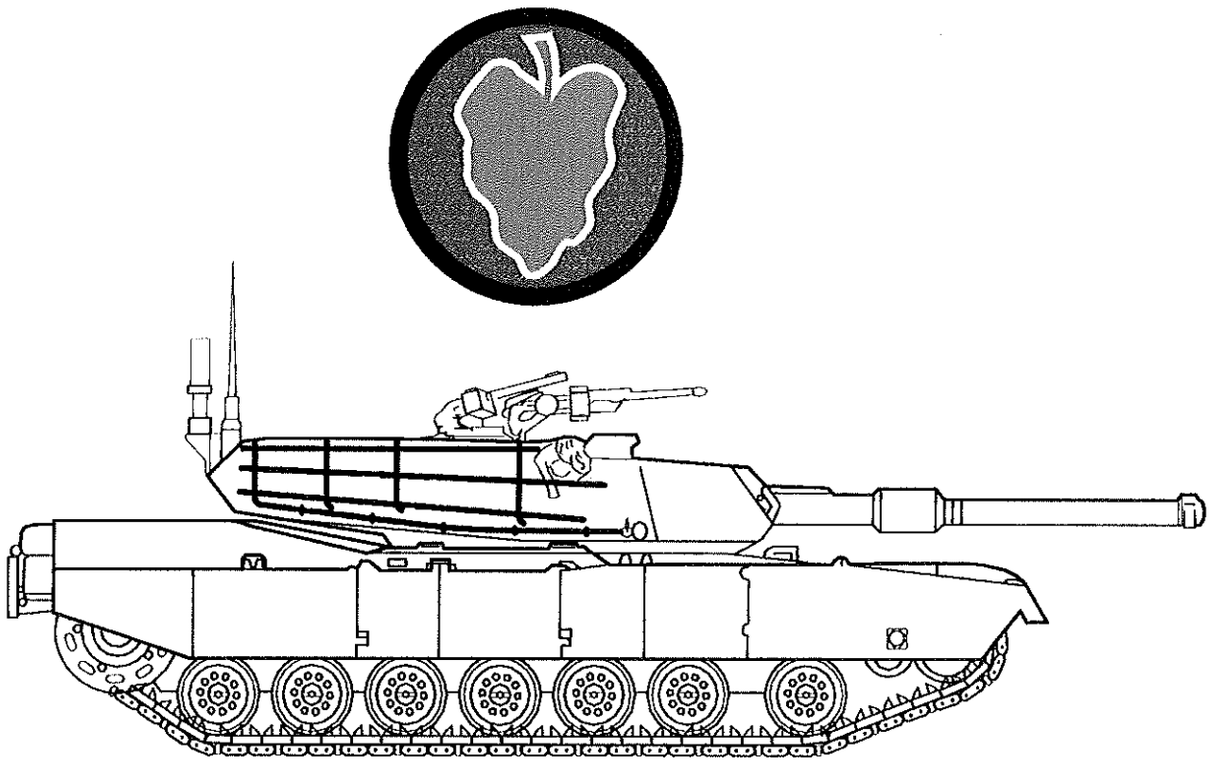
Corrected Final
Phase I RCRA Facility Investigation Report
For 24 Solid Waste Management Units
At Fort Stewart, Georgia

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
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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.

5.5 Inactive EOD Area SWMU9(FST-009)

5.5.1 Site Description

The inactive Explosive Ordinance Disposal (EOD) Area SWMU9(FST-009) is located in Red Cloud Range, Hotel Area, approximately 11 miles north of the cantonment area and about 3/5 mile east of Georgia Highway 119 (Figure 5-87). Open detonation of unexploded ordinance was performed at the EOD Area from 1979 to 1983 (G&M, 1993), but is currently inactive.

A detailed site map showing the sample locations is provided in Figure 5-88. Photographs from a recent site inspection (November 29, 1993) are shown in Figure 5-89. The site (< 1 acre) is accessed by an unpaved road. Three blast craters, each approximately 9 feet in diameter and 3 feet deep, are present. Relief across the site is negligible. The site area is overgrown with grasses and weeds. A few small trees are present. No surface water was observed on-site. Shrapnel and exploded ordinance debris is commonly present surrounding and within the craters. A small amount of non-ordinance debris (dead trees, cans, and plastic bottles) was present within the craters.

5.5.2 Work Completed

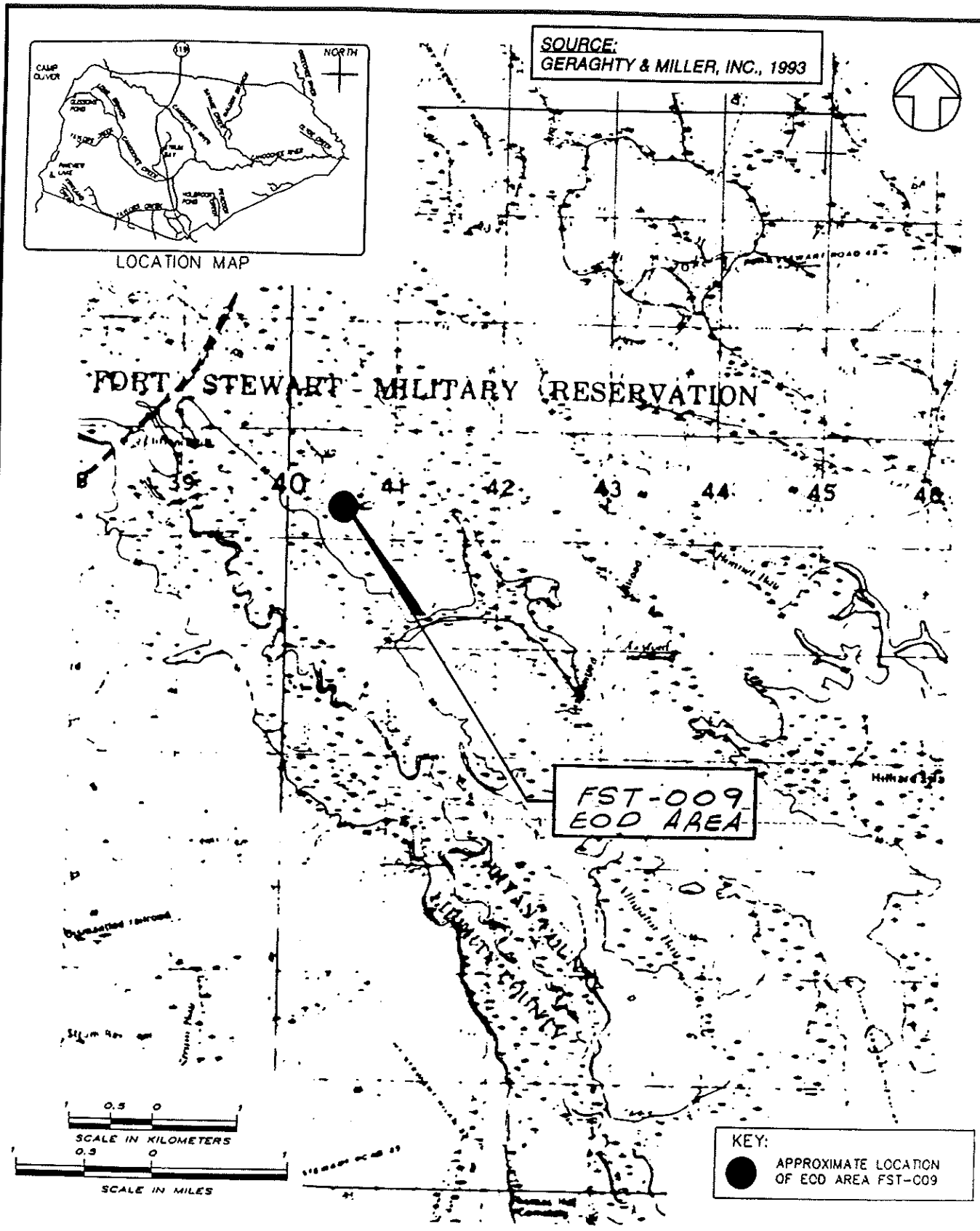
A sample location map has been prepared for EOD Area SWMU9. Six surface soil samples were collected in the appropriate locations of the blast aerators. Surface soil sample laboratory analyses included pH, specific conductance, VOCs, RCRA total metals, and explosive residues. A summary of the analytical results is presented in Section 5.5.5.

5.5.3 Site Characterization

The EOD Area (SWMU9) soil sample location map is provided in Figure 5-88. Soil descriptions were not reported. Contaminant distributions are discussed in Section 5.5.5.

5.5.4 Waste Characterization

Material characterization for the EOD Area SWMU9(FST-009) includes: excess artillery bags, small arms rounds, artillery and mortar rounds, illuminating projectiles, pyrotechnics,

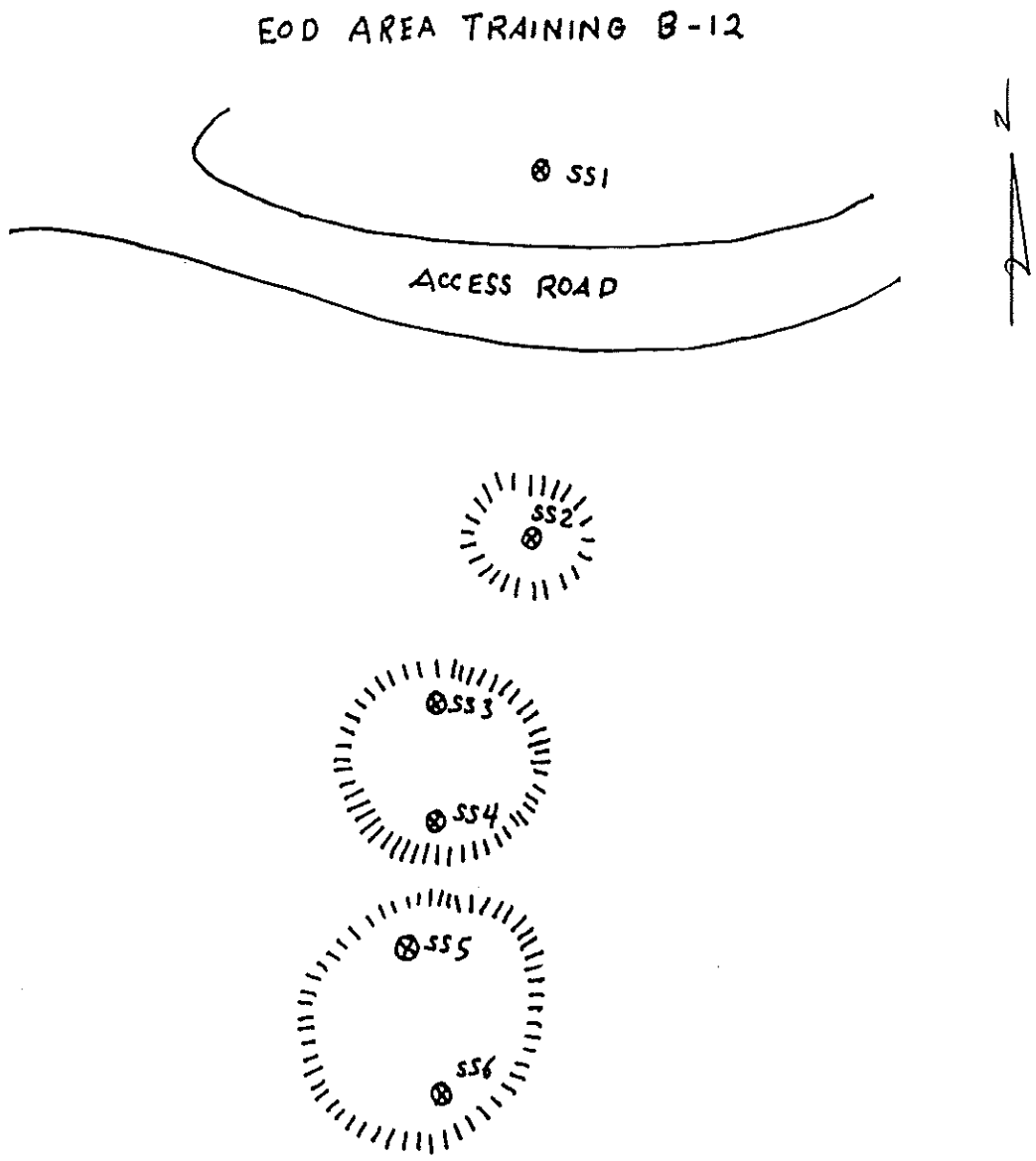


RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5-87

LOCATION MAP
SWMU-9 (FST-009)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000



SOURCE:
USACE, SAVANNAH, GEORGIA
RFI FIELD WORK, 1993

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5-88

SOIL SAMPLE LOCATIONS
SWMU-9 (FST-009)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000

PHOTO
NORTHWARD

PHOTO
NORTHWARD

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5-89

PHOTOGRAPHS
SWMU-9 (FST-009)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000

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). Shrapnel and projectile debris were observed within and around site craters during the site reconnaissance. Minor amounts of other trash (dead trees, cans, plastic bottles) were observed during the November 29, 1993 site reconnaissance.

5.5.5 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 SWMU9. Surface soil samples were collected from six (6) locations (1.0 to 1.5 feet below land surface (bls)) and are presented in Figure 5-88. The surface soil samples were collected by the USACE on November 22, 1993 and analyzed for VOCs, RCRA total metals, explosive residue, specific conductance and pH.

5.5.5.1 Action Levels and Clean-Up Standards

Table 5-17 summaries the analytical results for the soil samples collected at the EOD Area SWMU9. This table highlights, in bold, the parameters detected above the GAEPD guideline or above 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.

5.5.5.2 Surface Soil

Volatile Organic Compounds

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

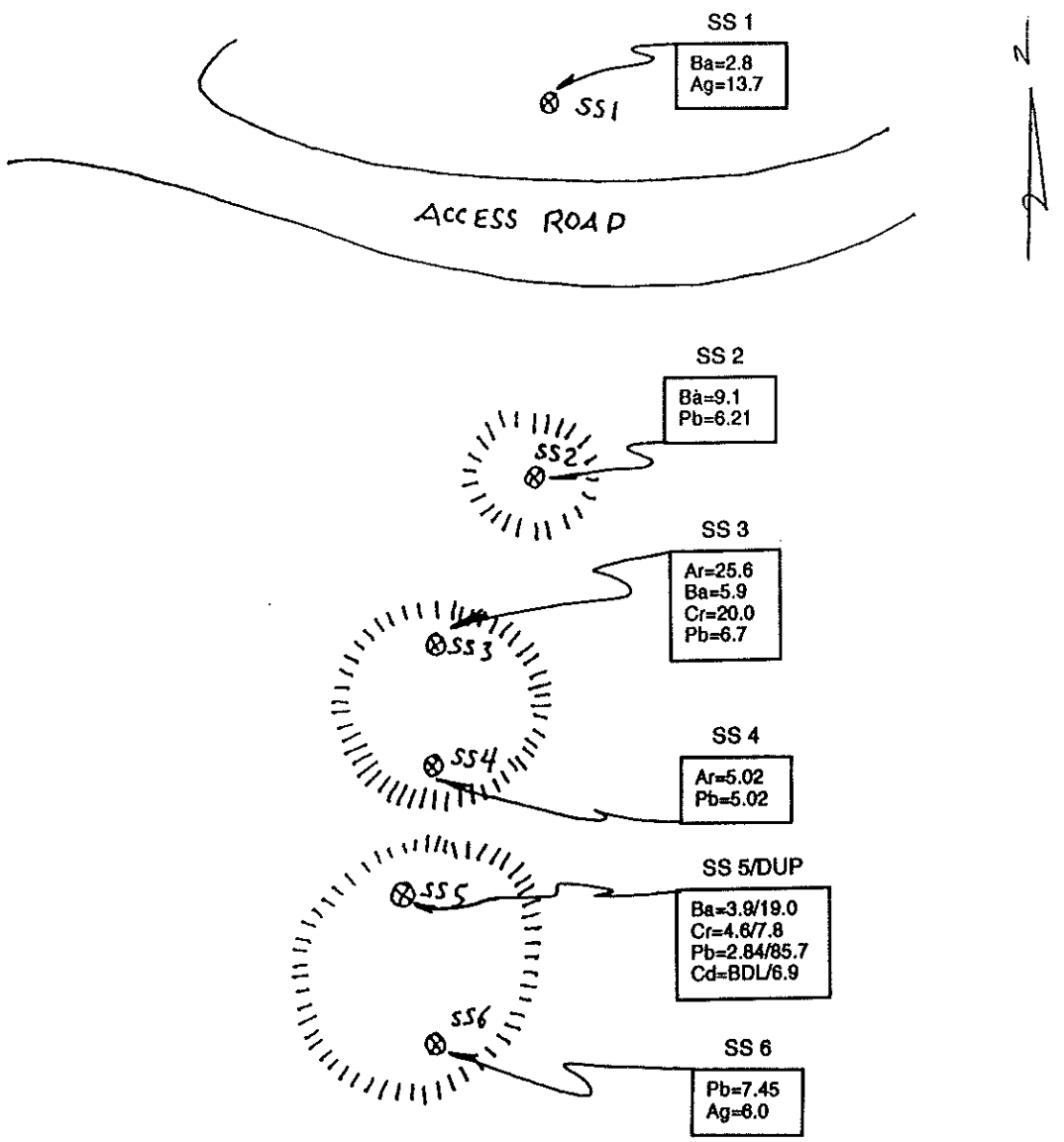
Metals

As noted in Table 5-17, arsenic, barium, chromium, lead, and cadmium were detected above site-specific background concentrations (SS1). In addition, silver was detected in the background surface soil sample (SS1) and SS6. Figure 5-90 shows the metal concentration distribution in surface soils at EOD Area SWMU9.

TABLE 5-17
SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS
SWMU9(FST-009) - EOD AREA
NOVEMBER 22, 1993

ID	Volatile Organic Compounds (mg/kg)	Metals (mg/kg)	Explosives (mg/kg)	Specific Conductance	pH
SS1 (Background)	BDL	Ba 2.8 Ag 13.7	U	49.8	5.23
SS2	BDL	**Ba 9.1** **Pb 6.21**	U	5.0	5.38
SS3	BDL	**Ar 25.6** **Ba 5.9** **Cr 20.0** **Pb 6.7**	U	4.5	7.1
SS4	BDL	**Ar 5.02** **Pb 5.02**	U	10.6	7.0
SS5/SS5 (DUP)	BDL/BDL	**Ba 3.9/19** **Cd BDL/6.9** **Cr 4.6/7.8** **Pb 2.84/85.7**	U/U	2.5/ND	6.3/ND
SS6	BDL	**Pb 7.45** Ag 6.0	U	2.7	6.2

NOTES:
BDL = Below Detection Level
Ar = Arsenic
Ba = Barium
Cd = Cadmium
Cr = Chromium
Pb = Lead
ND = No Data
Ag = Silver
U = Undetected
Dup = Duplicate



LEGEND FOR CONTAMINANTS

BDL = Below Detection Limit
DUP = Duplicate
Ar = Arsenic (mg/kg)
Ba = Barium (mg/kg)
Cr = Chromium (mg/kg)
Pb = Lead (mg/kg)
Cd = Cadmium (mg/kg)
Ag = Silver (mg/kg)

LEGEND

● SAMPLE LOCATION

SOURCE:
USACE, SAVANNAH, GEORGIA
RFI FIELD WORK, 1993

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FIGURE 5-90
METAL CONTAMINANT DISTRIBUTION
IN SOILS
SWMU-9 (FST-009)

EOD AREA, FORT STEWART, GEORGIA
PROJECT NO. 87528.000

Explosive Residue

The characteristic explosive residue compounds HMX; RDX; 1,3,5-trinitrobenzene; 1,3-dinitrobenzene; tetryl; nitrobenzene; 2,4,6-trinitrotoluene; 2,6-dinitrotoluene; 2,4-dinitrotoluene; 2-nitrotoluene; and 3-nitrotoluene were undetected in the surface soil samples.

Specific Conductance and pH

The specific conductance in the surface soil samples ranged from 2.5 to 49.8. The pH ranged from 5.23 to 7.1.

5.5.5.3 Data Evaluation

The USACE QCSR (February, 1994) states that both the data quality objectives and completeness criteria were met, and that the data met in SWMU9 the project objectives.

5.5.6 Evidence of Release form the Site

The analytical results indicate that the metal concentrations of silver, barium, chromium, lead, arsenic and cadmium appear to be above background concentrations in surface soil samples at the inactive EOD Area SWMU9, which may indicate that a release has occurred at the site.

5.5.7 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).

5.5.7.1 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 SWMU9, soil samples were collected from areas of probable contamination.

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 SWMU 9 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 potential exposure pathway that was quantitatively evaluated for human receptors was ingestion of soil.

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 SWMU9. 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 were: 0.1 g/day soil ingestion for a 70 kg person based on a 70 year exposure period.

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. The values used for the assumed weight (W) and intake rate (I) were the

same as those used in calculating the carcinogen criteria, with the exception of soil ingestion. 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) were used unless lower carcinogen criteria existed.

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. Maximum detected concentrations were used for the comparison. Concentrations that exceeded human health exposure action levels are shown in Table 5-17A.

Soil samples collected at SWMU9 were analyzed for volatile organic compounds, metals, and explosives. Of the six metals detected, only arsenic exceeded the human health criterion values. The EPA Superfund cleanup level for lead was used as the human health criterion.

The soil exposure pathway used to develop the criteria for soil was ingestion, which was considered to represent the greatest potential for human health risk. Other potential pathways for the constituents detected in soil are inhalation of airborne soil particulates and ingestion of biota that have taken up those constituents from the soil. Constituents in soil at SWMU9 may also be transported by stormwater runoff and by infiltration/percolation to ground-water, with subsequent discharge to surface water of the adjacent wetland. Potentially complete exposure pathways include ingestion of and dermal contact with ground-water, surface water, and sediment

5.5.7.2 Environmental Assessment

Transport Mechanisms and Exposure Pathways

Potential transport mechanisms and complete exposure pathways for ecological receptors

TABLE 5-17A
COMPARISON OF INDIVIDUAL CONSTITUENT CONCENTRATIONS
WITH HUMAN HEALTH CRITERIA
SWMU9(FST-009) - EOD AREA

Exposure Medium	Units	Constituent Released	Release Concentration	Criterion Type Used	Criterion Value	Release Concentrations Exceed Criterion?
SOIL	mg/kg	Arsenic	2.56E+01	C	4.00E-01	Yes
		Barium	5.90E+00	NC	5.60E+03	No
		Cadmium	6.90E+00	NC	8.00E+01	No
		Chromium	2.00E+01	NC	4.00E+02	No
		Lead	7.45E+00	EPA	5.00E+02	No
		Silver	1.37E+01	NC	4.00E+02	No

* Release concentration represents the maximum detected concentration for each constituent.

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

are the same as those described in Section 5.5.7.1 for human receptors. 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 soil at SWMU9 were found to be of concern based on comparison to human toxicity criteria, therefore, this medium was 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, to include uptake from soil by biota and contact with surface water and sediment of the adjacent wetland.

5.5.8 Potential for Phase II Investigation

As stated in Section 5.5.6, the analytical results indicate that a release may have occurred at SWMU9. 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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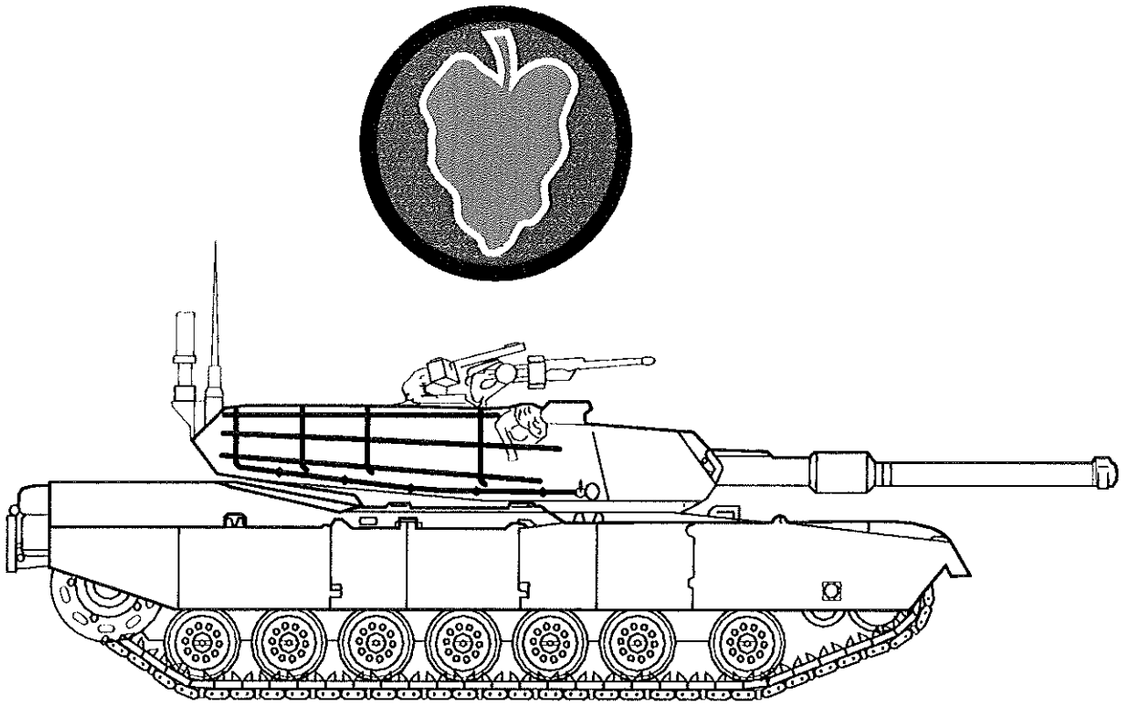
Volume III of III



May 1996

Job No. 87528.000

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May 1996

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

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

U.S. Army Corps of Engineers
100 West Oglethorpe Ave.
Savannah, GA 31402
Attn: Toni Nicholson/EN-GH

January 5, 1994

Job Number: AYCC 55571 (Amended)

P.O. Number: DACA21-93-M0762

This is the Certificate of Analysis for the following samples:

Client Project ID:	CESAS FST-009
Date Received by Lab:	11/26/93
Number of Samples:	Seven (7)
Sample Type:	Soil

I. Introduction

On 11/26/93, seven (7) soil samples arrived at the ITAS-Knoxville, Tennessee, laboratory from U. S. Army Corps of Engineers, Cincinnati, Ohio, in support of the CESAS FST-009 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 was amended to reflect the associated QC ran on project ITEK 55490.

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 12/07/93. No problems were encountered.

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 55571

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: Method Blank
Lab Sample ID: F1993

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: 12/07/93

This Method Blank applies to samples: F1994 MS, AB2312, AB2313, AB2314, AB2315, AB2316, AB2317, AB2318

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 555

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: Method Spike
Lab Sample ID: F1994

Compounds	Results
HMX	0.52
RDX	0.62
1,3,5-trinitrobenzene	0.49
1,3-dinitrobenzene	0.53
tetryl	0.46
nitrobenzene	0.59
2,4,6-trinitrotoluene	0.44
2,6-dinitrotoluene	0.48
2,4-dinitrotoluene	0.57
2-nitrotoluene	0.49
3-nitrotoluene	0.60
4-nitrotoluene	0.50

Analysis Date: 12/07/93

U-440

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 55571

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-009-SS1-11-93
Lab Sample ID: AB2312

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: 12/07/93

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

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amend
Job Number AYCC 55

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-009-SS2-11-93
Lab Sample ID: AB2313

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: 12/07/93

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

C1-442

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 55571

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-009-SS3-11-93
Lab Sample ID: AB2314

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: 12/07/93

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

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amend-
Job Number AYCC 5

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-009-SS4-11-93
Lab Sample ID: AB2315

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: 12/07/93

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

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 55571

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-009-SS5-11-93
Lab Sample ID: AB2316

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: 12/07/93

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

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 555

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-009-SS5-DUP-11-93
Lab Sample ID: AB2317

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: 12/07/93

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

A-446

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 55571

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: FST-009-SS6-11-93
Lab Sample ID: AB2318

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: 12/07/93

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

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amend
Job Number AYCC 55

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: 8004-MD (ITEK 55490)
Lab Sample ID: AB1302

Compounds	Results
HMX	0.71
RDX	0.73
1,3,5-trinitrobenzene	0.59
1,3-dinitrobenzene	0.66
tetryl	0.41
nitrobenzene	0.76
2,4,6-trinitrotoluene	0.56
2,6-dinitrotoluene	0.60
2,4-dinitrotoluene	0.75
2-nitrotoluene	0.62
3-nitrotoluene	0.71
4-nitrotoluene	0.63

Analysis Date: 12/04/93

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

(Amended)
Job Number AYCC 55571

NITROEXPLOSIVES ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: 8004-MS (ITEK 55490)
Lab Sample ID: AB1301

Compounds	Results
HMX	0.66
RDX	0.60
1,3,5-trinitrobenzene	0.57
1,3-dinitrobenzene	0.60
tetryl	0.41
nitrobenzene	0.72
2,4,6-trinitrotoluene	0.72
2,6-dinitrotoluene	0.80
2,4-dinitrotoluene	0.77
2-nitrotoluene	0.68
3-nitrotoluene	0.66
4-nitrotoluene	0.62

Analysis Date: 12/04/93

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amend
Job Number AYCC 55

SOIL/WATER SURROGATE PERCENT RECOVERY SUMMARY

		EXPLOSIVES
Client Sample ID	Lab Sample ID	4-Nitrotoluene (21-178%)
Method Blank	F1993	118
Method Spike	F1994	N/A
FST-009-SS1-11-93	AB2312	89
FST-009-SS2-11-93	AB2313	88
FST-009-SS3-11-93	AB2314	94
FST-009-SS4-11-93	AB2315	75
FST-009-SS5-11-93	AB2316	89
FST-009-SS5-DUP-11-93	AB2317	88
FST-009-SS6-11-93	AB2318	92

U.S. Army Corp of Engineers
January 5, 1994

Client Project ID: CESAS FST-009

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
(Amended)
Job Number AYCC 55571

SPIKED BLANK ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: Blank Spike
Lab Sample ID: F1994

Compound	Conc. Spike Added	Conc. Blank Spike	% Rec.
HMX	0.78	0.52	67
RDX	0.72	0.62	86
1,3,5-trinitrobenzene	0.72	0.49	68
1,3-dinitrobenzene	0.72	0.53	74
tetryl	0.78	0.46	59
nitrobenzene	0.84	0.59	70
2,4,6-trinitrotoluene	0.72	0.44	61
2,6-dinitrotoluene	0.72	0.48	67
2,4-dinitrotoluene	0.78	0.57	73
2-nitrotoluene	0.78	0.49	63
4-nitrotoluene	0.72	0.50	69
3-nitrotoluene	0.84	0.60	71

Anlaysis Date: 12/07/93

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY ANALYSIS

Results in mg/kg (ppm)

Sample Matrix: Soil

Client Sample ID: 8004 (ITEK 55490)
Lab Sample ID: AB1300, AB1301 MS, AB1302 MSD

Compound	Sample Result	Conc. Spike Added	Conc. MS	% Rec.	Conc. MSD	% Rec.	RPD
HMX	0.29 U	0.78	0.66	85	0.71	91	7
RDX	0.42 U	0.72	0.6	83	0.73	101	20
1,3,5-trinitrobenzene	0.25 U	0.72	0.57	79	0.59	82	3
1,3-dinitrobenzene	0.25 U	0.72	0.6	83	0.66	92	10
tetryl	0.65 U	0.78	0.41	53	0.41	53	0
nitrobenzene	0.26 U	0.84	0.72	86	0.76	90	5
2,4,6-trinitrotoluene	0.25 U	0.72	0.72	100	0.56	78	25
2,6-dinitrotoluene	0.26 U	0.72	0.8	111	0.6	83	29
2,4-dinitrotoluene	0.25 U	0.78	0.77	99	0.75	96	3
2-nitrotoluene	0.25 U	0.78	0.68	87	0.62	79	9
4-nitrotoluene	0.22 U	0.72	0.62	86	0.63	88	2
3-nitrotoluene	0.22 U	0.84	0.66	79	0.71	85	7

IT LABORATORIES

CHAIN OF CUSTODY RECORD

ARC 5557

Client CESAS | Project No. FST-009

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

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

Collected By Jason 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-009-SS1-11-93	FST-009	FT STEWART	11/22/93 11:55		X		S		1	N	EXPLOSIVE RESIDUE 8330 BJB 11/26/93 6°C ok
FST-009-SS2-11-93	"	"	11/22/93 12:10		X		S		1	N	"
FST-009-SS3-11-93	"	"	11/22/93 12:15		X		S		1	N	"
FST-009-SS4-11-93	"	"	11/22/93 12:27		X		S		1	N	"
FST-009-SS5-11-93	"	"	11/22/93 12:30		X		S		1	N	"
FST009-SS5 DP 11-93	"	"	11/22/93 12:30		X		S		1	N	"
FST-009-SS6-11-93	"	"	11/22/93 12:40		X		S		1	N	"

SS4-D

Relinquished By	Received By	Date	Time
1.	~~Bryan Blomquist~~	11/23/93	11:30
2.	~~Bryan Blomquist~~	~~11/24/93~~	~~8:45~~ BJB 11/26/93
3.			
Received In Lab By	Bryan Blomquist	11/26/93	8:45

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

James H. Carr & Associates, Inc.

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

12/14/93

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-009 samples listed below.

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/22/93 In House # 11-8522-93 Source: SS1-11-93 Location: FT.STEWART							
Metals Sample Prep - nonaqueous	JN	12/03/93	17:00	0.000		0.00	
Lab pH	TW	11/26/93	09:50	5.230	pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/26/93	10:00	49.800	umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	GEL	12/07/93	19:11	< 2.500	mg/kg	2.50 mg/kg	206.2
Selenium - solid	GEL	12/07/93	14:04	< 2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	CW	12/09/93	17:49	2.800	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	CW	12/09/93	17:49	< 1.000	mg/kg	1.00 mg/kg	200.7
Chromium - solid	CW	12/13/93	14:04	< 2.500	mg/kg	2.50 mg/kg	200.7
Lead - solid	GEL	12/07/93	21:45	< 2.500	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	12/09/93	17:49	13.700	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	12/02/93	15:30	< 0.020	mg/kg	0.02 mg/kg	245.5
% Solids	MB	12/06/93	09:00	99.700	%	0.01 %	160.3
Chloroethane - solid	JCF	12/04/93	09:15	< 10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	12/04/93	09:15	< 10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	12/04/93	09:15	< 10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	12/04/93	09:15	< 10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	12/04/93	09:15	< 10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	12/04/93	09:15	< 10.000	ug/kg	10.00 ug/kg	8240
Bromoform - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	12/04/93	09:15	< 0.200	mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	JCF	12/04/93	09:15	< 5.000	ug/kg	5.00 ug/kg	8240
Xylene - solid	JCF	12/04/93	09:15	< 10.000	ug/kg	10.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/22/93 In House # 11-8522-93		Source: SS1-11-93		Location: FT.STEWART			
		- CONTINUED -					
2-Butanone - solid	JCF	12/04/93 09:15	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	12/04/93 09:15	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	12/04/93 09:15	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	12/04/93 09:15	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	12/04/93 09:15	<	5.000	ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	JCF	12/04/93 09:15	<	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 15:32.

Sample Date: 11/22/93 In House # 11-8523-93		Source: SS2-11-93		Location: FT.STEWART			
Metals Sample Prep - nonaqueous	JN	12/03/93 17:00		0.000		0.00	
Lab pH	TW	11/26/93 09:50		5.380	pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/26/93 10:00		5.000	umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	GEL	12/07/93 19:18	<	2.500	mg/kg	2.50 mg/kg	206.2
Selenium - solid	GEL	12/07/93 14:09	<	2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	CW	12/09/93 17:54		9.100	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	CW	12/09/93 17:54	<	1.000	mg/kg	1.00 mg/kg	200.7
Chromium - solid	CW	12/13/93 14:04	<	2.500	mg/kg	2.50 mg/kg	200.7
Lead - solid	GEL	12/07/93 21:51		6.210	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	12/09/93 17:54	<	2.500	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	12/02/93 15:30	<	0.020	mg/kg	0.02 mg/kg	245.5
% Solids	MB	12/06/93 09:00		99.300	%	0.01 %	160.3
Chloroethane - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Bromoform - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
Carbon tetrachloride - solid	JCF	12/04/93 09:16	<	0.200	mg/kg	0.20 mg/kg	8240
Xylene - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
2-Butanone - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	12/04/93 09:16	<	10.000	ug/kg	10.00 ug/kg	8240
2-Hexanone - solid	JCF	12/04/93 09:16	<	5.000	ug/kg	5.00 ug/kg	8240
	JCF	12/04/93 09:16	<	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 15:59.

Sample Date: 11/22/93 In House # 11-8524-93 Source: SS3-11-93 Location: FT.STEWART

Metals Sample Prep - nonaqueous	JN	12/03/93	17:00		0.000	0.00	
Lab pH	TW	11/26/93	09:50		7.100 pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/26/93	10:00		4.500 umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	GEL	12/07/93	19:21		25.600 mg/kg	2.50 mg/kg	206.2
Selenium - solid	GEL	12/07/93	14:14	<	2.500 mg/kg	2.50 mg/kg	270.2
Barium - solid	CW	12/09/93	17:58		5.900 mg/kg	2.50 mg/kg	200.7
Cadmium - solid	CW	12/09/93	17:58	<	1.000 mg/kg	1.00 mg/kg	200.7
Chromium - solid	CW	12/13/93	14:11		20.000 mg/kg	2.50 mg/kg	200.7
Lead - solid	GEL	12/07/93	21:57		6.700 mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	12/09/93	17:58	<	2.500 mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	12/02/93	15:30	<	0.020 mg/kg	0.02 mg/kg	245.5
% Solids	MB	12/06/93	09:00		99.200 %	0.01 %	160.3
Chloroethane - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Bromoform - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	12/04/93	09:17	<	0.200 mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
Xylene - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
2-Butanone - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	12/04/93	09:17	<	10.000 ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	12/04/93	09:17	<	5.000 ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	JCF	12/04/93	09:17	<	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 16:26.

Sample Date: 11/22/93 In House # 11-8525-93 Source: SS4-11-93 Location: FT.STEWART

Metals Sample Prep - nonaqueous	JN	12/03/93	17:00		0.000	0.00	
Lab pH	TW	11/26/93	09:50		7.000 pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/26/93	10:00		10.600 umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	GEL	12/07/93	19:28		5.020 mg/kg	2.50 mg/kg	206.2
Selenium - solid	GEL	12/07/93	14:19	<	2.500 mg/kg	2.50 mg/kg	270.2
Barium - solid	CW	12/09/93	18:03	<	2.500 mg/kg	2.50 mg/kg	200.7
Cadmium - solid	CW	12/09/93	18:03	<	1.000 mg/kg	1.00 mg/kg	200.7
Chromium - solid	CW	12/13/93	14:12	<	2.500 mg/kg	2.50 mg/kg	200.7
Lead - solid	GEL	12/07/93	22:03		5.020 mg/kg	2.50 mg/kg	239.2

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/22/93 In House # 11-8525-93		Source: SS4-11-93		Location: FT.STEWART			
		- CONTINUED -					
Silver - solid	CW	12/09/93 18:03	<	2.500 mg/kg		2.50 mg/kg	200.7
Mercury - solid	VTB	12/02/93 15:30	<	0.020 mg/kg		0.02 mg/kg	245.5
% Solids	MB	12/06/93 09:00		99.800 %		0.01 %	160.3
Chloroethane - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
Chloromethane - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
Bromomethane - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
Methylene Chloride - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Trichloroethene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Benzene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Bromoform - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Toluene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Chlorobenzene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Ethylbenzene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Chloroform - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Acetone - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
Carbon tetrachloride - solid	JCF	12/04/93 09:17	<	0.200 mg/kg		0.20 mg/kg	8240
Xylene - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
2-Butanone - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
Styrene - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	12/04/93 09:17	<	10.000 ug/kg		10.00 ug/kg	8240
2-Hexanone - solid	JCF	12/04/93 09:17	<	5.000 ug/kg		5.00 ug/kg	8240
	JCF	12/04/93 09:17	<	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 16:53.

Sample Date: 11/22/93 In House # 11-8526-93		Source: SS5-11-93		Location: FT.STEWART			
Metals Sample Prep - nonaqueous	JN	12/03/93 17:00		0.000		0.00	
Lab pH	TW	11/26/93 09:50		6.300 pH Units		0.00 pH Units	150.1
Lab Conductivity	TW	11/26/93 10:00		2.500 umhos/cm		1.00 umhos/cm	120.1
Arsenic - solid	GEL	12/07/93 19:44	<	2.500 mg/kg		2.50 mg/kg	206.2
Selenium - solid	GEL	12/07/93 14:36	<	2.500 mg/kg		2.50 mg/kg	270.2
Barium - solid	CW	12/09/93 18:16		3.900 mg/kg		2.50 mg/kg	200.7
Cadmium - solid	CW	12/09/93 18:16	<	1.000 mg/kg		1.00 mg/kg	200.7
Chromium - solid	CW	12/13/93 14:14		4.600 mg/kg		2.50 mg/kg	200.7
Lead - solid	GEL	12/07/93 22:20		2.840 mg/kg		2.50 mg/kg	239.2
Silver - solid	CW	12/09/93 18:16	<	2.500 mg/kg		2.50 mg/kg	200.7
Mercury - solid	VTB	12/02/93 15:30	<	0.020 mg/kg		0.02 mg/kg	245.5
% Solids	MB	12/06/93 09:00		99.800 %		0.01 %	160.3
Chloroethane - solid	JCF	12/04/93 09:18	<	10.000 ug/kg		10.00 ug/kg	8240
Chloromethane - solid	JCF	12/04/93 09:18	<	10.000 ug/kg		10.00 ug/kg	8240
Bromomethane - solid	JCF	12/04/93 09:18	<	10.000 ug/kg		10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	12/04/93 09:18	<	10.000 ug/kg		10.00 ug/kg	8240
Methylene Chloride - solid	JCF	12/04/93 09:18	<	5.000 ug/kg		5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	12/04/93 09:18	<	10.000 ug/kg		10.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/22/93 In House # 11-8526-93		Source: SS5-11-93		Location: FT.STEWART			
		- CONTINUED -					
1,1-Dichloroethene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Bromoform - solid	JCF	12/04/93 09:18	<	10.000	ug/kg	10.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
Carbon tetrachloride - solid	JCF	12/04/93 09:18	<	0.200	mg/kg	0.20 mg/kg	8240
Xylene - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
2-Butanone - solid	JCF	12/04/93 09:18	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	12/04/93 09:18	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	12/04/93 09:18	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	12/04/93 09:18	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	12/04/93 09:18	<	10.000	ug/kg	10.00 ug/kg	8240
2-Hexanone - solid	JCF	12/04/93 09:18	<	5.000	ug/kg	5.00 ug/kg	8240
	JCF	12/04/93 09:18	<	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 17:19.

Sample Date: 11/22/93 In House # 11-8527-93 Source: SEECOMMENT Location: FT.STEWART

Metals Sample Prep - nonaqueous	JN	12/03/93 17:00		0.000		0.00	
Arsenic - solid	GEL	12/07/93 19:49	<	2.500	mg/kg	2.50 mg/kg	206.2
Selenium - solid	GEL	12/07/93 14:41	<	2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	CW	12/09/93 18:21		19.000	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	CW	12/09/93 16:21		6.900	mg/kg	1.00 mg/kg	200.7
Chromium - solid	CW	12/13/93 14:15		7.800	mg/kg	2.50 mg/kg	200.7
Lead - solid	GEL	12/07/93 22:29		85.700	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	12/09/93 16:21	<	2.500	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	12/02/93 15:30	<	0.020	mg/kg	0.02 mg/kg	245.5
% Solids	MB	12/06/93 09:00		99.600	%	0.01 %	160.3
Chloroethane - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/22/93 In House # 11-8527-93		Source: SEECOMMENT		Location: FT.STEWART			
		- CONTINUED -					
Cis-1,3-Dichloropropene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Bromoform - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Ethylbenzene - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	12/04/93 09:19	<	0.200	mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
Xylene - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
2-Butanone - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	12/04/93 09:19	<	5.000	ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	JCF	12/04/93 09:19	<	10.000	ug/kg	10.00 ug/kg	8240

Comments:
Source: SS5-DUP-11-93, Location: Ft. Stewart.
Analytical results are reported on a wet-weight basis.

The volatile run was initiated at 17:46.

Sample Date: 11/22/93 In House # 11-8528-93 Source: SS6-11-93 Location: FT.STEWART

Metals Sample Prep - nonaqueous	JN	12/03/93 17:00		0.000		0.00	
Lab pH	TW	11/26/93 09:50		6.200	pH Units	0.00 pH Units	150.1
Lab Conductivity	TW	11/26/93 10:00		2.700	umhos/cm	1.00 umhos/cm	120.1
Arsenic - solid	GEL	12/07/93 19:56	<	2.500	mg/kg	2.50 mg/kg	206.2
Selenium - solid	GEL	12/07/93 14:46	<	2.500	mg/kg	2.50 mg/kg	270.2
Barium - solid	CW	12/09/93 18:25	<	2.500	mg/kg	2.50 mg/kg	200.7
Cadmium - solid	CW	12/09/93 18:25	<	1.000	mg/kg	1.00 mg/kg	200.7
Chromium - solid	CW	12/13/93 14:17	<	2.500	mg/kg	2.50 mg/kg	200.7
Lead - solid	GEL	12/07/93 22:36		7.450	mg/kg	2.50 mg/kg	239.2
Silver - solid	CW	12/13/93 18:25		6.000	mg/kg	2.50 mg/kg	200.7
Mercury - solid	VTB	12/02/93 15:30	<	0.020	mg/kg	0.02 mg/kg	245.5
% Solids	MB	12/06/93 09:00		99.800	%	0.01 %	160.3
Chloroethane - solid	JCF	12/04/93 09:31	<	10.000	ug/kg	10.00 ug/kg	8240
Chloromethane - solid	JCF	12/04/93 09:31	<	10.000	ug/kg	10.00 ug/kg	8240
Bromomethane - solid	JCF	12/04/93 09:31	<	10.000	ug/kg	10.00 ug/kg	8240
Vinyl Chloride - solid	JCF	12/04/93 09:31	<	10.000	ug/kg	10.00 ug/kg	8240
Methylene Chloride - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Trichlorofluoromethane - solid	JCF	12/04/93 09:31	<	10.000	ug/kg	10.00 ug/kg	8240
1,1-Dichloroethene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
1,1-Dichloroethane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,2-Dichloroethene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloroethane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,1-Trichloroethane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Bromodichloromethane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
1,2-Dichloropropane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Trans 1,3-Dichloropropene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Trichloroethene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Dibromochloromethane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2-trichloroethane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Cis-1,3-Dichloropropene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Benzene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
2-Chloroethylvinyl ether - solid	JCF	12/04/93 09:31	<	10.000	ug/kg	10.00 ug/kg	8240
Bromoform - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
1,1,2,2,-Tetrachloroethane - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Tetrachloroethene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Toluene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240
Chlorobenzene - solid	JCF	12/04/93 09:31	<	5.000	ug/kg	5.00 ug/kg	8240

Parameter	Analyst	Analysis Date -- Time		Results	Units	Lowest Detectable Level	Method Number
Sample Date: 11/22/93 In House # 11-8528-93		Source: SS6-11-93 - CONTINUED -		Location: FT.STEWART			
Ethylbenzene - solid	JCF	12/04/93	09:31	< 5.000	ug/kg	5.00 ug/kg	8240
Chloroform - solid	JCF	12/04/93	09:31	< 5.000	ug/kg	5.00 ug/kg	8240
Acetone - solid	JCF	12/04/93	09:31	< 0.200	mg/kg	0.20 mg/kg	8240
Carbon tetrachloride - solid	JCF	12/04/93	09:31	< 5.000	ug/kg	5.00 ug/kg	8240
Xylene - solid	JCF	12/04/93	09:31	< 10.000	ug/kg	10.00 ug/kg	8240
2-Butanone - solid	JCF	12/04/93	09:31	< 10.000	ug/kg	10.00 ug/kg	8240
Vinyl Acetate - solid	JCF	12/04/93	09:31	< 10.000	ug/kg	10.00 ug/kg	8240
4-methyl-2 pentanone - solid	JCF	12/04/93	09:31	< 10.000	ug/kg	10.00 ug/kg	8240
Styrene - solid	JCF	12/04/93	09:31	< 10.000	ug/kg	10.00 ug/kg	8240
Carbon Disulfide - solid	JCF	12/04/93	09:31	< 5.000	ug/kg	5.00 ug/kg	8240
2-Hexanone - solid	JCF	12/04/93	09:31	< 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 18:39.

Laboratory ID # 40111

Very truly yours,

James H. Carr, Jr.
Chemist

FT. STEWART Number Key
JOB NUMBER FST-009

Carr Lab No.	FT STEWART ID
11-8522-93	SS1-11-93
11-8523-93	SS2-11-93
11-8524-93	SS3-11-93
11-8525-93	SS4-11-93
11-8526-93	SS5-11-93
11-8527-93	SS5-DUP-11-93
11-8528-93	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:

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

QUALITY CONTROL FOR LEAD ANALYSIS

SAMPLES NUMBERED: 11-8522-93 through 11-8528-93 analyzed 12/07/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
12/07/93	WP28-2					150	172	115
12/07/93	DIG.STD.					100	110	110
12/07/93	8528*	45.8	46.1	0.6	15.0	47.8	45.8	87

* Indicates a spiked duplicate sample.

QUALITY CONTROL FOR ARSENIC ANALYSIS

SAMPLES NUMBERED: 11-8522-93 through 11-8528-93 analyzed 12/07/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
12/07/93	WP28-2					460	465	101
12/07/93	DIG.STD.					100	105	105
12/07/93	8528*	21.1	20.9	1.0	15.0	21.3	21.1	99

QUALITY CONTROL FOR SELENIUM ANALYSIS

SAMPLES NUMBERED: 11-8522-93 through 11-8528-93 analyzed 12/07/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
12/07/93	WP28-2					55.0	65.0	118
12/07/93	DIG.STD.					100	102	102
12/07/93	8828*	13.7	14.3	4.3	15.0	15.0	14.3	95

C1-4624

QUALITY CONTROL FOR ICP ANALYSIS

SAMPLES NUMBERED: 11-8522-93 through 11-8528-93 analyzed on 12/09/93.
SAMPLES NUMBERED: 11-8522-93 through 11-8528-93 analyzed for Cr on 12/13/93.

Date	Elem	QC Sample Number	Val. 1 (mg/l)	Val. 2 (mg/l)	% RPD	Spike Conc.	True Value	Obs. Val	Percent Recovery
12/09/93	Ag	ICP-07					1.00	0.940	99
12/09/93	Ba	ICP-07					1.00	1.03	99
12/09/93	Cd	ICP-19					1.00	0.960	85
12/09/93	Ag	8525	0.089	0.091	2.2				
12/09/93	Ag	6828	0.225			0.20	0.20	0.225	112
12/09/93	Ba	8525	0.223	0.212	5.1	0.20	0.219	0.212	97
12/09/93	Cd	8525	0.187	0.175	6.6	0.20	0.20	0.187	94
12/09/93	Ag	CHK.STD	2.80	3.18	12.7		3.00	2.80	93
12/09/93	Ba	CHK.STD	3.04	2.87	5.8		3.00	3.04	101
12/09/93	Cd	CHK.STD	2.92	2.61	11.2		3.00	2.92	97
12/13/93	Cr	ICP-19					0.10	0.979	98
12/13/93	Cr	212*	0.182	0.150	19.3	0.20	0.20	0.182	91

QUALITY CONTROL FOR MERCURY ANALYSIS

SAMPLES NUMBERED: 11-8522-93 through 11-8528-93 analyzed 12/02/93;

Date	QC Sample Number	Val. 1 (ug/l)	Val. 2 (ug/l)	% RPD	Spike Conc.	True Value	Observed Value	Percent Recovery
12/02/93	EPA KNOWN					2.00	1.77	89
12/02/93	8524	0.84	1.11	27.7	1.0	1.00	1.11	111
12/02/93	78,79*	1.11	1.37	21.0	1.0	1.00	1.11	111

11-465

QUALITY CONTROL FOR VOLATILES

SAMPLES NUMBERED: 11-8522-93 through 11-8528-93 analyzed 12/04/93;

DATE: 12/04/93
SPIKE QC SAMPLE NUMBER: 11850193 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	48.3	~~5.2~~ 19.0	50	50	48.3	97
Trichloroethene	44.1	60.5	31.4	50	50	44.1	88
Benzene	46.1	62.2	19.8	50	50	46.1	92
Toluene	38.0	50.9	29.0	50	50	50.9	102
Chlorobenzene	44.5	50.0	11.6	50	50	50.0	100

C1-4726

BLANK DATA FOR VOLATILES

All analytes on all dates <5 ug/L.

SURROGATE RECOVERIES FOR VOLATILES, PERCENT RECOVERY

Sample Date	Sample Number	1,2 dichloro-ethane d-4	Toluene d-8	Bromofloro benzene
12/04/93	BLANK	85	97	71
12/04/93	11-8501-93	80	90	67
12/04/93	11-8501SPK	80	96	68
12/04/93	11-8501SPKDUP	93	86	72
12/04/93	11-8522-93	95	98	84
12/04/93	11-8523-93	115	120	103
12/04/93	11-8524-93	99	106	90
12/04/93	11-8525-93	108	106	92
12/04/93	11-8526-93	91	101	85
12/04/93	11-8527-93	110	102	82
12/04/93	11-8528-93	122	120	103

CARR LABORATORIES

CHAIN OF CUSTODY RECORD

Client: CESAS
Contact: Toni Nicholson
Address: P.O. Box 889, Sav. Ga. 31402
Collected By: Judson Smith

Project No.: FST-009
Phone No.: 912-652-5312
Fax No.: 912-652-5311
Client P.O.#: ___

MT (Matrix Type)
L=Liquid
S=Soil (circled)
O=Oil
X=Other

AP (Analytical Program)
W=Wastewater
G=Groundwater
D=Drinking Water
S=Solid/Haz. Waste (circled)
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-009-SS1-11-93	FST-009	Ft Stewart	11/22/93 / 11:55		X		S		3	N	pH, SPC, VOC 8240, RCRA METALS 11-8522-93
FST-009-SS2-11-93	"	"	11/22/93 / 12:10		Y		S		3	N	" " " " 8523
FST-009-SS3-11-93	"	"	11/22/93 / 12:15		X		S		3	N	" " " " 8524
FST-009-SS4-11-93	"	"	11/22/93 / 12:22		X		S		3	N	" " " " 8525
FST-009-SS5-11-93	"	"	11/22/93 / 12:30		X		S		3	N	" " " " 8526
FST-009-SS5 Dup-11-93	"	"	11/22/93 / 12:30		X		S		2	N	VOC 8240, RCRA METALS 8527
FST-009-SS6-11-93	"	"	11/22/93 / 12:40		X		S		3	N	pH, SPC, VOC 8240, RCRA METALS 8528

temp of vial = 16°C - ice visible

Relinquished By	Received By	Date	Time
1. [signature]	[signature] Henry Barton	11/23/93	15:40
2. Henry Barton	[signature]	11/23/93	1945
3.			
Received In Lab By	[signature]	11-23-93	1945

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Columbia, South Carolina 29290
(803) 776-7789 Fax: 783-2192

U-467

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.