT	AP	Number of Containers	Preserved Y or N	Analyses Requested
FST-010-SS1-11-93	Ft Stewart	FST-010	11/4/93 / 08 50		X		S		1	N	Explosive RES 8330 7°C
FST-010-SS2-11-93	Ft Stewart	FST-010	11/4/93 / 09:10		X		S		1	N	"
FST-010-SS3-11-93	Ft Stewart	FST-010	11/4/93 / 09:32		X		S		1	N	"
FST-010-SS4-11-93	Ft Stewart	FST-010	11/4/93 / 10:0		X		S		1	N	"
FST-010-SS4-DUP-11-93	Ft Stewart	FST-010	11/4/93 / 10:00		X		S		1	N	"
FST-010-SS5-11-93	Ft Stewart	FST-010	11/4/93 / 10:30		X		S		1	N	"
FST-010-SS6-11-93	Ft Stewart	FST-010	11/4/93 / 11:00		X		S		1	N	"

Relinquished By	Received By	Date	Time
1.		11/4/93	15:00
2.			
3.			
Received In Lab By	Bryan Blomquist	11/05/93	10:25

JAMES H. CARR & ASSOCIATES, INC.
Office and Laboratories
P.O. Box 90209
Columbia, South Carolina 29290
(803) 776-7789 Fax: 783-2192

NITROEXPLOSIVES ANALYSIS

Laboratory Name	: ITAS-KNOXVILLE	SDG Number	: U1004 Ayce 55931
Contract Name	: WVOW-OU1	Job Number	: ITEK 55409, 55411
Client Sample I.D.	: ~~3013~~ method blank	Collection Date	: ~~11/01/93~~ JLK 11/18/93
Lab Sample I.D.	: JLK 11/18/93 ~~ZZ9632~~ Aut F1955	Analysis Date	: 11/2/93
Sample Matrix	: SOIL	Confirmation Date:	NA
Concentration Units:	mg/kg	Dryness Factor	:

COMPOUND	RESULTS	QUALIFIERS	DETECTION LIMITS
HMX	~~2.2~~ 0.29	U	~~2.2~~ 0.29
RDX	JLK 12/13/93 ~~2.0~~ 0.76	U JLK 12/13/93	~~1.0~~ 0.76
1,3,5-trinitrobenzene	0.25	U	0.25
1,3-dinitrobenzene	0.25	U	0.25
nitrobenzene	0.26	U	0.26
tetryl	0.65	U	0.65
2,4,6-trinitrotoluene	0.25	U	0.25
[illegible] and 2,6-dinitrotoluene	~~0.51~~ 0.24, 0.26	U	~~0.51~~ 0.24, 0.2[illegible]
2-nitrotoluene	0.25	U	0.25
3-nitrotoluene	0.22	U	0.22

SURROGATE RECOVERY	4-NITROTOLUENE
ACCEPTANCE LIMITS: SOIL WATER LAB I.D.	(21 - 179) (-)
ZZ9632	135

DB=NITEXP.DTF
DP FORM=NITEXP
LAB FORM=8330S2
BS=NITEXPBS
MSMSD=NITMSMSD

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the Phase I investigation (analytical results did not indicate a release had occurred, analytical results indicated concentrations were below the GAEPD guidelines and/or the site was never used), no further action is recommended at the following sites:

- SWMU4G(FST-004G) Burn Pit
- SWMU24A(FST-024A) New Radiator Shop
- SWMU27(FST-027) DOL Maintenance Motor Pool
- SWMU28(FST-028) 724th Battery Shop
- SWMU30(FST-030) Recirculating Wash Impoundment "Bird Bath"
- SWMU33(FST-033) DEH Pesticide Warehouse

Continued monitoring is recommended at SWMU20(FST-020) Wright Army Airfield Sewage Disposal Beds (Land Spray Application and Lagoon) in accordance with the NPDES permit.

Based on the Phase I results of the soil and ground-water analytical data and the exposure pathways analyses, a Phase II investigation is recommended at the following sites:

- SWMU1(FST-001) South Central Landfill
- SWMU2(FST-002) Camp Oliver Landfill
- SWMU3(FST-003) TAC-X Landfill
- SWMU4(FST-004) Burn Pits A through F
- SWMU9(FST-009) Inactive EOD Area
- SWMU10(FST-010) Inactive EOD Area
- SWMU11(FST-011) Inactive EOD Area
- SWMU12(FST-012) Active EOD Area
- SWMU14(FST-014) Old Fire Training Area
- SWMU17(FST-017) DRMO Hazardous Waste Storage Area
- SWMU18(FST-018) Industrial Wastewater Treatment Plant
- SWMU19(FST-019) Old Sludge Drying Beds

- SWMU24A(FST-024A) Old Radiator Shop
- SWMU24B(FST-024B) Paint Booth
- SWMU25(FST-025) Waste Oil Tanks (All 15 sampled tanks and the tanks that failed the tank tightness test)
- SWMU26(FST-026) 724th Tanker Purging Station
- SWMU27(FST-027) Motor Pools (All motor pools with oil/water separators)
- SWMU29(FST-029) Evans Army Heliport POL Storage Facility
- SWMU31(FST-031) DEH Asphalt Tanks
- SWMU32(FST-032) Supply Diesel Tank
- SWMU34(FST-034) DEH Equipment Wash Rack

RUST E&I recommends that a Phase II RFI Work Plan be prepared for the previously noted SWMUs at Fort Stewart. The Phase II RFI Work Plan will document procedures to be utilized for RCRA investigations at each of the SWMUs. Prior to initiation of Phase II field activities, the Phase II RFI Work Plan must meet GAEPD approval. The Phase II field investigations will include monitoring well installation, soil sampling and soil permeability testing, ground-water sampling, horizontal and vertical extent of contamination, ground-water flow rate calculations, map preparation, data quality objectives for risk assessment needs and any requirements that the GAEPD recommends.

Upon completion of Phase II field activities, a Phase II RFI Report will be submitted to the GAEPD that summarizes the results of all work completed. The results of the Phase II investigations will be evaluated along with the results of the Phase I investigations to confirm if Corrective Measure Studies (CMS) are warranted.