OhioEPA
State of Ohio Environmental Protection Agency

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May 5, 1999

Completion of Partial Closure
Ravenna Arsenal Ammunition Plant (RVAAP)
Ravenna, Ohio
Building 1601 & Open Burning Ground (OBG)
U.S. EPA ID No.: OH5 210 020 736

U.S. Army Ravenna Arsenal Ammunition Plant
Attn: Mr. Mark Patterson
8451 State Route 5
Ravenna, Ohio 44266

Dear Mr. Patterson:

According to Ohio EPA records, on February 12, 1998, the Director of the Ohio EPA approved closure plans for the hazardous waste storage area (Building 1601) and the open burning ground area (OBG) of the Ravenna Arsenal Ammunition Plant (RVAAP). The facility is located at 8451 State Route 5 in Ravenna, Ohio. The Ohio EPA has also received certification documents stating that the units have been closed according to the specifications in the approved closure plan. Ohio EPA District Office personnel completed a closure inspection on April 15, 1999.

Based on this inspection, the Ohio EPA has determined that Building 1601 and OBG have been closed in accordance with the approved closure plan and Rules 3745-66-12 through 3745-66-15 of the Ohio Administrative Code (OAC). RVAAP remains a hazardous waste treatment, storage and disposal (TSD) facility.

If you have any questions concerning the closure process or the current status of the facility, please contact the Ohio EPA, Northeast District Office, Attn: Gregory Orr, 2110 E. Aurora Road, Twinsburg, Ohio 44087, tel: 330-425-9179.

Sincerely yours,

Thomas E. Crepeau

Thomas E. Crepeau, Manager
Data Management Section
Division of Hazardous Waste Management

cc: Stephanie McClure, DHWM
Gregory Orr, DHWM, NEDO

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MAY 07 1999
OHIO EPA NEDO

Ravenna Army Ammunition Plant
Closure Plan Certification
For The
Open Burning Ground Facility

I certify that the Report of Closure Activities for the Open Burning Ground Facility, Ravenna Army Ammunitions Plant (RVAAP), Ravenna Ohio was prepared under the direction or supervision of the RVAAP staff in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on the RVAAP staff's inquiry of the person or persons who manage the system, and of those persons directly responsible for performing the project, the information submitted herein is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for intentionally submitting false information, including the possibility of fine and imprisonment for knowing violations.

John A. Cicero, Jr.
RVAAP Commander's Representative

4-1-99
Date

Mark C. Patterson
Mark C. Patterson
RVAAP Environmental Program Manager

4-1-99
Date

FINAL
Report of Closure Activities
Open Burning Ground Facility
Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No. DACA27-97-D-0005
Delivery Order 0008

Prepared for:

U.S. Army Corps of Engineers
Louisville District

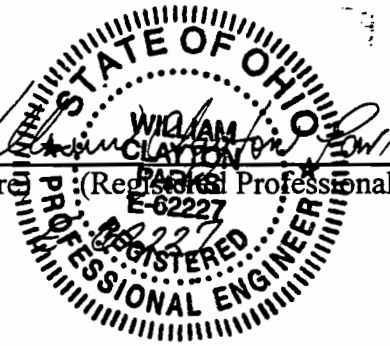
Prepared by:

IT Corporation
312 Directors Drive
Knoxville, Tennessee 37923

February 1999

CLOSURE PLAN CERTIFICATION

I certify under penalty of law that the Report of Closure Activities for Building 1601, Ravenna Army Ammunitions Plant, Ravenna Ohio was prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, and of those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



William Clayton Parks

(Signature) (Registered Professional Engineer)

2-9-99

(Date)

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List of Acronyms

DNB	dinitrobenzene
EPA	U.S. Environmental Protection Agency
FWBC	facility-wide background concentration
HMX	octogen
IDW	investigation-derived waste
IT	IT Corporation
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
OEPA	Ohio Environmental Protection Agency
PPE	personal protective equipment
RCRA	Resource Conservation and Recover Act
RDX	cyclonite
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
TAL	target analyte list
USACE	U.S. Army Corps of Engineers

1.0 Introduction

This report provides a summary of activities performed during the implementation of the *Closure Activities Work Plan, Building 1601, Ravenna Army Ammunition Plant, Ravenna, Ohio* (IT Corporation [IT], 1998). Closure activities at Building 1601 were conducted by IT under a Preplaced Remedial Action Contract (PRAC) with the U.S. Army Corps of Engineers (USACE), Louisville District. Full-time field oversight of the project was provided by Mr. Fred Tschop for the USACE. Site-specific activities began on August 26, 1998 and were completed on September 21, 1998. Overall, closure activities involved removing miscellaneous debris (wooden pallets, refuse drums, and loose dirt and dust) from the building, sampling soils beneath the floor slab and around the building's exterior, and decontaminating the interior of the building. Rinsate samples were collected after completing the interior decontamination; these samples, along with the subsurface soil samples and debris samples, were analyzed for low level explosive compounds, several metals, and cyanide. The remainder of this report presents detailed information concerning closure activities conducted at Building 1601, including the handling and disposition of investigation-derived wastes (IDW) and the discussion of sample analytical results.

All substantive work was performed as outlined in the August 1998 closure activities work plan (IT, 1998) and in accordance with the approved October 1997 *Revised Closure Plan for the Container Storage Unit (Building 1601) Hazardous Waste Treatment Unit* (Science Applications International Corporation [SAIC], 1997). Detailed descriptions of closure activities are provided in the closure activities work plan. Minor amendments to the approved plans are detailed herein.

1.1 Facility Description

The Ravenna Army Ammunition Plant (RVAAP) is located in northeast Ohio, approximately 20 miles east of Akron near the city of Ravenna. The installation covers approximately 21,419 acres, and is 11 miles long and 3.5 miles wide. The facility is located within Portage and Trumbull counties as shown on Figure 1-1. Ordnance production activities at RVAAP began in August of 1940. During its operation, the primary purpose of RVAAP was to load explosives into medium and major caliber artillery ammunition, bombs, mines, fuses, boosters, primers, and percussion elements. Land use surrounding the facility is primarily agricultural with sparse private residence. RVAAP is currently classified as an inactive facility.

Originally, RVAAP was divided into two separate units; one unit is designated as the Portage Ordinance Depot, with its primary mission being storage activity, while the other, designated as

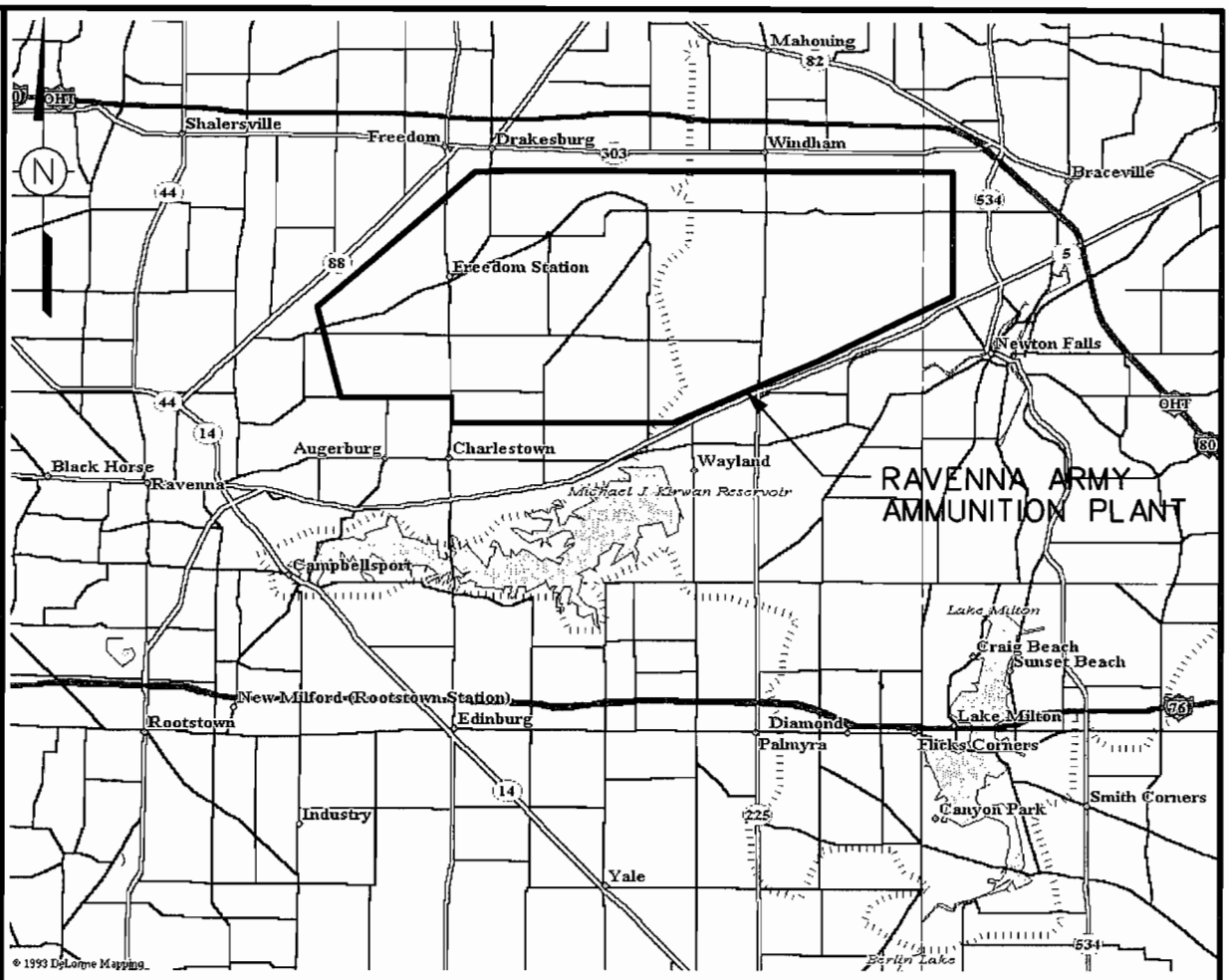

FIGURE 1-1
RAVENNA ARMY AMMUNITION PLANT & VICINITY

U.S. ARMY CORPS OF ENGINEERS
NASHVILE DISTRICT
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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INTERNATIONAL TECHNOLOGY CORPORATION

STARTING DATE: 6/18/98 | DATE LAST REV.: | DRAFT. CHCK. BY: C. TUMLIN | INITIATOR: C. WALLACE | DWG. NO.: \775574ES. 006
DRAWN BY: M. CRAFT | DRAWN BY: | ENGR. CHCK. BY: | PROJ. MGR.: C. SHAFER | PROJ. NO.: 775574

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the Ravenna Ordnance Plant, has a primary mission of munitions loading. Over the years, RVAAP has handled and stored strategic and critical materials for various government agencies, as well as received, stored, and maintained the capabilities to load, assemble, and pack military ammunition. Currently, these operations are inactive.

1.2 Site Description

The RVAAP facility operated a Resource Conservation and Recovery Act (RCRA) storage facility identified as Building 1601, which is located just off D Road in the central portion of the Base (Figure 1-2). Building 1601 consists of a 440-square foot structure constructed entirely of concrete (Figure 1-3) (Appendix A, Photo 1). The structure was previously covered by soil. Available as-built drawings indicate that the floor of Building 1601 is constructed on 3.5 feet of fill material.

Building 1601 was used as a RCRA storage facility beginning in March of 1984. This facility was used in conjunction with RVAAP's demilitarization by open ground burning, and open detonation of munitions. Dry ash material generated from the open burning was placed into 55-gallon drums and stored at this facility. Fifty-five-gallon drums of dry spent activated carbon used to treat explosive-contaminated water were also stored at Building 1601. According to available information, the drums were stored on pallets and stacked three-high. Storage activities of RCRA waste at Building 1601 were discontinued in April 1994, although several wooden pallets and one drum containing general refuse (newspaper, cardboard, plastic six-pack rings, and unused glass amber bottles) and labeled "trash" were still stored at the facility when closure activities began.

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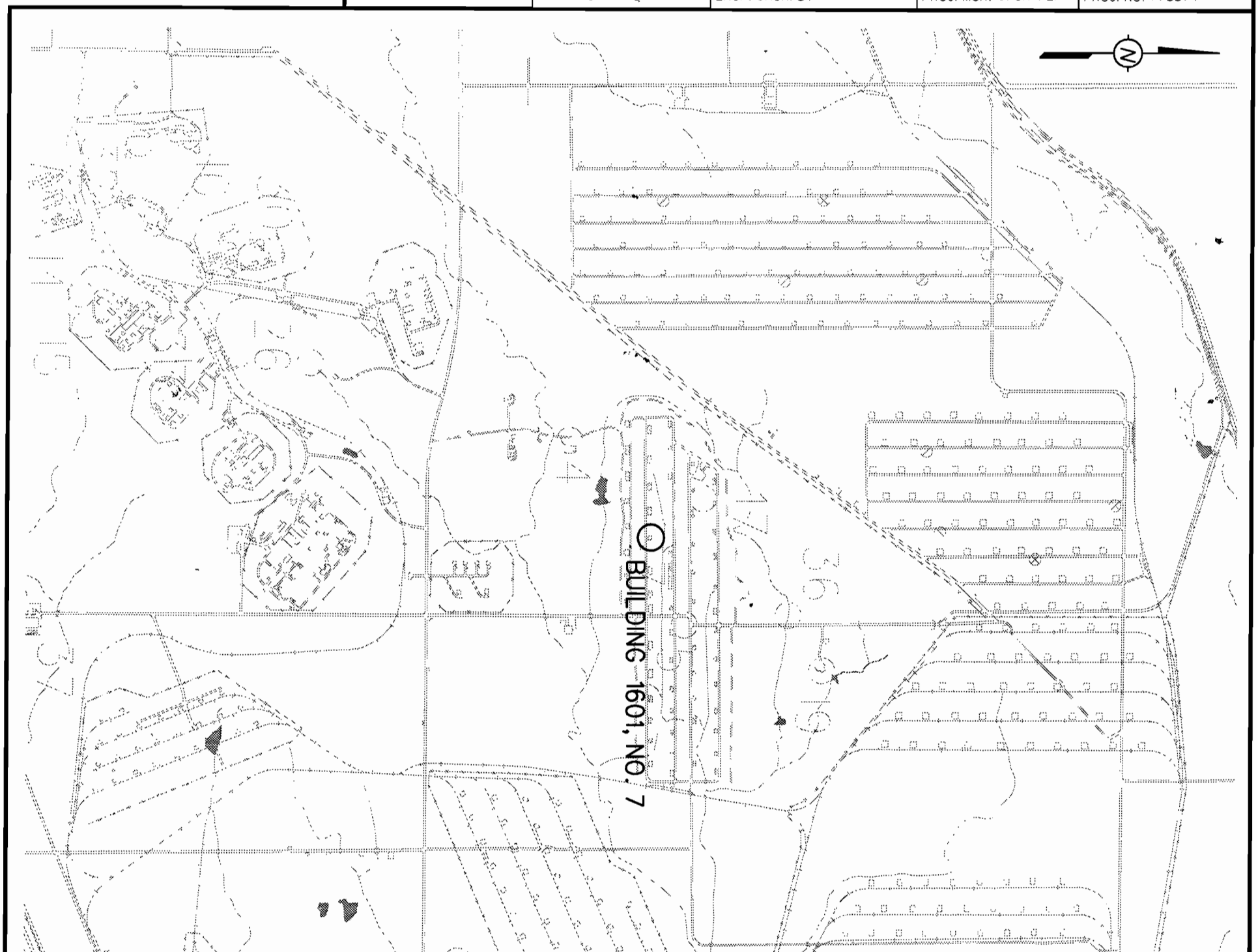

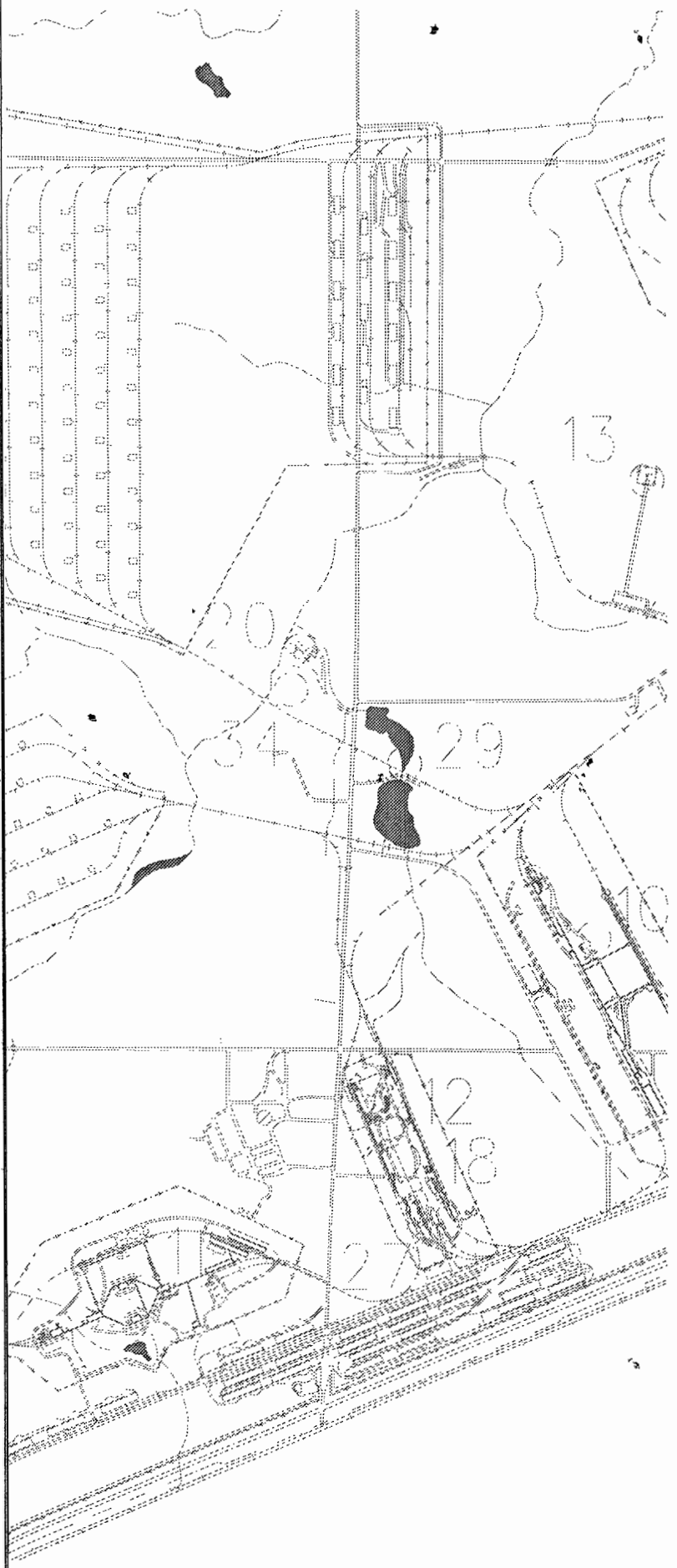

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FIGURE 1-2
SITE LOCATION
BUILDING 1601

U.S. ARMY CORPS OF ENGINEERS
NASHVILLE DISTRICT
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

IT *INTERNATIONAL TECHNOLOGY CORPORATION*

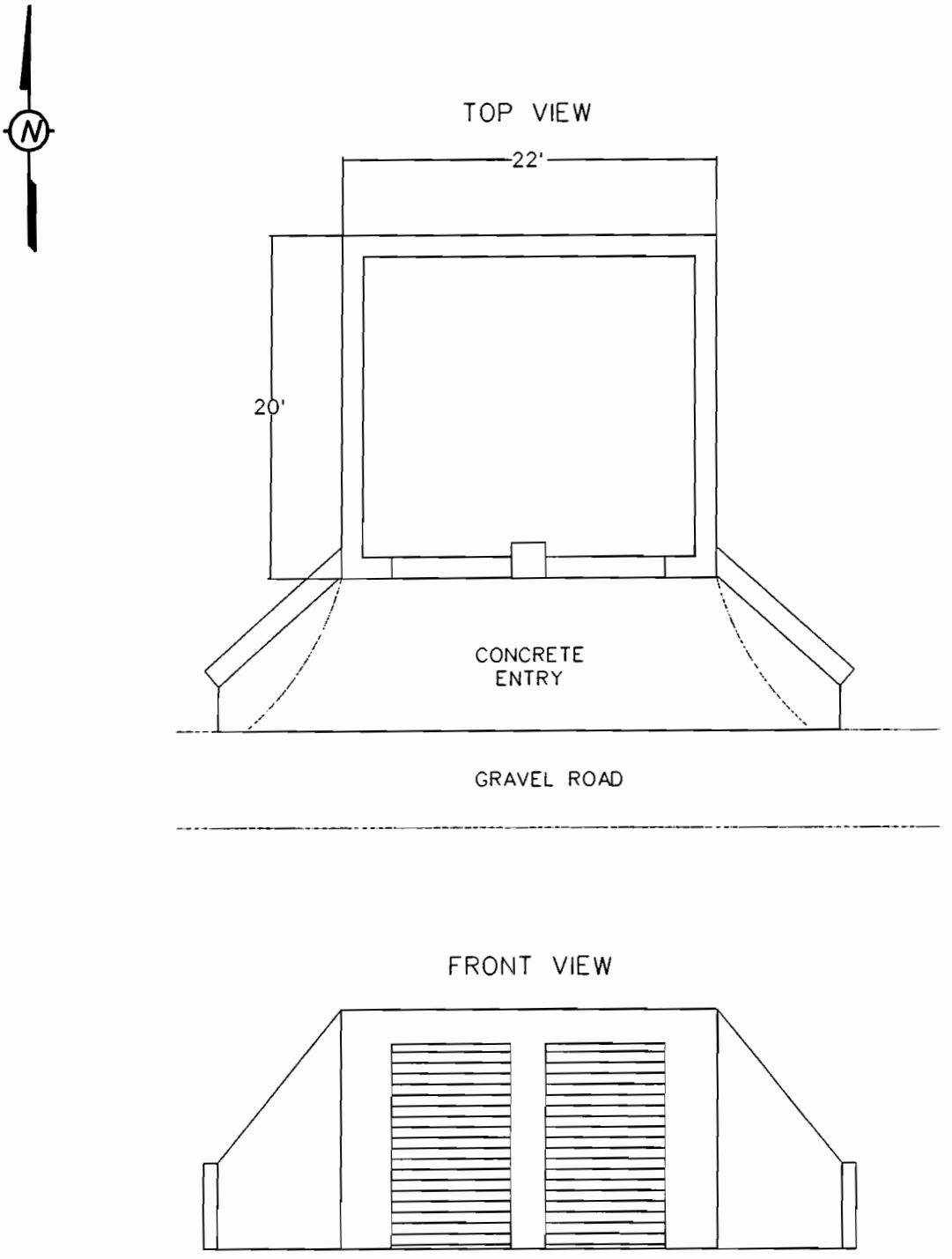

FIGURE 1-3
BUILDING 1601

U.S. ARMY CORPS OF ENGINEERS
NASHVILE DISTRICT
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

SCALE:
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INTERNATIONAL TECHNOLOGY CORPORATION

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2.0 Closure Activities

The following closure activities were performed at the Building 1601 site:

- Removal and containerization of debris found within Building 1601 (wooden pallets, refuse drum, rodent droppings, and loose dust and dirt)
- Decontamination and removal of the temporary scales located within Building 1601
- Installation of soil borings both within and around the surrounding exterior of Building 1601 for the collection of soil samples for chemical analysis
- Removal from the interior surfaces of the structure any observed staining or other types of demarcation that could be indicative of contamination
- Decontamination of the interior of Building 1601 by high-pressure wash and rinse
- Collection of confirmatory rinsate samples for chemical analysis
- Collection, characterization, and disposal of IDW generated during the previously listed activities.

2.1 Facility Preparation

Prior to initiating sampling and decontamination activities, the wooden pallets, refuse drum, and loose dirt were removed from the building and containerized or staged for later disposal decontamination and/or destruction, as appropriate. The wooden pallets were cut into small pieces and placed in IDW drums. Trash and debris in the refuse drum were removed and placed into another IDW drum. The loose dust and dirt on the floor of the building were collected by sweeping and vacuuming the material into drums. Inhalation of airborne dust from the sweeping action was prevented by spraying a light mist of potable water over work surfaces and by workers wearing fiber dust masks. IDW drums were staged close to the building. Once the IDW material was containerized, a composite sample was collected for disposal criteria. IDW sampling and analysis is discussed in Section 2.4.

2.2 Soil Sampling Procedures

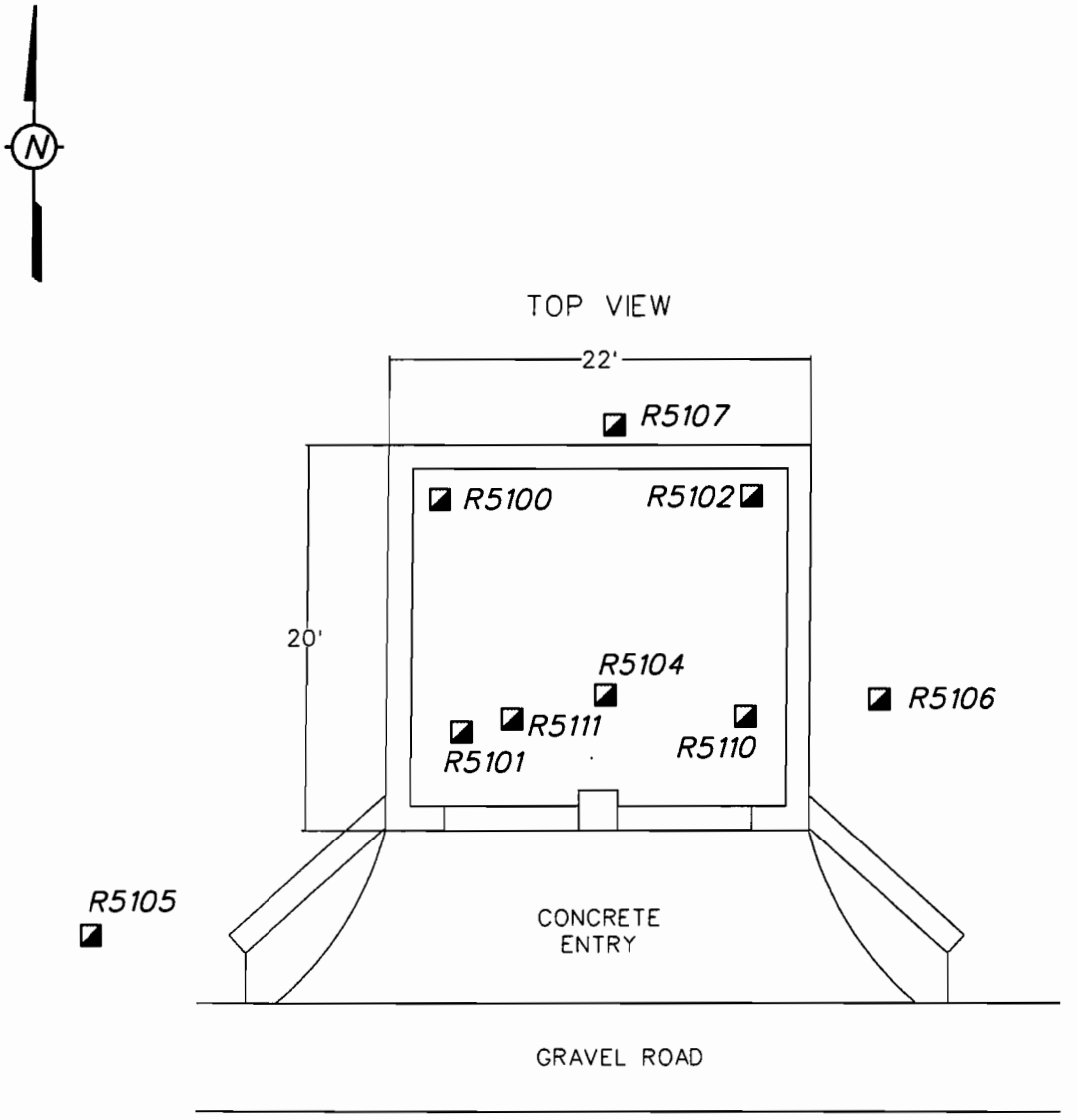
Nine soil borings were installed at Building 1601. Soil samples were collected for chemical analysis to determine if contaminants were released into the surrounding environment through cracks in the concrete floor slab. According to the work plan (IT, 1998), four borings were to be installed within the interior of the building. After mobilization to the site, appropriate interior

sampling locations were determined by a representative of the Ohio Environmental Protection Agency (OEPA), with concurrence by RVAAP and IT representatives. These individuals visually inspected the floor for staining or cracks that could be indicative of possible contaminant migratory pathways. Although no visible staining was seen, several cracks in the concrete slab were found. To adequately sample these potential contaminant pathways, the OEPA representative directed the USACE and IT to increase the number of sampling locations inside Building 1601 from four to six (Figure 2-1).

Three soil sampling locations were identified around the exterior of Building 1601. The revised closure plan (SAIC, 1997) required only two exterior soil sampling locations; however, it was determined before preparing the work plan (IT, 1998) that three locations would better represent potentially contaminated areas. The three exterior soil samples locations were located as shown on Figure 2-1.

Soil samples from locations within Building 1601 were collected by coring through the concrete slab using an electric coring machine with a diamond/carbide tipped core barrel (Appendix A, Photo 2). To prevent possible contaminant migration from the concrete surface to the subsurface, water was not used to cool the coring bit. The concrete slab was measured at approximately 8 inches thick, with approximately 2 inches of sub-base material. After removing the concrete core and backfill material, a decontaminated stainless-steel hand auger was advanced to a depth of 6 inches below the first soil encountered. Table 2-1 summarizes the sample depths and soil descriptions for each of the soil borings for Building 1601. Soil retrieved from the auger was placed in a clean stainless-steel mixing pan and homogenized before being placed into sample containers.

Soil borings completed along the exterior of Building 1601 were also installed using a clean stainless-steel hand auger. Each of the three exterior sampling locations were prepared by first clearing the surface area of loose debris. Photo 3 of Appendix A shows one exterior sampling location. For each of the three sample locations, a three-point composite sample was obtained at each location by augering to a depth of approximately 6 inches at three spots approximately representing the corners of a small equilateral triangle. Soil from each of these three points comprised an exterior sampling location. Material was placed in a clean stainless- steel mixing pan and homogenized before being placed into sample containers. All soil sampling and mixing tools were decontaminated in accordance with the work plan (IT, 1998) between sampling locations. All soil sampling methods and procedures, including sample homogenization, were accomplished in accordance with the work plan.



LEGEND:

R5100 SOIL BORING LOCATION AND SAMPLE NUMBER

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FIGURE 2-1
BUILDING 1601
SOIL BORING LOCATIONS

U.S. ARMY CORPS OF ENGINEERS
NASHVILE DISTRICT
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

INTERNATIONAL TECHNOLOGY CORPORATION

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ENGR. CHCK. BY: C. WALLACE
INITIATOR: C. WALLACE
PROJ. MGR.: C. SHAFER
DWG. NO.: \775574ES. 014
PROJ. NO.: 775574
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DRAWN BY:
STARTING DATE: 11/02/98
DRAWN BY: D.HALL

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Table 2-1

Soil Sample Information
Building 1601 Site
Ravenna Army Ammunition Plant, Ravenna, Ohio

Sample Number	Sample Location	Sample Date	Sample Depth[a]	Sample Description
R5100	Interior	09/11/98	0.8 - 1.25	Dry sandy clay, with 2-inches of black organic material
R5101	Interior	09/11/98	0.8 - 1.25	Dry sandy clay, 2-inches of black organic material, and few thin roots and pebbles
R5102	Interior	09/11/98	0.8 - 1.25	Dry sandy clay with a few small pebbles
R5103	Interior	09/11/98	0.8 - 1.25	Field duplicate of sample no. R5102
R5104	Interior	09/02/98	0.8 - 1.25	2-inches black organic material with tan sand and small quartz pebbles
R5105	Exterior	09/02/98	0.0 - 0.5	None given
R5106	Exterior	09/02/98	0.0 - 0.5	None given
R5107	Exterior	09/11/98	0.0 - 0.5	None given
R5110	Interior	09/11/98	0.8 - 1.25	Dry sandy clay
R5111	Interior	09/11/98	0.8 - 1.25	None given

[a]Depth of sampled interval given in feet below top of concrete slab for interior samples and below top of ground surface for exterior samples.

After completing the soil sampling effort, each of the six sample locations within Building 1601 was filled using a bentonite powder slurry to within approximately 2 inches of the concrete slab surface. The remaining annulus was filled with concrete to its original grade. Also, all cracks in the concrete floor were sealed with a flexible caulking compound to prevent possible migration of contaminated liquids during decontamination efforts. Exterior soil borings were also backfilled with a bentonite slurry and capped with native soil at each location.

2.3 Building Decontamination Procedures

The interior walls, ceiling, and floor of Building 1601 were triple-washed and rinsed using a high-pressure detergent wash (a minimal amount of detergent was used to facilitate the treatment of generated liquid waste). Prior to decontamination activities, the floor and floor joints were covered with plastic sheeting to prevent the migration of potentially contaminated liquid through any remaining openings. A temporary dike was constructed along the doorway entrance to ensure that all generated waste was kept within Building 1601. As the interior of the walls and ceiling was cleaned, the liquid spray collected onto the plastic sheeting on the floor. Sorbent material, along with brooms, squeegees, and a wet/dry vacuum, were used to collect the excess liquid. Once the ceiling and walls were decontaminated, the plastic sheeting was removed and the floor of Building 1601 was decontaminated in similar fashion.

The portable metal floor scale, historically used to weigh drums stored at Building 1601, was triple-washed similar to the interior of Building 1601. After cleaning the scale, Base personnel determined that it was probably not in working order and the scale was scrapped.

After initial decontamination activities were completed at Building 1601, the floor cracks and joints were reinspected for structural integrity and for the presence of any remaining contamination. The inspection did not reveal any a visible potential for further contamination.

A final rinse of the building was conducted to collect rinsate samples to confirm that Building 1601 was adequately decontaminated. The final rinsate samples were randomly collected from the interior walls, ceiling, and floor surfaces of the building by pouring American Society for Testing and Materials Type 1 water from its original container over randomly selected surface features and collecting a portion for chemical analysis. Results from the final rinsate samples are discussed in Section 3.2 and are compared to the approved performance standards (Table 2 of the revised closure plan [SAIC, 1997]) to determine the adequacy of decontamination efforts.

2.4 Investigation-Derived Waste Handling Procedures

Waste material generated during the activities conducted at Building 1601 include the demolished wooden pallets, contents of the refuse drum (newspaper, cardboard, plastic six-pack rings, and glass bottles) , loose dust and dirt from sweeping/vacuuming the floor, plastic sheeting used to divert over-spray during pressure washing, personal protective equipment (PPE), and excess water from the pressure washing/decontamination process. Solid-phase IDW was placed in drums, which were staged close to the building. Liquid-phase IDW was containerized in a polyethylene tank, also staged at the site. Wooden pallet scrap was containerized in six 55-gallon drums; refuse, dirt, PPE, and plastic sheeting required three drums; and 600 gallons of waste water was generated. Representative samples of both the solid and liquid IDW were collected for analyses to assist in determining final disposal methods. IDW sampling results are discussed in Section 3.3.

3.0 Analytical Results

The following sections provide and discuss the results of the analytical sampling conducted at the Building 1601 site. The sampling program at this site consisted of investigatory soil sampling beneath and around the structure, decontamination process confirmation sampling, and waste disposal characterization sampling. Building 1601 samples were submitted to be analyzed for explosive compounds, target analyte list (TAL) metals, and cyanide. Table 3-1 provides a listing of constituents of concern for Building 1601, by the different analytical groups (explosives, TAL metals, and cyanide) for which samples were tested. In addition, OEPA-defined performance standards to which rinsate samples are compared are provided in Table 3-1. All certificates of analysis for Building 1601 sampling are provided in Appendix B.1.

Data validation summary reports are presented in Appendix C. These data validation summary reports were prepared by Griffin-Schruers, Inc. using the U.S. Environmental Protection Agency (EPA) National Functional Guidelines (EPA, 1994, 1993). The reports summarize the overall data findings as defined during the Level III data validation effort. The qualifiers applied to the data are incorporated into the summary tables in this chapter of this closure report and can also be reviewed in the analytical summaries presented in Appendix B.2.

3.1 Soil Sampling Results

A total of nine composite soil samples were collected at the Building 1601 site: three from surface soils surrounding the building and six from subsurface soils beneath the building's concrete floor. The soil samples were analyzed for TAL metals, explosives and cyanide. Performance standards have not been defined for soil samples; however, preliminary facility-wide background concentrations (FWBC) for metals have been proposed. A summary of analytical results for the nine soil samples, along with applicable preliminary FWBC, is provided as Table 3-2. Of the seven TAL metals for which results are available, silver was the only metal not detected in any soil sample. Arsenic was detected at concentrations below the preliminary FWBC in all nine samples, with a maximum concentration of 14.6 milligrams per kilogram (mg/kg). Barium was also detected in all nine samples below the preliminary FWBC of 222 mg/kg. The maximum concentration was 145 mg/kg. Cadmium was detected in four of the nine samples at a maximum concentration of 3.3 mg/kg. Cadmium was not detected in facility-wide background samples. Both chromium and lead were detected below their respective preliminary FWBC in each of the nine samples, with maximum concentrations of 15.8 and 53.4 mg/kg, respectively. For comparison purposes, U.S. Environmental Protection Agency (EPA) Region 9

Table 3-1

Analytical Class and Specific Constituents of Concern
Building 1601 Site
Ravenna Army Ammunition Plant, Ravenna, Ohio

Analytical Class	Analytical Parameter	OEPA Performance Standard (mg/L)
EXPLOSIVES	2,4-Dinitrotoluene	1.0
	2,4,6-Trinitrotoluene	1.0
	RDX (Cyclonite)	1.0
	HMX (Homocyclonite)	1.0
	1,3,5-Trinitrobenzene	1.0
	1,3-Dinitrobenzene	1.0
	Tetryl	1.0
	Nitrobenzene	1.0
	2,6-Dinitrotoluene	1.0
	o-Nitrotoluene	1.0
	m-Nitrotoluene	1.0
	p-Nitrotoluene	1.0
TARGET ANALYTE LIST METALS	Aluminum	1.0
	Antimony	na
	Arsenic	0.75
	Barium	1.0
	Beryllium	na
	Cadmium	0.075
	Calcium	na
	Chromium	1.0
	Cobalt	na
	Copper	na
	Iron	na
	Lead	0.75
	Magnesium	na
	Manganese	1.0
	Mercury	0.03
	Nickel	na
	Potassium	na
	Selenium	0.75
	Silver	1.0
	Sodium	na
	Thallium	na
	Vanadium	na
	Zinc	1.0
CYANIDE	Cyanide	na

Notes:
Ohio Environmental Protection Agency (EPA) references the OEPA Closure Plan Review Guidance.
mg/L - Milligrams per liter.
na - Not available; performance standards not established.

Table 3-2

Analytical Summary for Soil Samples
Building 1601 Site
Constituents of Concern
Ravenna Army Ammunition Plant, Ravenna, Ohio

	Sample Number:		R5100	R5101	R5102	R5104	R5105
	Sample Location:		B1601CS001	B1601CS002	B1601CS003	B1601S004	B1601S005
Analyte	FWBG[a]	Units	Interior	Interior	Interior	Interior	Exterior
Arsenic	15.4	mg/kg	14.3 J	12.7 J	8.7 J	14.6	10.5
Barium	222.0	mg/kg	82.2 J	77.6 J	145 J	73.8	32.8
Cadmium	ND	mg/kg	3.3 J	1.4 J	0.59 UJ	0.69	0.54 U
Chromium	17.4	mg/kg	15.8 J	13.2 J	15.7 J	13.7	10.6
Lead	66.5	mg/kg	53.4 J	32.6 J	9.5 J	29.8 J	9.4 J
Mercury	0.05	mg/kg	0.12 UJ	0.028 J	0.037 J	0.03 J	0.03 J
Silver	ND	mg/kg	1.2 UJ	1.2 UJ	1.2 UJ	1.1 U	1.1 U
2,4-Dinitrotoluene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
2,4,6-Trinitrotoluene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
RDX	na	mg/kg	0.50 UJ	0.50 UJ	0.50 UJ	0.07 J	0.50 U
HMX	na	mg/kg	0.50 UJ	0.50 UJ	0.50 UJ	0.5 U	0.50 U
1,3,5-Trinitrobenzene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
1,3-Dinitrobenzene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
Tetryl	na	mg/kg	0.65 UJ	0.65 UJ	0.65 UJ	0.65 U	0.65 U
Nitrobenzene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
2,6-Dinitrotoluene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
O-nitrotoluene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
M-nitrotoluene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
P-nitrotoluene	na	mg/kg	0.25 UJ	0.25 UJ	0.25 UJ	0.25 U	0.25 U
Cyanide	na	mg/kg	0.58 UJ	0.58 UJ	0.99 J	0.57 U	0.54 U

Table 3-2

Analytical Summary for Soil Samples
Building 1601 Site
Constituents of Concern
Ravenna Army Ammunition Plant, Ravenna, Ohio

	Sample Number:		R5106	R5107	R5110	R5111
	Sample Location:		B1601S006	B1601CS007	B1601CS010	B1601CS011
Analyte	FWBG[a]	Units	Exterior	Exterior	Interior	Interior
Arsenic	15.4	mg/kg	12.1	8.5 J	11.4 J	14.4 J
Barium	222.0	mg/kg	38	44.9 J	58.9 J	77.5 J
Cadmium	ND	mg/kg	0.55 U	0.61 UJ	0.59 UJ	0.81 J
Chromium	17.4	mg/kg	11.2	10.2 J	11.8 J	12.6 J
Lead	66.5	mg/kg	11.5 J	10.8 J	27.7 J	22.8 J
Mercury	0.05	mg/kg	0.034 J	0.038 J	0.039 J	0.027 J
Silver	ND	mg/kg	1.1 U	1.2 UJ	1.2 UJ	1.1 UJ
2,4-Dinitrotoluene	na	mg/kg	0.25 U	0.25 UJ	0.25 UJ	0.25 UJ
2,4,6-Trinitrotoluene	na	mg/kg	0.25 U	0.25 UJ	0.25 UJ	0.25 UJ
RDX	na	mg/kg	0.50 U	0.073 J	0.50 UJ	0.50 UJ
HMX	na	mg/kg	0.50 U	0.50 UJ	0.50 UJ	0.50 UJ
1,3,5-Trinitrobenzene	na	mg/kg	0.25 U	0.25 UJ	0.25 UJ	0.25 UJ
1,3-Dinitrobenzene	na	mg/kg	0.25 U	0.024 J	0.25 UJ	0.25 UJ
Tetryl	na	mg/kg	0.65 U	0.067 J	0.65 UJ	0.65 UJ
Nitrobenzene	na	mg/kg	0.25 U	0.25 UJ	0.25 UJ	0.25 UJ
2,6-Dinitrotoluene	na	mg/kg	0.25 U	0.25 UJ	0.25 UJ	0.25 UJ
O-nitrotoluene	na	mg/kg	0.25 U	0.14 J	0.25 UJ	0.25 UJ
M-nitrotoluene	na	mg/kg	0.25 U	0.25 UJ	0.25 UJ	0.25 UJ
P-nitrotoluene	na	mg/kg	0.25 U	0.25 UJ	0.25 UJ	0.25 UJ
Cyanide	na	mg/kg	0.55 U	0.61 UJ	0.59 UJ	0.57 UJ

[a] FWBG=Preliminary Facility-Wide Background Concentrations

B - Compound was detected in the associated blanks at a level that has contributed to the overall result.

J - Concentration detected should be considered an estimated concentration.

U - Not detected.

na - Not applicable.

ND - Not detected.

preliminary remediation goals for a residential scenario are 38.0, 210, and 400 mg/kg, respectively, for cadmium, chromium, and lead. Mercury was detected in eight of the nine samples at a maximum detection of 0.039 mg/kg. All mercury concentrations were below the preliminary FWBC at 0.05 mg/kg.

Four of the twelve explosive analytes were detected in at least one of the nine soil samples from Building 1601. Cyclonite (RDX) was detected in two soil samples (one exterior and one interior) at a maximum concentration of 0.073 mg/kg. The remaining three detected compounds include 1,3-dinitrobenzene (DNB) (detected once at a concentration of 0.024 mg/kg), tetryl (detected once at a concentration of 0.067 mg/kg), and o-nitrotoluene (also detected once at a concentration of 0.14 mg/kg). Cyanide was detected in one soil sample at a concentration of 0.99 mg/kg.

3.2 Decontamination Confirmation Sampling Results

A total of three rinsate samples were collected from the final rinse of the interior of Building 1601 and analyzed for TAL metals, explosives, and cyanide. Table 3-3 summarizes the results of the rinsate samples. Results are compared to established performance criteria to evaluate the effectiveness of decontaminating the interior of Building 1601. The analytical results indicate the presence of very low concentrations of metals, typically two or more orders of magnitude below their respective performance standard. Silver was the only TAL metal not detected in at least one of the three rinsate samples. Of the 12 explosive compounds analyzed, 6 were not detected and 6 were detected in one or more samples at very low concentrations (typically three or more orders of magnitude below their respective performance standard. The most prevalent explosive compounds (defined as being found in all three samples) include 2,4-dinitrotoluene (maximum concentration of 0.59 micrograms per liter [µg/L]), octogen (HMX) (maximum concentration of 9.6 µg/L), and o-nitrotoluene (maximum concentration of 0.1 µg/L). The one remaining analyte, cyanide, was not detected in the three rinsate samples.

3.3 Investigation-Derived Waste Sampling Results

Samples of the two types of IDW (solid and liquid) generated from decontamination and disposal activities at Building 1601 were collected to aid in determining acceptable methods of disposal. Solid IDW was generated as a result of demolition of several wooden pallets stored within Building 1601. A sample of the wood was collected (as sawdust) and analyzed for TAL metals, explosives, and cyanide. Liquid IDW was generated as a result of collecting the over-spray from the building decontamination efforts. A sample of the collected water was also submitted for TAL metals, explosives, and cyanide analyses. Table 3-4 provides a summary of the IDW sample analysis. Of the seven TAL metal analytes, cadmium and silver were not detected in the

Table 3-3

Analytical Summary for Rinsate Samples
Building 1601 Site
Constituents of Concern
Ravenna Army Ammunition Plant, Ravenna, Ohio

Analyte	Sample Number: Sample Location: PS[a]	Units	R5000 B1601SR001	R5001 B1601SR002	R5002 B1601SR003
Arsenic	0.75	mg/L	0.0042 J	0.005 U	0.005 U
Barium	1.0	mg/L	0.0637 J	0.0062 J	0.0061 J
Cadmium	0.075	mg/L	0.0022 J	0.0011 J	0.005 U
Chromium	1.0	mg/L	0.022	0.010 U	0.010 U
Lead	0.75	mg/L	0.0315	0.0046	0.0036
Mercury	0.03	mg/L	0.0002 U	0.000097 B	0.000083 B
Silver	1.0	mg/L	0.010 U	0.010 U	0.010 U
2,4-Dinitrotoluene	1000	ug/L	0.26	0.59	0.35
2,4,6-Trinitrotoluene	1000	ug/L	0.20 U	0.20 U	0.20U
RDX	1000	ug/L	33	0.54 U	1.7
HMX	1000	ug/L	9.6	0.062 B	0.16 B
1,3,5-Trinitrobenzene	1000	ug/L	0.20 U	0.20 U	0.20 U
1,3-Dinitrobenzene	1000	ug/L	0.20 U	0.20 U	0.20 U
Tetryl	1000	ug/L	0.20 U	4.0 U	0.20 U
Nitrobenzene	1000	ug/L	0.20 U	0.20 U	0.075 J
2,6-Dinitrotoluene	1000	ug/L	0.13 U	0.13 U	0.13 U
O-nitrotoluene	1000	ug/L	0.1 B	0.087 B	0.073 B
M-nitrotoluene	1000	ug/L	0.20 U	0.47	0.20 U
P-nitrotoluene	1000	ug/L	0.20 U	1.1 U	0.20 U
Cyanide	na	mg/L	0.010 U	0.010 U	0.010 U

[a] Listed are Performance Standards for RVAAP as established in the approved site closure plans.
B - Compound was detected in the associated blanks at a level that has contributed to the overall result.
J - Concentration detected should be considered an estimated concentration.
U - Not detected.

Table 3-4

Analytical Summary for Investigation-Derived Waste Samples
Building 1601 Site
Constituents of Concern
Ravenna Army Ammunition Plant, Ravenna, Ohio

Sample Number:		R5112		R5003
Sample Location:		B1601CS012		Bldg. 1601
Analyte	Units	Sawdust	Units	Water IDW
Arsenic	mg/kg	2.7 J	mg/L	0.0169
Barium	mg/kg	29.2 J	mg/L	0.243
Cadmium	mg/kg	0.74 UJ	mg/L	0.0081
Chromium	mg/kg	6.6	mg/L	0.0509
Lead	mg/kg	7.2	mg/L	0.108
Mercury	mg/kg	0.037 B	mg/L	0.00014 B
Silver	mg/kg	1.5 UJ	mg/L	0.010 U
2,4-Dinitrotoluene	mg/kg	2.5 U	ug/L	1.3 U
2,4,6-Trinitrotoluene	mg/kg	42	ug/L	2.0 U
RDX	mg/kg	93	ug/L	640
HMX	mg/kg	15	ug/L	120
1,3,5-Trinitrobenzene	mg/kg	2.5 U	ug/L	2.0 U
1,3-Dinitrobenzene	mg/kg	0.61 J	ug/L	2.0 U
Tetryl	mg/kg	6.5 U	ug/L	2.0 U
Nitrobenzene	mg/kg	2.5 U	ug/L	2.0 U
2,6-Dinitrotoluene	mg/kg	2.5 U	ug/L	1.3 U
O-nitrotoluene	mg/kg	2.5 U	ug/L	2.0 U
M-nitrotoluene	mg/kg	2.5 U	ug/L	2.0 U
P-nitrotoluene	mg/kg	2.5 U	ug/L	2.0 U
Cyanide	mg/kg	0.74 UJ	mg/L	0.010 U

B - Compound was detected in the associated blanks at a level that has contributed to the overall result.
J - Concentration detected should be considered an estimated concentration.
U - Not detected.

4.0 Investigation-Derived Waste Disposal

Waste types collected during activities conducted at Building 1601 include wood/sawdust, waste water, trash/general debris, and plastic sheeting. IDW volumes generated include the following:

- Six 55-gallon drums of wood/sawdust
- Approximately 600 gallons of waste water
- Two drums of trash/debris
- One drum of plastic sheeting.

Liquid IDW as well as the debris and plastic sheeting solid IDW generated at Building 1601 have been determined to be, and were disposed as, nonhazardous, special waste. Wood/sawdust IDW required classification as hazardous waste due to levels of explosive compounds present and was disposed as such. Photo 4 of Appendix A shows solid IDW being loaded for transport. Nonhazardous solid IDW was transported off Base by Dart Trucking Company, Inc. and disposed of at the Wayne Disposal, Inc. facility near Belleville, Michigan. Hazardous solid IDW drums were also transported by Dart Trucking Company, Inc., but were disposed at the City Environmental, Inc. facility in Detroit, Michigan. Photo 5 of Appendix A shows liquid IDW being transferred into a tanker for transport. Nonhazardous liquid IDW was transported off Base by DFL Oilfield Services, LLC and disposed at the Everclear of Ohio, Ltd. facility near Austintown, Ohio. Copies of waste manifests are provided in Appendix D.

5.0 Conclusions

IT was tasked to remove and containerize material and debris found within Building 1601, including removing the drum scales; collecting soil samples from beneath and around the exterior of the building; and decontaminating the interior of the building using a high-pressure wash and rinse. These tasks were accomplished from August 26, 1998 through September 21, 1998.

Soil samples were collected and analyzed to determine if historic activities at Building 1601 resulted in the release of contaminants into the soils around and under the building. Rinsate samples were collected after pressure-washing the building's interior surfaces to confirm that decontamination efforts were successful. IDW generated during the Building 1601 activities was also sampled to aid in determining potential disposal methods. All samples were submitted to be analyzed for TAL metals, explosives, and cyanide.

A review of the Building 1601 soils data indicate that metallic analytes are widespread and at various concentrations in each of the nine soil samples submitted; however, cadmium was the only metal detected above the preliminary FWBC. While small amounts of cadmium were encountered above the preliminary FWBC, these levels were well below EPA Region 9 soil preliminary remediation goals and thus do not constitute any significant risk. Results from two soil samples, one exterior and one interior, also indicate the presence of explosive compounds. RDX is the only explosive compound detected in the interior sample (sample number R5104). The exterior sample (sample number R5107) contained concentrations of RDX, 1,3-DNB, tetryl, and o-nitrotoluene. Cyanide was detected in one interior soil sample.

Results of the three rinsate samples collected to evaluate the decontamination process were reviewed and detected concentrations were compared to performance standards developed by the OEPA. Although concentrations of metals and explosive compounds were detected in the rinsate samples, all concentrations were well below their individual performance standards. Cyanide was not detected in the rinsate samples. Based on the analytical data presented, requirements for site closure have been satisfied and Building 1601 is recommended for closure.

Both solid and liquid IDW were sampled to assist the disposal process. Sawdust from the demolition of wooden pallets was sampled, as was the containerized wash water from the decontami-

nation process. Sample analysis indicates the presence of several metallic and explosive analytes in both sample types. Cyanide was not detected in either sample.

Liquid IDW, classified as a special waste, was transported and disposed off site on December 16, 1998 by DFL Oilfield Services, Inc. Plastic sheeting and general debris IDW, classified non-hazardous, were transported and disposed off site on December 17, 1998 by Dart Trucking Company, Inc. Wood/sawdust IDW was classified as hazardous waste due to levels of explosive compounds and was transported and disposed off site by Dart Trucking Company, Inc. on December 18, 1998.

A third-party Level III data validation was performed by Griffin-Schruers, Inc. using the EPA National Functional Guidelines (EPA, 1994, 1993). The data presented in the tables of this report do not reflect the qualifiers applied during the data validation process. The qualifier will be incorporated into the final report.

Copies of the validation reports generated from the third-party data review process are included in Appendix C for review.

The overall results of the analysis, as discussed in this report, suggest that representative samples were collected and analyzed. The results obtained are indicative of the media analyzed. Overall, the data do reflect the expected site conditions and they are fully usable for their intended purposes.

6.0 References

IT Corporation (IT), 1998, ***Closure Activities Work Plan, Building 1601, Ravenna Army Ammunition Plant, Ravenna, Ohio***, prepared for the U.S. Army Corps of Engineers, Nashville District, August.

Science Applications International Corporation (SAIC), 1997, ***Revised Closure Plan for the Container Storage Unit (Building 1601) Hazardous Waste Treatment Unit, Ravenna Army Ammunition Plant, Ravenna, Ohio***, prepared for the U.S. Army Corps of Engineers, Nashville District, October.

U.S. Environmental Protection Agency (EPA), 1994, ***Contract Laboratory Program National Functional Guidelines for Inorganic Data Review***, Office of Solid Waste and Emergency Response, Washington, DC, NTIS No. PB94-963502.

U.S. Environmental Protection Agency (EPA), 1993, ***Contract Laboratory Program National Functional Guidelines for Organic Data Review***, Office of Solid Waste and Emergency Response, Washington, DC, NTIS No. PB94-963501.

APPENDIX A

PROJECT PHOTOGRAPHS

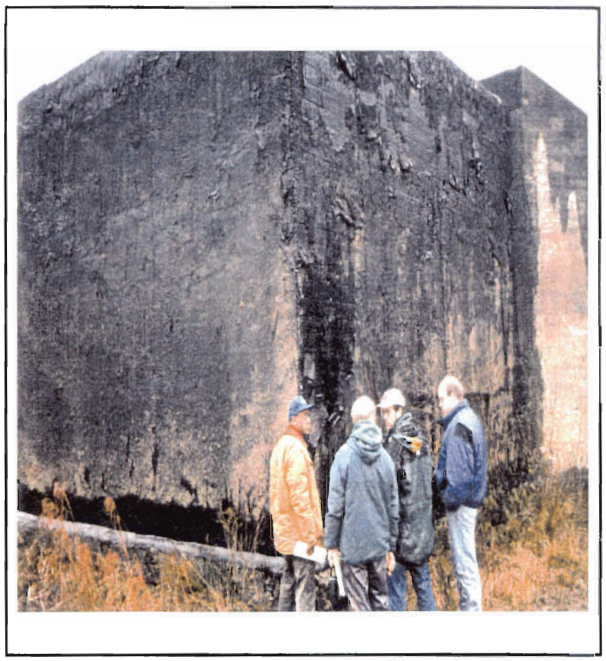

Photo 1: Exterior of Building 1601

Photo 2: Concrete core from floor of Building 1601

Photo 3: Exterior sample location R5106

Photo 4: Solid IDW being loaded for transportation

Photo 5: Liquid IDW being transferred into vacuum truck

APPENDIX B

CERTIFICATES OF ANALYSIS AND SUMMARY OF VALIDATED RESULTS

B.1 CERTIFICATES OF ANALYSIS

IT CORPORATION - KNOXVILLE

Client Sample ID: R5112

HPLC

Lot-Sample #...: A8I190160-001 Work Order #...: CLMAJ10T Matrix.....: SOLID
Date Sampled...: 09/17/98 17:20 Date Received..: 09/18/98
Prep Date.....: 09/30/98 Analysis Date..: 10/06/98
Prep Batch #...: 8273267
Dilution Factor: 10
% Moisture.....: 33 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	15	5.0	mg/kg
RDX	93	5.0	mg/kg
1,3,5-Trinitrobenzene	ND	2.5	mg/kg
1,3-Dinitrobenzene	0.61 J	2.5	mg/kg
Tetryl	ND	6.5	mg/kg
Nitrobenzene	ND	2.5	mg/kg
2,4,6-Trinitrotoluene	42	2.5	mg/kg
2-Nitrotoluene	ND	2.5	mg/kg
2,4-Dinitrotoluene	ND	2.5	mg/kg
3-Nitrotoluene	ND	2.5	mg/kg
4-Nitrotoluene	ND	2.5	mg/kg
2,6-Dinitrotoluene	ND	2.5	mg/kg
Nitroglycerin	23 J	25	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	NC,DIL	(72 - 129)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5112

TOTAL Metals

Lot-Sample #...: A8I190160-001 Matrix.....: SOLID
Date Sampled...: 09/17/98 17:20 Date Received..: 09/18/98
% Moisture.....: 33

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8267108						
Arsenic	2.7	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ101
Lead	7.2	0.45 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ102
Selenium	1.5	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ103
Thallium	ND	0.97 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ104
Silver	ND	1.5 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ106
Aluminum	260	29.8 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-10/01/98	CLMAJ107
Antimony	0.94	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ105
Barium	29.2 B	29.8 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ108
Beryllium	ND	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ109
Calcium	2150	744 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10A
Cadmium	ND	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10C
Cobalt	2.4 B	7.4 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10D
Chromium	6.6	1.5 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10E
Copper	11.2	3.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10F

(Continued on next page)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5112

TOTAL Metals

Lot-Sample #...: A8I190160-001 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	6430	14.9	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10G
		Dilution Factor: 1				
Potassium	1450	744	mg/kg	SW846 6010B	09/24-10/01/98	CLMAJ10H
		Dilution Factor: 1				
Magnesium	385 B	744	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10J
		Dilution Factor: 1				
Manganese	145	2.2	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10K
		Dilution Factor: 1				
Sodium	167 B	744	mg/kg	SW846 6010B	09/24-10/01/98	CLMAJ10L
		Dilution Factor: 1				
Nickel	6.4	6.0	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10M
		Dilution Factor: 1				
Vanadium	ND	7.4	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10N
		Dilution Factor: 1				
Mercury	0.037 B	0.15	mg/kg	SW846 7471A	09/24-09/25/98	CLMAJ10Q
		Dilution Factor: 1				
Zinc	28.5 MBD	3.0	mg/kg	SW846 6010B	09/24-09/28/98	CLMAJ10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

MBD This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5112

General Chemistry

Lot-Sample #...: A8I190160-001 Work Order #...: CLMAJ Matrix.....: SOLID
Date Sampled...: 09/17/98 17:20 Date Received..: 09/18/98
% Moisture.....: 33

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	67.2	0.10	%	MCAWW 160.3 MOD	09/23-09/24/98	8267196
	Dilution Factor: 1					
Total Cyanide	ND	0.74	mg/kg	SW846 9010A	10/07/98	8280258
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5000

HPLC

Lot-Sample #...: A8I230102-001 Work Order #...: CLP8R101 Matrix.....: WATER
Date Sampled...: 09/21/98 15:50 Date Received..: 09/22/98
Prep Date.....: 09/28/98 Analysis Date..: 09/29/98
Prep Batch #...: 8271177
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	9.6	0.50	ug/L
1,3,5-Trinitrobenzene	ND	0.20	ug/L
1,3-Dinitrobenzene	ND	0.20	ug/L
Tetryl	ND	0.20	ug/L
Nitrobenzene	ND	0.20	ug/L
2,4,6-Trinitrotoluene	ND	0.20	ug/L
2-Nitrotoluene	0.10 J	0.20	ug/L
2,4-Dinitrotoluene	0.26	0.13	ug/L
3-Nitrotoluene	ND	0.20	ug/L
4-Nitrotoluene	ND	0.20	ug/L
2,6-Dinitrotoluene	ND	0.13	ug/L
Nitroglycerin	19	2.5	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	84	(39 - 157)

NOTE(S):

J Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5000

HPLC

Lot-Sample #...:	A8I230102-001	Work Order #...:	CLP8R201	Matrix.....:	WATER
Date Sampled...:	09/21/98 15:50	Date Received..:	09/22/98		
Prep Date.....:	09/28/98	Analysis Date..:	09/30/98		
Prep Batch #...:	8271177				
Dilution Factor:	5	Method.....:	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
RDX	33	2.5	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	75	(39 - 157)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5001

HPLC

Lot-Sample #...: A8I230102-002 Work Order #...: CLP8T101 Matrix.....: WATER
Date Sampled...: 09/21/98 16:10 Date Received..: 09/22/98
Prep Date.....: 09/28/98 Analysis Date..: 09/29/98
Prep Batch #...: 8271177
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	0.062 J	0.50	ug/L
RDX	ND G	0.54	ug/L
1,3,5-Trinitrobenzene	ND	0.20	ug/L
1,3-Dinitrobenzene	ND	0.20	ug/L
Tetryl	ND G	4.0	ug/L
Nitrobenzene	ND	0.20	ug/L
2,4,6-Trinitrotoluene	ND	0.20	ug/L
2-Nitrotoluene	0.087 J	0.20	ug/L
2,4-Dinitrotoluene	0.59	0.13	ug/L
3-Nitrotoluene	0.47	0.20	ug/L
4-Nitrotoluene	ND G	1.1	ug/L
2,6-Dinitrotoluene	ND	0.13	ug/L
Nitroglycerin	30	2.5	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	78	(39 - 157)

NOTE(S):

J Estimated result. Result is less than RL.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5002

HPLC

Lot-Sample #...: A8I230102-003 Work Order #...: CLP8V101 Matrix.....: WATER
Date Sampled...: 09/21/98 16:35 Date Received..: 09/22/98
Prep Date.....: 09/28/98 Analysis Date..: 09/29/98
Prep Batch #...: 8271177
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	0.16 J	0.50	ug/L
RDX	1.7	0.50	ug/L
1,3,5-Trinitrobenzene	ND	0.20	ug/L
1,3-Dinitrobenzene	ND	0.20	ug/L
Tetryl	ND	0.20	ug/L
Nitrobenzene	0.075 J	0.20	ug/L
2,4,6-Trinitrotoluene	ND	0.20	ug/L
2-Nitrotoluene	0.073 J	0.20	ug/L
2,4-Dinitrotoluene	0.35	0.13	ug/L
3-Nitrotoluene	ND	0.20	ug/L
4-Nitrotoluene	ND	0.20	ug/L
2,6-Dinitrotoluene	ND	0.13	ug/L
Nitroglycerin	14	2.5	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	61	(39 - 157)

NOTE(S):

J Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5003

HPLC

Lot-Sample #...:	A8I230102-004	Work Order #...:	CLP8W201	Matrix.....:	WATER
Date Sampled...:	09/22/98 09:30	Date Received..:	09/22/98		
Prep Date.....:	09/28/98	Analysis Date..:	09/30/98		
Prep Batch #...:	8271177				
Dilution Factor:	100	Method.....:	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	120	50	ug/L
RDX	640	50	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	NC,DIL	(39 - 157)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5003

HPLC

Lot-Sample #...:	A8I230102-004	**Work Order #...:**	CLP8W101	**Matrix.....:**	WATER
Date Sampled...:	09/22/98 09:30	**Date Received..:**	09/22/98		
Prep Date.....:	09/28/98	**Analysis Date..:**	09/30/98		
Prep Batch #...:	8271177				
Dilution Factor:	10	**Method.....:**	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
1,3,5-Trinitrobenzene	ND	2.0	ug/L
1,3-Dinitrobenzene	ND	2.0	ug/L
Tetryl	ND	2.0	ug/L
Nitrobenzene	ND	2.0	ug/L
2,4,6-Trinitrotoluene	ND	2.0	ug/L
2-Nitrotoluene	ND	2.0	ug/L
2,4-Dinitrotoluene	ND	1.3	ug/L
3-Nitrotoluene	ND	2.0	ug/L
4-Nitrotoluene	ND	2.0	ug/L
2,6-Dinitrotoluene	ND	1.3	ug/L
Nitroglycerin	ND	25	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	108	(39 - 157)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5000

TOTAL Metals

Lot-Sample #...: A8I230102-001 **Matrix.....:** WATER
Date Sampled...: 09/21/98 15:50 **Date Received..:** 09/22/98

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8267106						
Silver	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8R102
Aluminum	**4580**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/29/98**	**CLP8R109**
Arsenic	**4.2 B**	**5.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R103**
Barium	**63.7 B**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R10A**
Beryllium	ND	4.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8R10C
Cadmium	**2.2 B**	**5.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R104**
Calcium	**12300**	**5000** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R10D**
Chromium	**22.0**	**10.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R105**
Cobalt	ND	50.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8R10E
Lead	**31.5**	**3.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R106**
Copper	**84.0**	**25.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R10F**
Antimony	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8R107
Iron	**2740**	**100** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8R10G**
Selenium	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8R108

(Continued on next page)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5000

TOTAL Metals

Lot-Sample #...: A8I230102-001 Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Potassium	35800	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8R10H
		Dilution Factor: 1				
Magnesium	898 B	5000	ug/L	SW846 6010B	09/24-09/28/98	CLP8R10J
		Dilution Factor: 1				
Manganese	152	15.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8R10K
		Dilution Factor: 1				
Sodium	22600	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8R10L
		Dilution Factor: 1				
Nickel	ND	40.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8R10M
		Dilution Factor: 1				
Vanadium	7.5 B	50.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8R10N
		Dilution Factor: 1				
Mercury	ND	0.20	ug/L	SW846 7470A	09/24-09/25/98	CLP8R10R
		Dilution Factor: 1				
Thallium	ND	2.0	ug/L	SW846 7841	09/24-09/28/98	CLP8R10Q
		Dilution Factor: 1				
Zinc	289	20.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8R10P
		Dilution Factor: 1				

NOTE(S):

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5001

TOTAL Metals

Lot-Sample #...: A8I230102-002 Matrix.....: WATER
Date Sampled...: 09/21/98 16:10 Date Received..: 09/22/98

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8267106						
Silver	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T102
Aluminum	**336**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/29/98**	**CLP8T109**
Arsenic	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T103
Barium	**6.2 B**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8T10A**
Beryllium	ND	4.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10C
Cadmium	**1.1 B**	**5.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8T104**
Calcium	**6420**	**5000** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8T10D**
Chromium	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T105
Cobalt	ND	50.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10E
Lead	**4.6**	**3.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8T106**
Copper	ND	25.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10F
Antimony	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T107
Iron	**605**	**100** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8T10G**
Selenium	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8T108

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5001

TOTAL Metals

Lot-Sample #...: A8I230102-002 Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Potassium	4560 B	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8T10H
		Dilution Factor: 1				
Magnesium	248 B	5000	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10J
		Dilution Factor: 1				
Manganese	18.2	15.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10K
		Dilution Factor: 1				
Sodium	4570 B	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8T10L
		Dilution Factor: 1				
Nickel	ND	40.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10M
		Dilution Factor: 1				
Vanadium	ND	50.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10N
		Dilution Factor: 1				
Mercury	0.097 B	0.20	ug/L	SW846 7470A	09/24-09/25/98	CLP8T10R
		Dilution Factor: 1				
Thallium	ND	2.0	ug/L	SW846 7841	09/24-09/28/98	CLP8T10Q
		Dilution Factor: 1				
Zinc	76.8	20.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8T10P
		Dilution Factor: 1				

NOTE(S):

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5002

TOTAL Metals

Lot-Sample #...: A8I230102-003 **Matrix.....:** WATER
Date Sampled...: 09/21/98 16:35 **Date Received..:** 09/22/98

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8267106						
Silver	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V102
Aluminum	**251**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/29/98**	**CLP8V109**
Arsenic	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V103
Barium	**6.1 B**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8V10A**
Beryllium	ND	4.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V10C
Cadmium	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V104
Calcium	**8130**	**5000** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8V10D**
Chromium	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V105
Cobalt	ND	50.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V10E
Lead	**3.6**	**3.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8V106**
Copper	**3.3 B**	**25.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8V10F**
Antimony	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V107
Iron	**416**	**100** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8V10G**
Selenium	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8V108

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5002

TOTAL Metals

Lot-Sample #...: A8I230102-003 Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Potassium	3110 B	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8V10H
		Dilution Factor: 1				
Magnesium	293 B	5000	ug/L	SW846 6010B	09/24-09/28/98	CLP8V10J
		Dilution Factor: 1				
Manganese	16.2	15.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8V10K
		Dilution Factor: 1				
Sodium	3100 B	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8V10L
		Dilution Factor: 1				
Nickel	ND	40.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8V10M
		Dilution Factor: 1				
Vanadium	ND	50.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8V10N
		Dilution Factor: 1				
Mercury	0.083 B	0.20	ug/L	SW846 7470A	09/24-09/25/98	CLP8V10R
		Dilution Factor: 1				
Thallium	ND	2.0	ug/L	SW846 7841	09/24-09/28/98	CLP8V10Q
		Dilution Factor: 1				
Zinc	42.7	20.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8V10P
		Dilution Factor: 1				

NOTE(S):

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5003

TOTAL Metals

Lot-Sample #...: A8I230102-004 **Matrix.....:** WATER
Date Sampled...: 09/22/98 09:30 **Date Received..:** 09/22/98

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8267106						
Silver	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8W102
Aluminum	**15100**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/29/98**	**CLP8W109**
Arsenic	**16.9**	**5.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W103**
Barium	**243**	**200** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W10A**
Beryllium	ND	4.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8W10C
Cadmium	**8.1**	**5.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W104**
Calcium	**182000**	**5000** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W10D**
Chromium	**50.9**	**10.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W105**
Cobalt	**31.9 B**	**50.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W10E**
Lead	**108**	**3.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W106**
Copper	**66.9**	**25.0** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W10F**
Antimony	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8W107
Iron	**17500**	**100** Dilution Factor: 1	**ug/L**	**SW846 6010B**	**09/24-09/28/98**	**CLP8W10G**
Selenium	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/24-09/28/98	CLP8W108

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5003

TOTAL Metals

Lot-Sample #...: A8I230102-004 Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Potassium	71400	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8W10H
		Dilution Factor: 1				
Magnesium	10900	5000	ug/L	SW846 6010B	09/24-09/28/98	CLP8W10J
		Dilution Factor: 1				
Manganese	761	15.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8W10K
		Dilution Factor: 1				
Sodium	47800	5000	ug/L	SW846 6010B	09/24-09/29/98	CLP8W10L
		Dilution Factor: 1				
Nickel	30.1 B	40.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8W10M
		Dilution Factor: 1				
Vanadium	30.1 B	50.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8W10N
		Dilution Factor: 1				
Mercury	0.14 B	0.20	ug/L	SW846 7470A	09/24-09/25/98	CLP8W10R
		Dilution Factor: 1				
Thallium	1.1 B,Wa	2.0	ug/L	SW846 7841	09/24-09/28/98	CLP8W10Q
		Dilution Factor: 1				
Zinc	669	20.0	ug/L	SW846 6010B	09/24-09/28/98	CLP8W10P
		Dilution Factor: 1				

NOTE(S):

B Estimated result. Result is less than RL.

Wa Post digestion spike recovery fell between 40-85% due to matrix interference.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5000

General Chemistry

Lot-Sample #...: A8I230102-001 **Work Order #...:** CLP8R **Matrix.....:** WATER
Date Sampled...: 09/21/98 15:50 **Date Received..:** 09/22/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Cyanide	ND	0.010	mg/L	SW846 9010A	10/05/98	8278277

Dilution Factor: 1

IT CORPORATION - KNOXVILLE

Client Sample ID: R5001

General Chemistry

Lot-Sample #...: A8I230102-002 **Work Order #...:** CLP8T **Matrix.....:** WATER
Date Sampled...: 09/21/98 16:10 **Date Received..:** 09/22/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Cyanide	ND	0.010	mg/L	SW846 9010A	10/05/98	8278277

Dilution Factor: 1

IT CORPORATION - KNOXVILLE

Client Sample ID: R5002

General Chemistry

Lot-Sample #...: A8I230102-003 **Work Order #...:** CLP8V **Matrix.....:** WATER
Date Sampled...: 09/21/98 16:35 **Date Received..:** 09/22/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Cyanide	ND	0.010	mg/L	SW846 9010A	10/05/98	8278277

Dilution Factor: 1

IT CORPORATION - KNOXVILLE

Client Sample ID: R5003

General Chemistry

Lot-Sample #...: A8I230102-004 **Work Order #...:** CLP8W **Matrix.....:** WATER
Date Sampled...: 09/22/98 09:30 **Date Received..:** 09/22/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Cyanide	ND	0.010	mg/L	SW846 9010A	10/05/98	8278277

Dilution Factor: 1

IT CORPORATION - KNOXVILLE

Client Sample ID: R5108

HPLC

Lot-Sample #...: A8I030155-001	**Work Order #...:** CL7NA102	**Matrix.....:** WATER	
Date Sampled...: 09/02/98 08:30	**Date Received..:** 09/02/98		
Prep Date.....: 09/04/98	**Analysis Date..:** 09/08/98		
Prep Batch #...: 8247232			
Dilution Factor: 1	**Method.....:** SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	**0.15 J**	**0.50**	**ug/L**
RDX	ND	0.50	ug/L
1,3,5-Trinitrobenzene	ND	0.20	ug/L
1,3-Dinitrobenzene	ND	0.20	ug/L
Tetryl	**22**	**0.20**	**ug/L**
Nitrobenzene	ND	0.20	ug/L
2,4,6-Trinitrotoluene	**0.10 J**	**0.20**	**ug/L**
2-Nitrotoluene	**0.51**	**0.20**	**ug/L**
2,4-Dinitrotoluene	**0.25**	**0.13**	**ug/L**
3-Nitrotoluene	ND	0.20	ug/L
4-Nitrotoluene	ND	0.20	ug/L
2,6-Dinitrotoluene	ND	0.13	ug/L
Nitroglycerin	ND	2.5	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	94	(39 - 157)

NOTE(S):

J Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5104

HPLC

Lot-Sample #...:	A8I030155-002	**Work Order #...:**	CL7NL10T	**Matrix.....:**	SOLID
Date Sampled...:	09/02/98 11:00	**Date Received..:**	09/02/98		
Prep Date.....:	09/11/98	**Analysis Date..:**	09/14/98		
Prep Batch #...:	8254219				
Dilution Factor:	1				
% Moisture.....:	13	**Method.....:**	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	**0.070 J**	**0.50**	**mg/kg**
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	103	(72 - 129)

NOTE(S):

J Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5105

HPLC

Lot-Sample #...:	A8I030155-003	**Work Order #...:**	CL7NN10T	**Matrix.....:**	SOLID
Date Sampled...:	09/02/98 12:10	**Date Received..:**	09/02/98		
Prep Date.....:	09/11/98	**Analysis Date..:**	09/14/98		
Prep Batch #...:	8254219				
Dilution Factor:	1				
% Moisture.....:	7.4	**Method.....:**	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	104	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5106

HPLC

Lot-Sample #...:	A8I030155-004	Work Order #...:	CL7NV10T	Matrix.....:	SOLID
Date Sampled...:	09/02/98 14:30	Date Received..:	09/02/98		
Prep Date.....:	09/11/98	Analysis Date..:	09/14/98		
Prep Batch #...:	8254219				
Dilution Factor:	1				
% Moisture.....:	8.7	Method.....:	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	97	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5108

TOTAL Metals

Lot-Sample #...: A8I030155-001 **Matrix.....:** WATER
Date Sampled...: 09/02/98 08:30 **Date Received..:** 09/02/98

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8254124						
Silver	ND	10.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA103
		Dilution Factor: 1				
Aluminum	ND	200	ug/L	SW846 6010B	09/11-09/17/98	CL7NA10D
		Dilution Factor: 1				
Arsenic	ND	5.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA104
		Dilution Factor: 1				
Barium	ND	200	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10E
		Dilution Factor: 1				
Cadmium	ND	5.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA105
		Dilution Factor: 1				
Beryllium	ND	4.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10F
		Dilution Factor: 1				
Chromium	ND	10.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA106
		Dilution Factor: 1				
Calcium	**261 B**	**5000**	**ug/L**	**SW846 6010B**	**09/11-09/15/98**	**CL7NA10G**
		Dilution Factor: 1				
Lead	ND	3.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA107
		Dilution Factor: 1				
Cobalt	ND	50.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10H
		Dilution Factor: 1				
Antimony	ND	5.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA108
		Dilution Factor: 1				
Copper	ND	25.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10J
		Dilution Factor: 1				
Mercury	ND	0.20	ug/L	SW846 7470A	09/11-09/12/98	CL7NA10C
		Dilution Factor: 1				
Selenium	ND	5.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA109
		Dilution Factor: 1				

(Continued on next page)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5108

TOTAL Metals

Lot-Sample #...: A8I030155-001 Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Thallium	ND	2.0	ug/L	SW846 7841	09/11-09/13/98	CL7NA10A
		Dilution Factor: 1				
Iron	ND	100	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10K
		Dilution Factor: 1				
Potassium	ND	5000	ug/L	SW846 6010B	09/11-09/17/98	CL7NA10L
		Dilution Factor: 1				
Magnesium	ND	5000	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10M
		Dilution Factor: 1				
Manganese	ND	15.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10N
		Dilution Factor: 1				
Sodium	ND	5000	ug/L	SW846 6010B	09/11-09/17/98	CL7NA10P
		Dilution Factor: 1				
Nickel	ND	40.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10Q
		Dilution Factor: 1				
Vanadium	ND	50.0	ug/L	SW846 6010B	09/11-09/15/98	CL7NA10R
		Dilution Factor: 1				
Zinc	**19.3 B**	**20.0**	**ug/L**	**SW846 6010B**	**09/11-09/15/98**	**CL7NA10T**
		Dilution Factor: 1				

NOTE(S):

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5104

TOTAL Metals

Lot-Sample #...: A8I030155-002 Matrix.....: SOLID
Date Sampled...: 09/02/98 11:00 Date Received..: 09/02/98
% Moisture.....: 13

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8254126						
Arsenic	14.6	0.57	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL101
		Dilution Factor: 1				
Lead	29.8	0.34	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL102
		Dilution Factor: 1				
Selenium	0.75	0.57	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL103
		Dilution Factor: 1				
Thallium	ND	0.74	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL104
		Dilution Factor: 1				
Silver	ND	1.1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL106
		Dilution Factor: 1				
Aluminum	9750	22.9	mg/kg	SW846 6010B	09/11-09/17/98	CL7NL107
		Dilution Factor: 1				
Antimony	0.39 B	0.57	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL105
		Dilution Factor: 1				
Barium	73.8	22.9	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL108
		Dilution Factor: 1				
Beryllium	0.26 B	0.57	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL109
		Dilution Factor: 1				
Calcium	2870	572	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10A
		Dilution Factor: 1				
Cadmium	0.69	0.57	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10C
		Dilution Factor: 1				
Cobalt	6.5	5.7	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10D
		Dilution Factor: 1				
Chromium	13.7	1.1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10E
		Dilution Factor: 1				
Copper	39.0	2.9	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10F
		Dilution Factor: 1				

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5104

TOTAL Metals

Lot-Sample #...: A8I030155-002 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	16800	11.4	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10G
		Dilution Factor: 1				
Potassium	896	572	mg/kg	SW846 6010B	09/11-09/17/98	CL7NL10H
		Dilution Factor: 1				
Magnesium	1390	572	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10J
		Dilution Factor: 1				
Manganese	347	1.7	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10K
		Dilution Factor: 1				
Sodium	65.6 B	572	mg/kg	SW846 6010B	09/11-09/17/98	CL7NL10L
		Dilution Factor: 1				
Nickel	12.8	4.6	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10M
		Dilution Factor: 1				
Vanadium	17.0	5.7	mg/kg	SW846 6010B	09/11-09/15/98	CL7NL10N
		Dilution Factor: 1				
Mercury	0.030 B	0.11	mg/kg	SW846 7471A	09/11-09/14/98	CL7NL10Q
		Dilution Factor: 1				
Prep Batch #...: 8264118						
Zinc	61.5	2.3	mg/kg	SW846 6010B	09/21-09/22/98	CL7NL30P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5105

TOTAL Metals

Lot-Sample #...: A8I030155-003 Matrix.....: SOLID
Date Sampled...: 09/02/98 12:10 Date Received..: 09/02/98
% Moisture.....: 7.4

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8254126						
Arsenic	10.5	0.54 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN101
Lead	9.4	0.32 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN102
Selenium	ND	0.54 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN103
Thallium	ND	0.70 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN104
Silver	ND	1.1 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN106
Aluminum	8750	21.6 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/17/98	CL7NN107
Antimony	ND	0.54 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN105
Barium	32.8	21.6 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN108
Beryllium	0.25 B	0.54 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN109
Calcium	814	540 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10A
Cadmium	ND	0.54 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10C
Cobalt	5.2 B	5.4 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10D
Chromium	10.6	1.1 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10E
Copper	14.4	2.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10F

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5105

TOTAL Metals

Lot-Sample #...: A8I030155-003 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	14600	10.8	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10G
		Dilution Factor: 1				
Potassium	599	540	mg/kg	SW846 6010B	09/11-09/17/98	CL7NN10H
		Dilution Factor: 1				
Magnesium	1240	540	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10J
		Dilution Factor: 1				
Manganese	212	1.6	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10K
		Dilution Factor: 1				
Sodium	43.7 B	540	mg/kg	SW846 6010B	09/11-09/17/98	CL7NN10L
		Dilution Factor: 1				
Nickel	12.3	4.3	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10M
		Dilution Factor: 1				
Vanadium	14.6	5.4	mg/kg	SW846 6010B	09/11-09/15/98	CL7NN10N
		Dilution Factor: 1				
Mercury	0.030 B	0.11	mg/kg	SW846 7471A	09/11-09/14/98	CL7NN10Q
		Dilution Factor: 1				
Prep Batch #...: 8264118						
Zinc	48.9	2.2	mg/kg	SW846 6010B	09/21-09/22/98	CL7NN30P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5106

TOTAL Metals

Lot-Sample #...: A8I030155-004 Matrix.....: SOLID
Date Sampled...: 09/02/98 14:30 Date Received..: 09/02/98
% Moisture.....: 8.7

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8254126						
Arsenic	12.1	0.55 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV101
Lead	11.5	0.33 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV102
Selenium	0.57	0.55 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV103
Thallium	ND	0.71 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV104
Silver	ND	1.1 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV106
Aluminum	10500	21.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/17/98	CL7NV107
Antimony	ND	0.55 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV105
Barium	38.0	21.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV108
Beryllium	0.28 B	0.55 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV109
Calcium	343 B	547 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10A
Cadmium	ND	0.55 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10C
Cobalt	7.1	5.5 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10D
Chromium	11.2	1.1 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10E
Copper	13.6	2.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10F

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5106

TOTAL Metals

Lot-Sample #...: A8I030155-004 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	17000	10.9	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10G
		Dilution Factor: 1				
Potassium	561	547	mg/kg	SW846 6010B	09/11-09/17/98	CL7NV10H
		Dilution Factor: 1				
Magnesium	1410	547	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10J
		Dilution Factor: 1				
Manganese	349	1.6	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10K
		Dilution Factor: 1				
Sodium	24.0 B	547	mg/kg	SW846 6010B	09/11-09/17/98	CL7NV10L
		Dilution Factor: 1				
Nickel	16.0	4.4	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10M
		Dilution Factor: 1				
Vanadium	16.4	5.5	mg/kg	SW846 6010B	09/11-09/15/98	CL7NV10N
		Dilution Factor: 1				
Mercury	0.034 B	0.11	mg/kg	SW846 7471A	09/11-09/14/98	CL7NV10Q
		Dilution Factor: 1				
Prep Batch #...: 8264118						
Zinc	55.6 L	2.2	mg/kg	SW846 6010B	09/21-09/22/98	CL7NV30P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

L Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5108

General Chemistry

Lot-Sample #...: A8I030155-001 **Work Order #...:** CL7NA **Matrix.....:** WATER
Date Sampled...: 09/02/98 08:30 **Date Received..:** 09/02/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Cyanide	ND	0.010	mg/L	SW846 9010A	09/14/98	8257276

Dilution Factor: 1

IT CORPORATION - KNOXVILLE

Client Sample ID: R5104

General Chemistry

Lot-Sample #...: A8I030155-002 Work Order #...: CL7NL Matrix.....: SOLID
Date Sampled...: 09/02/98 11:00 Date Received..: 09/02/98
% Moisture.....: 13

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	87.4	0.10	%	MCAWW 160.3 MOD	09/11-09/14/98	8254243
	Dilution Factor: 1					
Total Cyanide	ND	0.57	mg/kg	SW846 9010A	09/14/98	8257273
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5105

General Chemistry

Lot-Sample #...: A8I030155-003 **Work Order #...:** CL7NN **Matrix.....:** SOLID
Date Sampled...: 09/02/98 12:10 **Date Received..:** 09/02/98
% Moisture.....: 7.4

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	**92.6**	**0.10**	**%**	**MCAWW 160.3 MOD**	**09/11-09/14/98**	**8254243**
	Dilution Factor: 1					
Total Cyanide	ND	0.54	mg/kg	SW846 9010A	09/14/98	8257273
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5106

General Chemistry

Lot-Sample #...: A8I030155-004 Work Order #...: CL7NV Matrix.....: SOLID
Date Sampled...: 09/02/98 14:30 Date Received..: 09/02/98
% Moisture.....: 8.7

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	91.3	0.10	%	MCAWW 160.3 MOD	09/11-09/14/98	8254243
	Dilution Factor: 1					
Total Cyanide	ND	0.55	mg/kg	SW846 9010A	09/14/98	8257273
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:A8I110171 003

Sample WT/Vol: 5 / mL
Work Order: CLE9V101
Dilution factor: 1
Moisture %:NA

Date Received: 09/11/98
Date Extracted:09/20/98
Date Analyzed: 09/20/98

QC Batch: 8264187

Client Sample Id: R5109

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
540-59-0	1,2-Dichloroethene (total)	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
100-41-4	Ethylbenzene	5.0	U
591-78-6	2-Hexanone	10	U
75-09-2	Methylene chloride	0.93	J
108-10-1	4-Methyl-2-pentanone	10	U
100-42-5	Styrene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
108-88-3	Toluene	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
75-01-4	Vinyl chloride	10	U
1330-20-7	Xylenes (total)	5.0	U
67-64-1	Acetone	10	U
71-43-2	Benzene	5.0	U
75-27-4	Bromodichloromethane	5.0	U
75-25-2	Bromoform	5.0	U
74-83-9	Bromomethane	10	U
78-93-3	2-Butanone	10	U
75-15-0	Carbon disulfide	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
108-90-7	Chlorobenzene	5.0	U
124-48-1	Dibromochloromethane	5.0	U
75-00-3	Chloroethane	10	U

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:A8I110171 003

Sample WT/Vol: 5 / mL
Work Order: CLE9V101
Dilution factor: 1
Moisture %:NA

Date Received: 09/11/98
Date Extracted:09/20/98
Date Analyzed: 09/20/98

QC Batch: 8264187

Client Sample Id: R5109

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
67-66-3	Chloroform	5.0	U
74-87-3	Chloromethane	10	U
75-34-3	1,1-Dichloroethane	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:A8I110171 004

Sample WT/Vol: 5 / mL
Work Order: CLEA9101
Dilution factor: 1
Moisture %:NA

Date Received: 09/11/98
Date Extracted:09/20/98
Date Analyzed: 09/20/98

QC Batch: 8264187

Client Sample Id: R5113TB

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
540-59-0	1,2-Dichloroethene (total)	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
100-41-4	Ethylbenzene	5.0	U
591-78-6	2-Hexanone	10	U
75-09-2	Methylene chloride	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
100-42-5	Styrene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
108-88-3	Toluene	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
75-01-4	Vinyl chloride	10	U
1330-20-7	Xylenes (total)	5.0	U
67-64-1	Acetone	10	U
71-43-2	Benzene	5.0	U
75-27-4	Bromodichloromethane	5.0	U
75-25-2	Bromoform	5.0	U
74-83-9	Bromomethane	10	U
78-93-3	2-Butanone	10	U
75-15-0	Carbon disulfide	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
108-90-7	Chlorobenzene	5.0	U
124-48-1	Dibromochloromethane	5.0	U
75-00-3	Chloroethane	10	U

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:A8I110171 004

Sample WT/Vol: 5 / mL
Work Order: CLEA9101
Dilution factor: 1
Moisture %:NA

Date Received: 09/11/98
Date Extracted:09/20/98
Date Analyzed: 09/20/98

QC Batch: 8264187

Client Sample Id: R5113TB

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
67-66-3	Chloroform	5.0	U
74-87-3	Chloromethane	10	U
75-34-3	1,1-Dichloroethane	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U

IT CORPORATION - KNOXVILLE

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:A8I110171 003

Sample WT/Vol: 1000 / mL
Work Order: CLE9V102
Dilution factor: 1
Moisture %:NA

Date Received: 09/11/98
Date Extracted:09/14/98
Date Analyzed: 09/21/98

QC Batch: 8257121

Client Sample Id: R5109

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
83-32-9	Acenaphthene	10	U
208-96-8	Acenaphthylene	10	U
120-12-7	Anthracene	10	U
56-55-3	Benzo(a)anthracene	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
191-24-2	Benzo(ghi)perylene	10	U
50-32-8	Benzo(a)pyrene	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
111-44-4	bis(2-Chloroethyl) ether	10	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	10	U
117-81-7	bis(2-Ethylhexyl) phthalate	10	U
101-55-3	4-Bromophenyl phenyl ether	10	U
85-68-7	Butyl benzyl phthalate	10	U
106-47-8	4-Chloroaniline	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-58-7	2-Chloronaphthalene	10	U
95-57-8	2-Chlorophenol	10	U
7005-72-3	4-Chlorophenyl phenyl ether	10	U
218-01-9	Chrysene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
132-64-9	Dibenzofuran	10	U
84-74-2	Di-n-butyl phthalate	10	U
95-50-1	1,2-Dichlorobenzene	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U
120-83-2	2,4-Dichlorophenol	10	U

IT CORPORATION - KNOXVILLE

Lab Name: QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID: A8I110171 003

Sample WT/Vol: 1000 / mL
Work Order: CLE9V102
Dilution factor: 1
Moisture %: NA

Date Received: 09/11/98
Date Extracted: 09/14/98
Date Analyzed: 09/21/98

QC Batch: 8257121

Client Sample Id: R5109

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
84-66-2	Diethyl phthalate	10	U
105-67-9	2,4-Dimethylphenol	10	U
131-11-3	Dimethyl phthalate	10	U
117-84-0	Di-n-octyl phthalate	10	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
51-28-5	2,4-Dinitrophenol	25	U
121-14-2	2,4-Dinitrotoluene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
206-44-0	Fluoranthene	10	U
86-73-7	Fluorene	10	U
118-74-1	Hexachlorobenzene	10	U
87-68-3	Hexachlorobutadiene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
67-72-1	Hexachloroethane	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
78-59-1	Isophorone	10	U
91-57-6	2-Methylnaphthalene	10	U
95-48-7	2-Methylphenol	10	U
91-20-3	Naphthalene	10	U
88-74-4	2-Nitroaniline	25	U
99-09-2	3-Nitroaniline	25	U
100-01-6	4-Nitroaniline	25	U
98-95-3	Nitrobenzene	10	U
88-75-5	2-Nitrophenol	10	U
100-02-7	4-Nitrophenol	25	U
621-64-7	N-Nitrosodi-n-propylamine	10	U
86-30-6	N-Nitrosodiphenylamine	10	U
87-86-5	Pentachlorophenol	25	U

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:A8I110171 003

Sample WT/Vol: 1000 / mL
Work Order: CLE9V102
Dilution factor: 1
Moisture %:NA

Date Received: 09/11/98
Date Extracted:09/14/98
Date Analyzed: 09/21/98

QC Batch: 8257121

Client Sample Id: R5109

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
85-01-8	Phenanthrene	10	U
108-95-2	Phenol	10	U
129-00-0	Pyrene	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
88-06-2	2,4,6-Trichlorophenol	10	U
86-74-8	Carbazole	10	U
106-44-5	4-Methylphenol	10	U

IT CORPORATION - KNOXVILLE

Client Sample ID: R5107

HPLC

Lot-Sample #...: A8I110171-001 Work Order #...: CLE9L10T Matrix.....: SOLID
Date Sampled...: 09/11/98 08:35 Date Received..: 09/11/98
Prep Date.....: 09/15/98 Analysis Date..: 09/21/98
Prep Batch #...: 8259256
Dilution Factor: 1
% Moisture.....: 18 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	0.073 J	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	0.024 J	0.25	mg/kg
Tetryl	0.067 J	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	0.14 J	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	102	(72 - 129)

NOTE(S):

J Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5100

HPLC

Lot-Sample #...: A8I110171-002 **Work Order #...:** CLE9T10T **Matrix.....:** SOLID
Date Sampled...: 09/11/98 09:50 **Date Received..:** 09/11/98
Prep Date.....: 09/15/98 **Analysis Date..:** 09/21/98
Prep Batch #...: 8259256
Dilution Factor: 1
% Moisture.....: 14 **Method.....:** SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	98	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5109

HPLC

Lot-Sample #...: A8I110171-003 Work Order #...: CLE9V103 Matrix.....: WATER
Date Sampled...: 09/11/98 09:25 Date Received..: 09/11/98
Prep Date.....: 09/15/98 Analysis Date..: 09/16/98
Prep Batch #...: 8258147
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	**0.25 J**	**0.50**	**ug/L**
RDX	ND	0.50	ug/L
1,3,5-Trinitrobenzene	ND	0.20	ug/L
1,3-Dinitrobenzene	ND	0.20	ug/L
Tetryl	ND	0.20	ug/L
Nitrobenzene	ND	0.20	ug/L
2,4,6-Trinitrotoluene	ND	0.20	ug/L
2-Nitrotoluene	ND	0.20	ug/L
2,4-Dinitrotoluene	**0.19**	**0.13**	**ug/L**
3-Nitrotoluene	ND	0.20	ug/L
4-Nitrotoluene	ND	0.20	ug/L
2,6-Dinitrotoluene	ND	0.13	ug/L
Nitroglycerin	ND	2.5	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	67	(39 - 157)

NOTE(S):

J Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5101

HPLC

Lot-Sample #...: A8I110171-005 Work Order #...: CLEAD10T Matrix.....: SOLID
Date Sampled...: 09/11/98 10:45 Date Received..: 09/11/98
Prep Date.....: 09/15/98 Analysis Date..: 09/17/98
Prep Batch #...: 8259256
Dilution Factor: 1
% Moisture.....: 14 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
,6-Dinitrotoluene	ND	0.25	mg/kg
itroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	99	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5102

HPLC

Lot-Sample #...:	A8I110171-006	**Work Order #...:**	CLEAE10T	**Matrix.....:**	SOLID
Date Sampled...:	09/11/98 11:35	**Date Received..:**	09/11/98		
Prep Date.....:	09/15/98	**Analysis Date..:**	09/18/98		
Prep Batch #...:	8259256				
Dilution Factor:	1				
% Moisture.....:	15	**Method.....:**	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	101	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5103FD

HPLC

Lot-Sample #...: A8I110171-007	**Work Order #...:** CLEAG10T	**Matrix.....:** SOLID	
Date Sampled...: 09/11/98 11:35	**Date Received..:** 09/11/98		
Prep Date.....: 09/15/98	**Analysis Date..:** 09/18/98		
Prep Batch #...: 8259256			
Dilution Factor: 1			
% Moisture.....: 14	**Method.....:** SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	103	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5110

HPLC

Lot-Sample #...:	A8I110171-008	**Work Order #...:**	CLEAJ10T	**Matrix.....:**	SOLID
Date Sampled...:	09/11/98 12:10	**Date Received..:**	09/11/98		
Prep Date.....:	09/15/98	**Analysis Date..:**	09/18/98		
Prep Batch #...:	8259256				
Dilution Factor:	1				
% Moisture.....:	15	**Method.....:**	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
,6-Dinitrotoluene	ND	0.25	mg/kg
itroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	98	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5111

HPLC

Lot-Sample #...: A8I110171-009 Work Order #...: CLEAM10T Matrix.....: SOLID
Date Sampled...: 09/11/98 12:50 Date Received..: 09/11/98
Prep Date.....: 09/15/98 Analysis Date..: 09/18/98
Prep Batch #...: 8259256
Dilution Factor: 1
% Moisture.....: 12 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	0.50	mg/kg
RDX	ND	0.50	mg/kg
1,3,5-Trinitrobenzene	ND	0.25	mg/kg
1,3-Dinitrobenzene	ND	0.25	mg/kg
Tetryl	ND	0.65	mg/kg
Nitrobenzene	ND	0.25	mg/kg
2,4,6-Trinitrotoluene	ND	0.25	mg/kg
2-Nitrotoluene	ND	0.25	mg/kg
2,4-Dinitrotoluene	ND	0.25	mg/kg
3-Nitrotoluene	ND	0.25	mg/kg
4-Nitrotoluene	ND	0.25	mg/kg
2,6-Dinitrotoluene	ND	0.25	mg/kg
Nitroglycerin	ND	2.5	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	102	(72 - 129)

IT CORPORATION - KNOXVILLE

Client Sample ID: R7008

HPLC

Lot-Sample #...:	A8I110171-010	Work Order #...:	CLEAQ10R	Matrix.....:	SOLID
Date Sampled...:	09/10/98 15:00	Date Received..:	09/11/98		
Prep Date.....:	09/15/98	Analysis Date..:	09/21/98		
Prep Batch #...:	8259256				
Dilution Factor:	10				
% Moisture.....:	33	Method.....:	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	9.7	5.0	mg/kg
RDX	7.3	5.0	mg/kg
1,3,5-Trinitrobenzene	ND	2.5	mg/kg
1,3-Dinitrobenzene	6.7	2.5	mg/kg
Tetryl	ND	6.5	mg/kg
Nitrobenzene	ND	2.5	mg/kg
2,4,6-Trinitrotoluene	83	2.5	mg/kg
2-Nitrotoluene	ND	2.5	mg/kg
2,4-Dinitrotoluene	28	2.5	mg/kg
3-Nitrotoluene	1.2 J	2.5	mg/kg
4-Nitrotoluene	ND G	2.5	mg/kg
2,6-Dinitrotoluene	ND	2.5	mg/kg
Nitroglycerin	ND	25	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	NC,DIL	(72 - 129)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

IT CORPORATION - KNOXVILLE

Client Sample ID: R7009

HPLC

Lot-Sample #...:	A8I110171-011	**Work Order #...:**	CLEC410R	**Matrix.....:**	SOLID
Date Sampled...:	09/11/98 14:00	**Date Received..:**	09/11/98		
Prep Date.....:	09/15/98	**Analysis Date..:**	09/21/98		
Prep Batch #...:	8259256				
Dilution Factor:	5				
% Moisture.....:	28	**Method.....:**	SW846 8330		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
HMX	ND	2.5	mg/kg
RDX	ND G	3.2	mg/kg
1,3,5-Trinitrobenzene	ND G	3.7	mg/kg
1,3-Dinitrobenzene	ND G	1.6	mg/kg
Tetryl	ND	3.2	mg/kg
Nitrobenzene	ND G	7.2	mg/kg
2,4,6-Trinitrotoluene	ND	1.2	mg/kg
2-Nitrotoluene	ND	1.2	mg/kg
2,4-Dinitrotoluene	ND	1.2	mg/kg
3-Nitrotoluene	ND G	1.6	mg/kg
4-Nitrotoluene	ND	1.2	mg/kg
2,6-Dinitrotoluene	ND G	2.2	mg/kg
Nitroglycerin	ND	12	mg/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1-Chloro-3-nitrobenzene	147 *	(72 - 129)

NOTE(S):

* Surrogate recovery is outside stated control limits.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5107

TOTAL Metals

Lot-Sample #...: A8I110171-001 **Matrix.....:** SOLID
Date Sampled...: 09/11/98 08:35 **Date Received..:** 09/11/98
% Moisture.....: 18

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	**8.5**	**0.61** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L101**
Lead	**10.8**	**0.37** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L102**
Selenium	**0.89**	**0.61** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L103**
Thallium	ND	0.80 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L104
Silver	ND	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L106
Aluminum	**8570**	**24.5** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L107**
Antimony	**0.33 B**	**0.61** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L105**
Barium	**44.9**	**24.5** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L108**
Beryllium	**0.20 B**	**0.61** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L109**
Calcium	**749**	**612** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L10A**
Cadmium	ND	0.61 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L10C
Cobalt	**7.6**	**6.1** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L10D**
Chromium	**10.2**	**1.2** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L10E**
Copper	**10.2**	**3.1** Dilution Factor: 1	**mg/kg**	**SW846 6010B**	**09/21-09/24/98**	**CLE9L10F**

(Continued on next page)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5107

TOTAL Metals

Lot-Sample #...: A8I110171-001 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	16500	12.2	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L10G
		Dilution Factor: 1				
Potassium	556 B	612	mg/kg	SW846 6010B	09/21-09/28/98	CLE9L10H
		Dilution Factor: 1				
Magnesium	1410	612	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L10J
		Dilution Factor: 1				
Manganese	604	1.8	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L10K
		Dilution Factor: 1				
Sodium	37.0 B	612	mg/kg	SW846 6010B	09/21-09/28/98	CLE9L10L
		Dilution Factor: 1				
Nickel	11.4	4.9	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L10M
		Dilution Factor: 1				
Vanadium	15.8	6.1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L10N
		Dilution Factor: 1				
Mercury	0.038 B	0.12	mg/kg	SW846 7471A	09/21/98	CLE9L10Q
		Dilution Factor: 1				
Zinc	40.5	2.4	mg/kg	SW846 6010B	09/21-09/24/98	CLE9L10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5100

TOTAL Metals

Lot-Sample #...: A8I110171-002 Matrix.....: SOLID
Date Sampled...: 09/11/98 09:50 Date Received..: 09/11/98
% Moisture.....: 14

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	14.3	0.58	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T101
		Dilution Factor: 1				
Lead	53.4	0.35	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T102
		Dilution Factor: 1				
Selenium	0.90	0.58	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T103
		Dilution Factor: 1				
Thallium	0.89	0.75	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T104
		Dilution Factor: 1				
Silver	ND	1.2	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T106
		Dilution Factor: 1				
Aluminum	10200	23.1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T107
		Dilution Factor: 1				
Antimony	1.2	0.58	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T105
		Dilution Factor: 1				
Barium	82.2	23.1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T108
		Dilution Factor: 1				
Beryllium	0.31 B	0.58	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T109
		Dilution Factor: 1				
Calcium	6570	578	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10A
		Dilution Factor: 1				
Cadmium	3.3	0.58	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10C
		Dilution Factor: 1				
Cobalt	8.2	5.8	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10D
		Dilution Factor: 1				
Chromium	15.8	1.2	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10E
		Dilution Factor: 1				
Copper	28.3	2.9	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10F
		Dilution Factor: 1				

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5100

TOTAL Metals

Lot-Sample #...: A8I110171-002 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	21600	11.6 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10G
Potassium	1090	578 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/28/98	CLE9T10H
Magnesium	1980	578 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10J
Manganese	606	1.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10K
Sodium	61.3 B	578 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/28/98	CLE9T10L
Nickel	12.4	4.6 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10M
Vanadium	21.3	5.8 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10N
Mercury	ND	0.12 Dilution Factor: 1	mg/kg	SW846 7471A	09/21/98	CLE9T10Q
Zinc	57.9	2.3 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLE9T10P

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5109

TOTAL Metals

Lot-Sample #...: A8I110171-003 **Matrix.....:** WATER
Date Sampled...: 09/11/98 09:25 **Date Received..:** 09/11/98

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8260112						
Silver	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V104
Aluminum	ND	200 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/18/98	CLE9V10C
Arsenic	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V105
Barium	ND	200 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V10D
Beryllium	ND	4.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V10E
Cadmium	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V106
Calcium	ND	5000 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V10F
Chromium	ND	10.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V107
Cobalt	ND	50.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V10G
Lead	ND	3.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V108
Copper	ND	25.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V10H
Antimony	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V109
Iron	ND	100 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V10J
Selenium	ND	5.0 Dilution Factor: 1	ug/L	SW846 6010B	09/17-09/21/98	CLE9V10A

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5101

TOTAL Metals

Lot-Sample #...: A8I110171-005 Matrix.....: SOLID
Date Sampled...: 09/11/98 10:45 Date Received..: 09/11/98
% Moisture.....: 14

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	12.7	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD101
Lead	32.6	0.35 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD102
Selenium	0.87	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD103
Thallium	ND	0.75 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD104
Silver	ND	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD106
Aluminum	10500	23.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD107
Antimony	0.42 B	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD105
Barium	77.6	23.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD108
Beryllium	0.33 B	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD109
Calcium	13600	579 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10A
Cadmium	1.4	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10C
Cobalt	28.2	5.8 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10D
Chromium	13.2	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10E
Copper	25.4	2.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10F

(Continued on next page)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5101

TOTAL Metals

Lot-Sample #...: A8I110171-005 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	18100	11.6	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10G
		Dilution Factor: 1				
Potassium	968	579	mg/kg	SW846 6010B	09/21-09/28/98	CLEAD10H
		Dilution Factor: 1				
Magnesium	2070	579	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10J
		Dilution Factor: 1				
Manganese	571	1.7	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10K
		Dilution Factor: 1				
Sodium	73.0 B	579	mg/kg	SW846 6010B	09/21-09/28/98	CLEAD10L
		Dilution Factor: 1				
Nickel	13.2	4.6	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10M
		Dilution Factor: 1				
Vanadium	16.8	5.8	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10N
		Dilution Factor: 1				
Mercury	0.028 B	0.12	mg/kg	SW846 7471A	09/21/98	CLEAD10Q
		Dilution Factor: 1				
Zinc	64.8	2.3	mg/kg	SW846 6010B	09/21-09/24/98	CLEAD10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5102

TOTAL Metals

Lot-Sample #...: A8I110171-006 Matrix.....: SOLID
Date Sampled...: 09/11/98 11:35 Date Received..: 09/11/98
% Moisture.....: 15

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	8.7	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE101
Lead	9.5	0.35 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE102
Selenium	0.76	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE103
Thallium	1.0	0.77 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE104
Silver	ND	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE106
Aluminum	16500	23.6 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE107
Antimony	0.30 B	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE105
Barium	145	23.6 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE108
Beryllium	0.79	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE109
Calcium	54100	589 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE10A
Cadmium	ND	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE10C
Cobalt	6.0	5.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE10D
Chromium	15.7	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE10E
Copper	11.3	2.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAE10F

(Continued on next page)

IT CORPORATION - KNOXVILLE

Client Sample ID: R5102

TOTAL Metals

Lot-Sample #...: A8I110171-006 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	19800	11.8	mg/kg	SW846 6010B	09/21-09/24/98	CLRAR10G
		Dilution Factor: 1				
Potassium	1320	589	mg/kg	SW846 6010B	09/21-09/28/98	CLRAR10H
		Dilution Factor: 1				
Magnesium	3940	589	mg/kg	SW846 6010B	09/21-09/24/98	CLRAR10J
		Dilution Factor: 1				
Manganese	1760	1.8	mg/kg	SW846 6010B	09/21-09/24/98	CLRAR10K
		Dilution Factor: 1				
Sodium	244 B	589	mg/kg	SW846 6010B	09/21-09/28/98	CLRAR10L
		Dilution Factor: 1				
Nickel	9.1	4.7	mg/kg	SW846 6010B	09/21-09/24/98	CLRAR10M
		Dilution Factor: 1				
Vanadium	19.2	5.9	mg/kg	SW846 6010B	09/21-09/24/98	CLRAR10N
		Dilution Factor: 1				
Mercury	0.037 B	0.12	mg/kg	SW846 7471A	09/21/98	CLRAR10Q
		Dilution Factor: 1				
Zinc	38.8	2.4	mg/kg	SW846 6010B	09/21-09/24/98	CLRAR10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5103FD

TOTAL Metals

Lot-Sample #...: A8I110171-007 Matrix.....: SOLID
Date Sampled...: 09/11/98 11:35 Date Received..: 09/11/98
% Moisture.....: 14

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	9.7	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG101
Lead	10.3	0.35 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG102
Selenium	0.96	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG103
Thallium	ND	0.76 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG104
Silver	ND	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG106
Aluminum	12600	23.3 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG107
Antimony	0.32 B	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG105
Barium	96.3	23.3 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG108
Beryllium	0.43 B	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG109
Calcium	26700	583 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG10A
Cadmium	ND	0.58 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG10C
Cobalt	5.9	5.8 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG10D
Chromium	11.9	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG10E
Copper	12.4	2.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAG10F

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IT CORPORATION - KNOXVILLE

Client Sample ID: RS103FD

TOTAL Metals

Lot-Sample #...: A8I110171-007 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	16400	11.7	mg/kg	SW846 6010B	09/21-09/24/98	CLKAG10G
		Dilution Factor: 1				
Potassium	999	583	mg/kg	SW846 6010B	09/21-09/28/98	CLKAG10H
		Dilution Factor: 1				
Magnesium	2530	583	mg/kg	SW846 6010B	09/21-09/24/98	CLKAG10J
		Dilution Factor: 1				
Manganese	932	1.7	mg/kg	SW846 6010B	09/21-09/24/98	CLKAG10K
		Dilution Factor: 1				
Sodium	109 B	583	mg/kg	SW846 6010B	09/21-09/28/98	CLKAG10L
		Dilution Factor: 1				
Nickel	10	4.7	mg/kg	SW846 6010B	09/21-09/24/98	CLKAG10M
		Dilution Factor: 1				
Vanadium	17.3	5.8	mg/kg	SW846 6010B	09/21-09/24/98	CLKAG10N
		Dilution Factor: 1				
Mercury	0.035 B	0.12	mg/kg	SW846 7471A	09/21/98	CLKAG10Q
		Dilution Factor: 1				
Zinc	41.9	2.3	mg/kg	SW846 6010B	09/21-09/24/98	CLKAG10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5110

TOTAL Metals

Lot-Sample #...: A8I110171-008 Matrix.....: SOLID
Date Sampled...: 09/11/98 12:10 Date Received..: 09/11/98
% Moisture.....: 15

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	11.4	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ101
Lead	27.7	0.35 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ102
Selenium	0.58 B	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ103
Thallium	ND	0.76 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ104
Silver	ND	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ106
Aluminum	10100	23.4 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ107
Antimony	0.45 B	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ105
Barium	58.9	23.4 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ108
Beryllium	0.21 B	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ109
Calcium	2240	586 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ10A
Cadmium	ND	0.59 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ10C
Cobalt	7.5	5.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ10D
Chromium	11.8	1.2 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ10E
Copper	20.5	2.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAJ10F

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5110

TOTAL Metals

Lot-Sample #...: A8I110171-008 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	17400	11.7	mg/kg	SW846 6010B	09/21-09/24/98	CLRAJ10G
		Dilution Factor: 1				
Potassium	806	586	mg/kg	SW846 6010B	09/21-09/28/98	CLRAJ10H
		Dilution Factor: 1				
Magnesium	1620	586	mg/kg	SW846 6010B	09/21-09/24/98	CLRAJ10J
		Dilution Factor: 1				
Manganese	540	1.8	mg/kg	SW846 6010B	09/21-09/24/98	CLRAJ10K
		Dilution Factor: 1				
Sodium	44.3 B	586	mg/kg	SW846 6010B	09/21-09/28/98	CLRAJ10L
		Dilution Factor: 1				
Nickel	11.7	4.7	mg/kg	SW846 6010B	09/21-09/24/98	CLRAJ10M
		Dilution Factor: 1				
Vanadium	17.9	5.9	mg/kg	SW846 6010B	09/21-09/24/98	CLRAJ10N
		Dilution Factor: 1				
Mercury	0.039 B	0.12	mg/kg	SW846 7471A	09/21/98	CLRAJ10Q
		Dilution Factor: 1				
Zinc	57.7	2.3	mg/kg	SW846 6010B	09/21-09/24/98	CLRAJ10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5111

TOTAL Metals

Lot-Sample #...: A8I110171-009 Matrix.....: SOLID
Date Sampled...: 09/11/98 12:50 Date Received..: 09/11/98
% Moisture.....: 12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	14.4	0.57	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM101
		Dilution Factor: 1				
Lead	22.8	0.34	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM102
		Dilution Factor: 1				
Selenium	0.83	0.57	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM103
		Dilution Factor: 1				
Thallium	ND	0.74	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM104
		Dilution Factor: 1				
Silver	ND	1.1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM106
		Dilution Factor: 1				
Aluminum	10500	22.8	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM107
		Dilution Factor: 1				
Antimony	0.40 B	0.57	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM105
		Dilution Factor: 1				
Barium	77.5	22.8	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM108
		Dilution Factor: 1				
Beryllium	0.30 B	0.57	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM109
		Dilution Factor: 1				
Calcium	16600	571	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10A
		Dilution Factor: 1				
Cadmium	0.81	0.57	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10C
		Dilution Factor: 1				
Cobalt	7.2	5.7	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10D
		Dilution Factor: 1				
Chromium	12.6	1.1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10E
		Dilution Factor: 1				
Copper	29.6	2.9	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10F
		Dilution Factor: 1				

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IT CORPORATION - KNOXVILLE

Client Sample ID: R5111

TOTAL Metals

Lot-Sample #...: A8I110171-009 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	17200	11.4	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10G
		Dilution Factor: 1				
Potassium	1030	571	mg/kg	SW846 6010B	09/21-09/28/98	CLEAM10H
		Dilution Factor: 1				
Magnesium	2320	571	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10J
		Dilution Factor: 1				
Manganese	653	1.7	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10K
		Dilution Factor: 1				
Sodium	83.6 B	571	mg/kg	SW846 6010B	09/21-09/28/98	CLEAM10L
		Dilution Factor: 1				
Nickel	12.2	4.6	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10M
		Dilution Factor: 1				
Vanadium	16.3	5.7	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10N
		Dilution Factor: 1				
Mercury	0.027 B	0.11	mg/kg	SW846 7471A	09/21/98	CLEAM10Q
		Dilution Factor: 1				
Zinc	62.7	2.3	mg/kg	SW846 6010B	09/21-09/24/98	CLEAM10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5107

General Chemistry

Lot-Sample #...: A8I110171-001 **Work Order #...:** CLE9L **Matrix.....:** SOLID
Date Sampled...: 09/11/98 08:35 **Date Received..:** 09/11/98
% Moisture.....: 18

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	**81.8**	**0.10**	**%**	**MCAWW 160.3 MOD**	**09/17-09/18/98**	**8260183**
	Dilution Factor: 1					
Total Cyanide	ND	0.61	mg/kg	SW846 9010A	09/23-09/24/98	8267342
	Dilution Factor: 1					
Total Cyanide	ND	0.61	mg/kg	SW846 9010A	10/01/98	8274197
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5109

General Chemistry

Lot-Sample #...: A8I110171-003 Work Order #...: CLE9V Matrix.....: WATER
Date Sampled...: 09/11/98 09:25 Date Received..: 09/11/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Cyanide	ND	0.010	mg/L	SW846 9010A	09/23-09/24/98	8266230
	Dilution Factor: 1					

IT CORPORATION - KNOXVILLE

Client Sample ID: R5101

General Chemistry

Lot-Sample #...: A8I110171-005 Work Order #...: CLEAD Matrix.....: SOLID
Date Sampled...: 09/11/98 10:45 Date Received..: 09/11/98
% Moisture.....: 14

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	86.4	0.10	%	MCAWW 160.3 MOD	09/17-09/18/98	8260183
	Dilution Factor: 1					
Total Cyanide	ND	0.58	mg/kg	SW846 9010A	09/24-09/25/98	8267322
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5102

General Chemistry

Lot-Sample #...: A8I110171-006 Work Order #...: CLEAE Matrix.....: SOLID
Date Sampled...: 09/11/98 11:35 Date Received..: 09/11/98
% Moisture.....: 15

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	84.9	0.10	%	MCAWW 160.3 MOD	09/17-09/18/98	8260183
	Dilution Factor: 1					
Total Cyanide	ND	0.59	mg/kg	SW846 9010A	09/23-09/24/98	8267342
	Dilution Factor: 1					
Total Cyanide	0.99	0.59	mg/kg	SW846 9010A	10/01/98	8274197
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5103FD

General Chemistry

Lot-Sample #...: A8I110171-007 Work Order #...: CLEAG Matrix.....: SOLID
Date Sampled...: 09/11/98 11:35 Date Received..: 09/11/98
% Moisture.....: 14

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	85.8	0.10	%	MCAWW 160.3 MOD	09/18-09/19/98	8261225
	Dilution Factor: 1					
Total Cyanide	0.66	0.58	mg/kg	SW846 9010A	09/23-09/24/98	8267342
	Dilution Factor: 1					
Total Cyanide	1.3	0.58	mg/kg	SW846 9010A	10/01/98	8274197
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5110

General Chemistry

Lot-Sample #...: A8I110171-008 **Work Order #...:** CLEAJ **Matrix.....:** SOLID
Date Sampled...: 09/11/98 12:10 **Date Received..:** 09/11/98
% Moisture.....: 15

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	**85.4**	**0.10**	**%**	**MCAWW 160.3 MOD**	**09/18-09/19/98**	**8261225**
	Dilution Factor: 1					
Total Cyanide	ND	0.59	mg/kg	SW846 9010A	09/23-09/24/98	8267342
	Dilution Factor: 1					
Total Cyanide	ND	0.59	mg/kg	SW846 9010A	10/01/98	8274197
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

IT CORPORATION - KNOXVILLE

Client Sample ID: R5111

General Chemistry

Lot-Sample #...: A8I110171-009 Work Order #...: CLEAM Matrix.....: SOLID
Date Sampled...: 09/11/98 12:50 Date Received..: 09/11/98
% Moisture.....: 12

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	87.6	0.10	%	MCAWW 160.3 MOD	09/18-09/19/98	8261225
	Dilution Factor: 1					
Total Cyanide	ND	0.57	mg/kg	SW846 9010A	09/23-09/24/98	8267342
	Dilution Factor: 1					
Total Cyanide	ND	0.57	mg/kg	SW846 9010A	10/01/98	8274197
	Dilution Factor: 1					

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID

Lab Sample ID:A8I110171 011

Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Sample WT/Vol: 1 / g

Date Received: 09/11/98

Work Order: CLEC410U

Date Extracted:09/18/98

Dilution factor: 10

Date Analyzed: 09/23/98

QC Batch: 8265324

Client Sample Id: R7009

Soil Extract Vol: 5 / mL

Soil Aliquot Vol: 10 / uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
74-87-3	Chloromethane	35000	U
74-83-9	Bromomethane	35000	U
75-01-4	Vinyl chloride	35000	U
75-00-3	Chloroethane	35000	U
75-09-2	**Methylene chloride**	**2900**	**J B**
67-64-1	Acetone	69000	U
75-15-0	Carbon disulfide	17000	U
75-35-4	1,1-Dichloroethene	17000	U
75-34-3	1,1-Dichloroethane	17000	U
540-59-0	1,2-Dichloroethene (total)	17000	U
67-66-3	Chloroform	17000	U
107-06-2	1,2-Dichloroethane	17000	U
78-93-3	2-Butanone	69000	U
71-55-6	1,1,1-Trichloroethane	17000	U
56-23-5	Carbon tetrachloride	17000	U
75-27-4	Bromodichloromethane	17000	U
78-87-5	1,2-Dichloropropane	17000	U
10061-01-5	cis-1,3-Dichloropropene	17000	U
79-01-6	Trichloroethene	17000	U
124-48-1	Dibromochloromethane	17000	U
79-00-5	1,1,2-Trichloroethane	17000	U
71-43-2	Benzene	17000	U
10061-02-6	trans-1,3-Dichloropropene	17000	U
75-25-2	Bromoform	17000	U
108-10-1	4-Methyl-2-pentanone	69000	U
591-78-6	2-Hexanone	69000	U
127-18-4	Tetrachloroethene	17000	U
79-34-5	1,1,2,2-Tetrachloroethane	17000	U

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID

Lab Sample ID:A8I110171 011

Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Sample WT/Vol: 1 / g

Date Received: 09/11/98

Work Order: CLEC410U

Date Extracted:09/18/98

Dilution factor: 10

Date Analyzed: 09/23/98

QC Batch: 8265324

Client Sample Id: R7009

Soil Extract Vol: 5 / mL

Soil Aliquot Vol: 10 / uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
108-88-3	**Toluene**	**2000**	**J**
108-90-7	Chlorobenzene	17000	U
100-41-4	Ethylbenzene	17000	U
100-42-5	Styrene	17000	U
1330-20-7	Xylenes (total)	17000	U

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID

Lab Sample ID:A8I110171 011

Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Sample WT/Vol: 30.17 / g

Date Received: 09/11/98

Work Order: CLEC410V

Date Extracted:09/24/98

Dilution factor: 20

Date Analyzed: 09/25/98

Moisture %:28

QC Batch: 8267115

Client Sample Id: R7009

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
83-32-9	Acenaphthene	9100	U
208-96-8	Acenaphthylene	9100	U
120-12-7	Anthracene	9100	U
56-55-3	Benzo(a)anthracene	9100	U
205-99-2	Benzo(b)fluoranthene	9100	U
207-08-9	Benzo(k)fluoranthene	9100	U
191-24-2	Benzo(ghi)perylene	9100	U
50-32-8	Benzo(a)pyrene	9100	U
111-91-1	bis(2-Chloroethoxy)methane	9100	U
111-44-4	bis(2-Chloroethyl) ether	9100	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	9100	U
117-81-7	**bis(2-Ethylhexyl) phthalate**	**1200**	**J**
101-55-3	4-Bromophenyl phenyl ether	9100	U
85-68-7	Butyl benzyl phthalate	9100	U
106-47-8	4-Chloroaniline	9100	U
59-50-7	4-Chloro-3-methylphenol	9100	U
91-58-7	2-Chloronaphthalene	9100	U
95-57-8	2-Chlorophenol	9100	U
7005-72-3	4-Chlorophenyl phenyl ether	9100	U
218-01-9	Chrysene	9100	U
53-70-3	Dibenz(a,h)anthracene	9100	U
132-64-9	Dibenzofuran	9100	U
84-74-2	Di-n-butyl phthalate	9100	U
95-50-1	1,2-Dichlorobenzene	9100	U
541-73-1	1,3-Dichlorobenzene	9100	U
106-46-7	1,4-Dichlorobenzene	9100	U
91-94-1	3,3'-Dichlorobenzidine	9100	U
120-83-2	2,4-Dichlorophenol	9100	U

Lab Name: QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID

Lab Sample ID: A8I110171 011

Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Sample WT/Vol: 30.17 / g

Date Received: 09/11/98

Work Order: CLEC410V

Date Extracted: 09/24/98

Dilution factor: 20

Date Analyzed: 09/25/98

Moisture %: 28

QC Batch: 8267115

Client Sample Id: R7009

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
84-66-2	Diethyl phthalate	9100	U
105-67-9	2,4-Dimethylphenol	9100	U
131-11-3	Dimethyl phthalate	9100	U
117-84-0	Di-n-octyl phthalate	9100	U
534-52-1	4,6-Dinitro-2-methylphenol	22000	U
51-28-5	2,4-Dinitrophenol	22000	U
121-14-2	2,4-Dinitrotoluene	9100	U
606-20-2	2,6-Dinitrotoluene	9100	U
206-44-0	Fluoranthene	9100	U
86-73-7	Fluorene	9100	U
118-74-1	Hexachlorobenzene	9100	U
87-68-3	Hexachlorobutadiene	9100	U
77-47-4	Hexachlorocyclopentadiene	9100	U
67-72-1	Hexachloroethane	9100	U
193-39-5	Indeno(1,2,3-cd)pyrene	9100	U
78-59-1	Isophorone	9100	U
91-57-6	2-Methylnaphthalene	9100	U
95-48-7	2-Methylphenol	9100	U
91-20-3	Naphthalene	9100	U
88-74-4	2-Nitroaniline	22000	U
99-09-2	3-Nitroaniline	22000	U
100-01-6	4-Nitroaniline	22000	U
98-95-3	Nitrobenzene	9100	U
88-75-5	2-Nitrophenol	9100	U
100-02-7	4-Nitrophenol	22000	U
621-64-7	N-Nitrosodi-n-propylamine	9100	U
86-30-6	N-Nitrosodiphenylamine	9100	U
87-86-5	Pentachlorophenol	9100	U

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:A8I110171 011

Sample WT/Vol: 30.17 / g
Work Order: CLEC410V
Dilution factor: 20
Moisture %:28

Date Received: 09/11/98
Date Extracted:09/24/98
Date Analyzed: 09/25/98

QC Batch: 8267115

Client Sample Id: R7009

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
85-01-8	Phenanthrene	9100	U
108-95-2	Phenol	9100	U
129-00-0	Pyrene	9100	U
120-82-1	1,2,4-Trichlorobenzene	9100	U
95-95-4	2,4,5-Trichlorophenol	9100	U
88-06-2	2,4,6-Trichlorophenol	9100	U
86-74-8	Carbazole	9100	U
106-44-5	4-Methylphenol	9100	U

IT CORPORATION - KNOXVILLE

Client Sample ID: R7008

TOTAL Metals

Lot-Sample #...: A8I110171-010 Matrix.....: SOLID
Date Sampled...: 09/10/98 15:00 Date Received..: 09/11/98
% Moisture.....: 33

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	1.6	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ101
Lead	15.0	0.45 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ102
Selenium	1.2	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ103
Thallium	ND	0.96 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ104
Silver	ND	1.5 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ106
Aluminum	744	29.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ107
Antimony	0.71 B	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ105
Barium	25.4 B	29.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ108
Beryllium	ND	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ109
Calcium	3850	742 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10A
Cadmium	ND	0.74 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10C
Cobalt	ND	7.4 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10D
Chromium	4.2	1.5 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10E
Copper	14.6	3.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10F

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IT CORPORATION - KNOXVILLE

Client Sample ID: R7008

TOTAL Metals

Lot-Sample #...: A8I110171-010 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	5080	14.8	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10G
		Dilution Factor: 1				
Potassium	1640	742	mg/kg	SW846 6010B	09/21-09/28/98	CLEAQ10H
		Dilution Factor: 1				
Magnesium	455 B	742	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10J
		Dilution Factor: 1				
Manganese	126	2.2	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10K
		Dilution Factor: 1				
Sodium	472 B	742	mg/kg	SW846 6010B	09/21-09/28/98	CLEAQ10L
		Dilution Factor: 1				
Nickel	4.8 B	5.9	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10M
		Dilution Factor: 1				
Vanadium	1.5 B	7.4	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10N
		Dilution Factor: 1				
Mercury	0.17	0.15	mg/kg	SW846 7471A	09/21/98	CLEAQ10Q
		Dilution Factor: 1				
Zinc	91.6	3.0	mg/kg	SW846 6010B	09/21-09/24/98	CLEAQ10P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

IT CORPORATION - KNOXVILLE

Client Sample ID: R7009

TOTAL Metals

Lot-Sample #...: A8I110171-011 Matrix.....: SOLID
Date Sampled...: 09/11/98 14:00 Date Received..: 09/11/98
% Moisture.....: 28

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8264120						
Arsenic	1760	41.5 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/28/98	CLEC4101
Lead	12.8	0.41 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4102
Selenium	1.6	0.69 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4103
Thallium	ND	0.90 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4104
Silver	ND	1.4 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4106
Aluminum	179	27.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4107
Antimony	8.4	0.69 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4105
Barium	15.6 B	27.7 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4108
Beryllium	ND	0.69 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC4109
Calcium	1680	691 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410A
Cadmium	ND	0.69 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410C
Cobalt	ND	6.9 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410D
Chromium	1880	1.4 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410E
Copper	1040	3.5 Dilution Factor: 1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410F

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IT CORPORATION - KNOXVILLE

Client Sample ID: R7009

TOTAL Metals

Lot-Sample #...: A8I110171-011 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	1440	13.8	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410G
		Dilution Factor: 1				
Potassium	725	691	mg/kg	SW846 6010B	09/21-09/28/98	CLEC410H
		Dilution Factor: 1				
Magnesium	313 B	691	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410J
		Dilution Factor: 1				
Manganese	139	2.1	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410K
		Dilution Factor: 1				
Sodium	923	691	mg/kg	SW846 6010B	09/21-09/28/98	CLEC410L
		Dilution Factor: 1				
Nickel	1.5 B	5.5	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410M
		Dilution Factor: 1				
Vanadium	ND	6.9	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410N
		Dilution Factor: 1				
Mercury	0.075 B	0.14	mg/kg	SW846 7471A	09/21/98	CLEC410Q
		Dilution Factor: 1				
Zinc	41.8	2.8	mg/kg	SW846 6010B	09/21-09/24/98	CLEC410P
		Dilution Factor: 1				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

B.2 SUMMARY OF VALIDATED RESULTS

Rinse Water
Data Summary

Report Date: 02/05/99

Sample Location:			B1601R001		B1601R002		B1601R003		R1601IDW01	
Associated Site:			WAD5		WAD5		WAD5		WAD5	
Sample No:			R5000		R5001		R5002		R5003	
Sample Date:			21-SEP-98		21-SEP-98		21-SEP-98		22-SEP-98	
METALS	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
ALUMINUM		ug/L	4580	J	336	B	251	B	15100	J
ANTIMONY		ug/L	5.0	U	5.0	U	5.0	U	5.0	U
ARSENIC		ug/L	4.2	J	5.0	U	5.0	U	16.9	
BARIUM		ug/L	63.7	J	6.2	J	6.1	J	243	
BERYLLIUM		ug/L	4.0	U	4.0	U	4.0	U	4.0	U
CADMIUM		ug/L	2.2	J	1.1	J	5.0	U	8.1	
CALCIUM		ug/L	12300		6420		8130		182000	
CHROMIUM		ug/L	22.0		10.0	U	10.0	U	50.9	
COBALT		ug/L	50.0	U	50.0	U	50.0	U	31.9	J
COPPER		ug/L	84.0		25.0	U	3.3	J	66.9	
IRON		ug/L	2740	J	605	J	416	J	17500	J
LEAD		ug/L	31.5		4.6		3.6		108	
MAGNESIUM		ug/L	898	J	248	J	293	J	10900	
MANGANESE		ug/L	152		18.2		16.2		761	
MERCURY		ug/L	0.20	U	0.097	B	0.083	B	0.14	B
NICKEL		ug/L	40.0	U	40.0	U	40.0	U	30.1	B
POTASSIUM		ug/L	35800		4560	J	3110	B	71400	
SELENIUM		ug/L	5.0	U	5.0	U	5.0	U	5.0	U
SILVER		ug/L	10.0	U	10.0	U	10.0	U	10.0	U
SODIUM		ug/L	22600		4570	J	3100	B	47800	
THALLIUM		ug/L	2.0	U	2.0	U	2.0	U	1.1	J
VANADIUM		ug/L	7.5	J	50.0	U	50.0	U	30.1	B
ZINC		ug/L	289		76.8	B	42.7	B	669	

Ravenna
Rinse Water
Data Summary

Report Date: 02/05/99

Sample Location:			B1601R001		B1601R002		B1601R003		R1601IDW01	
Associated Site:			WAD5		WAD5		WAD5		WAD5	
Sample No:			R5000		R5001		R5002		R5003	
Sample Date:			21-SEP-98		21-SEP-98		21-SEP-98		22-SEP-98	
EXPLOSIVES	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
1,3,5-TRINITROBENZENE		ug/L	0.20	U	0.20	U	0.20	U	2.0	U
1,3-DINITROBENZENE		ug/L	0.20	U	0.20	U	0.20	U	2.0	U
2,4,6-TRINITROTOLUENE		ug/L	0.20	U	0.20	U	0.20	U	2.0	U
2,4-DINITROTOLUENE		ug/L	0.26		0.59		0.35		1.3	U
2,6-DINITROTOLUENE		ug/L	0.13	U	0.13	U	0.13	U	1.3	U
HMX		ug/L	9.6		0.062	B	0.16	B	120	
NITROBENZENE		ug/L	0.20	U	0.20	U	0.075	J	2.0	U
RDX		ug/L	33		0.54	U	1.7		640	
TETRYL		ug/L	0.20	U	4.0	U	0.20	U	2.0	U
m-NITROTOLUENE		ug/L	0.20	U	0.47		0.20	U	2.0	U
o-NITROTOLUENE		ug/L	0.10	B	0.087	B	0.073	B	2.0	U
p-NITROTOLUENE		ug/L	0.20	U	1.1	U	0.20	U	2.0	U

Sample Location:			B1601R001		B1601R002		B1601R003		R1601IDW01	
Associated Site:			WAD5		WAD5		WAD5		WAD5	
Sample No:			R5000		R5001		R5002		R5003	
Sample Date:			21-SEP-98		21-SEP-98		21-SEP-98		22-SEP-98	
CYANIDE	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
CYANIDE, TOTAL		mg/L	0.010	U	0.010	U	0.010	U	0.010	U

Ravenna
Soils
Data Summary

Report Date: 02/05/99

Sample Location:			B1601CS001		B1601CS002		B1601CS003		B1601CS004		B1601CS005	
Associated Site:			WAD5		WAD5		WAD5		WAD5		WAD5	
Sample No:			R5100		R5101		R5102		R5104		R5105	
Sample Date:			11-SEP-98		11-SEP-98		11-SEP-98		02-SEP-98		02-SEP-98	
METALS	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
ALUMINUM		mg/kg	10200	J	10500	J	16500	J	9750		8750	
ANTIMONY		mg/kg	1.2	J	0.42	J	0.30	J	0.39	J	0.54	UJ
ARSENIC		mg/kg	14.3	J	12.7	J	8.7	J	14.6		10.5	
BARIUM		mg/kg	82.2	J	77.6	J	145	J	73.8		32.8	
BERYLLIUM		mg/kg	0.31	J	0.33	J	0.79	J	0.26	J	0.25	J
CADMIUM		mg/kg	3.3	J	1.4	J	0.59	UJ	0.69		0.54	U
CALCIUM		mg/kg	6570	J	13600	J	54100	J	2870	J	814	J
CHROMIUM		mg/kg	15.8	J	13.2	J	15.7	J	13.7		10.6	
COBALT		mg/kg	8.2	J	28.2	J	6.0	J	6.5		5.2	J
COPPER		mg/kg	28.3	J	25.4	J	11.3	J	39.0	J	14.4	J
IRON		mg/kg	21600	J	18100	J	19800	J	16800		14600	
LEAD		mg/kg	53.4	J	32.6	J	9.5	J	29.8	J	9.4	J
MAGNESIUM		mg/kg	1980	J	2070	J	3940	J	1390		1240	
MANGANESE		mg/kg	606	J	571	J	1760	J	347		212	
MERCURY		mg/kg	0.12	UJ	0.028	J	0.037	J	0.030	J	0.030	J
NICKEL		mg/kg	12.4	J	13.2	J	9.1	J	12.8		12.3	
POTASSIUM		mg/kg	1090	J	968	J	1320	J	896		599	
SELENIUM		mg/kg	0.90	J	0.87	J	0.76	J	0.75		0.54	U
SILVER		mg/kg	1.2	UJ	1.2	UJ	1.2	UJ	1.1	U	1.1	U
SODIUM		mg/kg	61.3	J	73.0	J	244	J	65.6	J	43.7	J
THALLIUM		mg/kg	0.89	J	0.75	UJ	1.0	J	0.74	U	0.70	U
VANADIUM		mg/kg	21.3	J	16.8	J	19.2	J	17.0		14.6	
ZINC		mg/kg	57.9	J	64.8	J	38.8	J	61.5	J	48.9	J

Sample Location:			B1601CS006		B1601CS007		B1601CS010		B1601CS011	
Associated Site:			WAD5		WAD5		WAD5		WAD5	
Sample No:			R5106		R5107		R5110		R5111	
Sample Date:			02-SEP-98		11-SEP-98		11-SEP-98		11-SEP-98	
METALS	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
ALUMINUM		mg/kg	10500		8570	J	10100	J	10500	J
ANTIMONY		mg/kg	0.55	UJ	0.33	J	0.45	J	0.40	J
ARSENIC		mg/kg	12.1		8.5	J	11.4	J	14.4	J
BARIUM		mg/kg	38.0		44.9	J	58.9	J	77.5	J
BERYLLIUM		mg/kg	0.28	J	0.20	J	0.21	J	0.30	J
CADMIUM		mg/kg	0.55	U	0.61	UJ	0.59	UJ	0.81	J
CALCIUM		mg/kg	343	BJ	749	J	2240	J	16600	J
CHROMIUM		mg/kg	11.2		10.2	J	11.8	J	12.6	J
COBALT		mg/kg	7.1		7.6	J	7.5	J	7.2	J
COPPER		mg/kg	13.6	J	10.2	J	20.5	J	29.6	J
IRON		mg/kg	17000		16500	J	17400	J	17200	J
LEAD		mg/kg	11.5	J	10.8	J	27.7	J	22.8	J
MAGNESIUM		mg/kg	1410		1410	J	1620	J	2320	J
MANGANESE		mg/kg	349		604	J	540	J	653	J
MERCURY		mg/kg	0.034	J	0.038	J	0.039	J	0.027	J
NICKEL		mg/kg	16.0		11.4	J	11.7	J	12.2	J
POTASSIUM		mg/kg	561		556	J	806	J	1030	J
SELENIUM		mg/kg	0.57		0.89	J	0.58	J	0.83	J
SILVER		mg/kg	1.1	U	1.2	UJ	1.2	UJ	1.1	UJ
SODIUM		mg/kg	24.0	J	37.0	J	44.3	J	83.6	J
THALLIUM		mg/kg	0.71	U	0.80	UJ	0.76	UJ	0.74	UJ
VANADIUM		mg/kg	16.4		15.8	J	17.9	J	16.3	J
ZINC		mg/kg	55.6	J	40.5	J	57.7	J	62.7	J

Sample Location:			B1601CS001		B1601CS002		B1601CS003		B1601CS004		B1601CS005	
Associated Site:			WAD5		WAD5		WAD5		WAD5		WAD5	
Sample No:			R5100		R5101		R5102		R5104		R5105	
Sample Date:			11-SEP-98		11-SEP-98		11-SEP-98		02-SEP-98		02-SEP-98	
EXPLOSIVES	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
1,3,5-TRINITROBENZENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
1,3-DINITROBENZENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2,4-DINITROTOLUENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2,6-DINITROTOLUENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
HMX		mg/kg	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
NITROBENZENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
RDX		mg/kg	0.50	UJ	0.50	UJ	0.50	UJ	0.070	J	0.50	U
TETRYL		mg/kg	0.65	UJ	0.65	UJ	0.65	UJ	0.65	U	0.65	U
m-NITROTOLUENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
o-NITROTOLUENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U
p-NITROTOLUENE		mg/kg	0.25	UJ	0.25	UJ	0.25	UJ	0.25	U	0.25	U

Sample Location:			B1601CS006		B1601CS007		B1601CS010		B1601CS011	
Associated Site:			WAD5		WAD5		WAD5		WAD5	
Sample No:			R5106		R5107		R5110		R5111	
Sample Date:			02-SEP-98		11-SEP-98		11-SEP-98		11-SEP-98	
EXPLOSIVES	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
1,3,5-TRINITROBENZENE		mg/kg	0.25	U	0.25	UJ	0.25	UJ	0.25	UJ
1,3-DINITROBENZENE		mg/kg	0.25	U	0.024	J	0.25	UJ	0.25	UJ
2,4,6-TRINITROTOLUENE		mg/kg	0.25	U	0.25	UJ	0.25	UJ	0.25	UJ
2,4-DINITROTOLUENE		mg/kg	0.25	U	0.25	UJ	0.25	UJ	0.25	UJ
2,6-DINITROTOLUENE		mg/kg	0.25	U	0.25	UJ	0.25	UJ	0.25	UJ
HMX		mg/kg	0.50	U	0.50	UJ	0.50	UJ	0.50	UJ
NITROBENZENE		mg/kg	0.25	U	0.25	UJ	0.25	UJ	0.25	UJ
RDX		mg/kg	0.50	U	0.073	J	0.50	UJ	0.50	UJ
TETRYL		mg/kg	0.65	U	0.067	J	0.65	UJ	0.65	UJ
m-NITROTOLUENE		mg/kg	0.25	U	0.25	UJ	0.25	UJ	0.25	UJ
o-NITROTOLUENE		mg/kg	0.25	U	0.14	J	0.25	UJ	0.25	UJ
p-NITROTOLUENE		mg/kg	0.25	U	0.25	UJ	0.25	UJ	0.25	UJ

Sample Location:			B1601CS001		B1601CS002		B1601CS003		B1601CS004		B1601CS005	
Associated Site:			WAD5		WAD5		WAD5		WAD5		WAD5	
Sample No:			R5100		R5101		R5102		R5104		R5105	
Sample Date:			11-SEP-98		11-SEP-98		11-SEP-98		02-SEP-98		02-SEP-98	
CYANIDE	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
CYANIDE, TOTAL		mg/kg	0.58	R	0.58	UJ	0.59	R	0.57	U	0.54	U
			0.58	UJ			0.99	J				

Sample Location:			B1601CS006		B1601CS007		B1601CS010		B1601CS011	
Associated Site:			WAD5		WAD5		WAD5		WAD5	
Sample No:			R5106		R5107		R5110		R5111	
Sample Date:			02-SEP-98		11-SEP-98		11-SEP-98		11-SEP-98	
CYANIDE	Fltr	Units	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr	Result	Val Qlfr
CYANIDE, TOTAL		mg/kg	0.55	U	0.61	R	0.59	R	0.57	R
					0.61	UJ	0.59	UJ	0.57	UJ

Ravenna
Saw Dust
Data Summary

Report Date: 02/05/99

Sample Location:	B1601CS012
Associated Site:	WAD5
Sample No:	R5112
Sample Date:	17-SEP-98

METALS	Fltr	Units	Result	Val Qlfr
ALUMINUM		mg/kg	260	
ANTIMONY		mg/kg	0.94	J
ARSENIC		mg/kg	2.7	J
BARIUM		mg/kg	29.2	J
BERYLLIUM		mg/kg	0.74	UJ
CADMIUM		mg/kg	0.74	UJ
CALCIUM		mg/kg	2150	
CHROMIUM		mg/kg	6.6	
COBALT		mg/kg	2.4	J
COPPER		mg/kg	11.2	J
IRON		mg/kg	6430	
LEAD		mg/kg	7.2	
MAGNESIUM		mg/kg	385	J
MANGANESE		mg/kg	145	J
MERCURY		mg/kg	0.037	B
NICKEL		mg/kg	6.4	J
POTASSIUM		mg/kg	1450	
SELENIUM		mg/kg	1.5	J
SILVER		mg/kg	1.5	UJ
SODIUM		mg/kg	167	J
THALLIUM		mg/kg	0.97	U
VANADIUM		mg/kg	7.4	UJ
ZINC		mg/kg	28.5	J

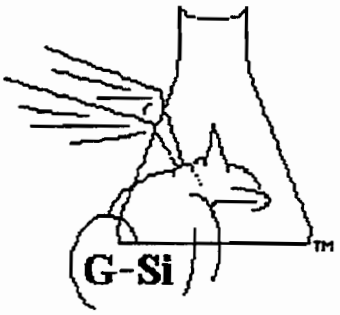
Sample Location:			B1601CS012	
Associated Site:			WAD5	
Sample No:			R5112	
Sample Date:			17-SEP-98	
EXPLOSIVES	Fltr	Units	Result	Val Qlfr
1,3,5-TRINITROBENZENE		mg/kg	2.5	U
1,3-DINITROBENZENE		mg/kg	0.61	J
2,4,6-TRINITROTOLUENE		mg/kg	42	
2,4-DINITROTOLUENE		mg/kg	2.5	U
2,6-DINITROTOLUENE		mg/kg	2.5	U
HMX		mg/kg	15	
NITROBENZENE		mg/kg	2.5	U
RDX		mg/kg	93	
TETRYL		mg/kg	6.5	U
m-NITROTOLUENE		mg/kg	2.5	U
o-NITROTOLUENE		mg/kg	2.5	U
p-NITROTOLUENE		mg/kg	2.5	U

Report Date: 02/05/99

Sample Location:			B1601CS012	
Associated Site:			WAD5	
Sample No:			R5112	
Sample Date:			17-SEP-98	
CYANIDE	Fltr	Units	Result	Val Qlfr
CYANIDE, TOTAL		mg/kg	0.74	UJ

APPENDIX C

DATA VALIDATION SUMMARY REPORTS



12/14/98

Joyce Dishner
IT Corporation
312 Directors Drive
Knoxville, TN 37923-4799
423-690-3211

Dear Joyce,

Please find enclosed a bound original and one copy of the Explosives data validation report and the Supplemental Attachment which contains Case Narratives, etc. for your Ravenna Army Ammunition Plant project. A copy of the invoice for this work is also being sent for your convenience. Per the contract, the original version is being sent via mail to Accounts Payable.

Thank you for the opportunity to work with you on this project. Please let me know if there is anything else we can do for you or if you have questions.

Sincerely,

Roger Simon

Griffin-Schruers, incorporated
2215 S. Estes St.
Lakewood, CO 80227-2324
303-987-2801 (T) • 303-987-0317 (F) • 303-257-3982 (Cell)
ras@idcomm.com

DATA VALIDATION REPORT

Program:	U.S. Army Corps of Engineers, U.S. EPA
Site:	Ravenna Army Ammunition Plant
Sampling Date (Month/Year):	9/98
Client:	IT Corporation, Knoxville, TN
Analytical Laboratory:	Quanterra, North Canton, OH
Case No.:	N/A
Sample Delivery Group (SDG):	A8I110156, A8I110171-B, A8I230103, A8I240205, A8I110171-A, A8I190158, A8I190160, A8I230102, A8I030155, A8I040101 and A8I290101
Analyses:	Explosives

Signatures:

Data Reviewer: Roger Simon Date: 12/14/98

QA/QC Review: Doug Kolb Date: 12/14/98

Senior Approval: Roger Simon Date: 12/14/98

Validation Summary Narrative

Although a number of minor qualifiers were present, the data maintained a high degree of quality. Low levels of HMX and 2-nitrotoluene were detected in the field blanks; 2,4-dinitrotoluene (DNT) was found slightly above the CRQL. Although these resulted in application of a 'B' flag to a number of low level sample results, all blank values were less than 2x the quantitation limit. Many samples arrived at temperatures greater than 6°C, which resulted in a large number of qualifiers. Since it is expected that appreciable cooling over ambient conditions was likely, these are considered to be very minor estimations. Detection limits for 2,4-DNT and 2,6-DNT (0.13 µg/L) failed to meet the QAPP specified criteria (0.10 µg/L), but were within rounding. Also, in three samples, 1,3,5-trinitrobenzene detection limits were not met. Minor accuracy and precision problems were noted for 2,4-DNT which resulted in qualification. Finally, in a number of samples, surrogates were diluted out due to high levels of target compounds.

Table of Contents

1.0 Sample IDs

The following table summarizes sample IDs, matrix of each sample and analyses present in the data package for each sample.

Sample Number	Matrix	Exp
SDG A8I110156		
R7004	W	X
R7005	W	X
R7006	W	X
SDG subtotal:		3
SDG A8I110171-B		
R7008	Sawdust	X
R7009	Sawdust	X
SDG subtotal:		2
SDG A8I230103		
R7011	W	X
R7012	W	X
SDG subtotal:		2
SDG A8I240205		
R1000	W	X
R1001	W	X
SDG subtotal:		2
SDG A8I110171-A		
R5107	S	X
R5100	S	X
R5109FB	QC	X
R5101	S	X
R5102	S	X
R5103FD	S	X
R5110	S	X
R5111	S	X
SDG subtotal:		8

Sample Number	Matrix	Exp
SDG A8I190158		
R9104FB	QC	X
SDG subtotal:		1
SDG A8I190160		
R5112	Sawdust	X
SDG subtotal:		1
SDG A8I230102		
R5000	W	X
R5001	W	X
R5002	W	X
R5003	W	X
SDG subtotal:		4
SDG A8I030155		
R5104	S	X
R5105	S	X
R5106	S	X
R5108ER	QC	X
SDG subtotal:		4
SDG A8I040101		
R7000	W	X
R7001	W	X
R7002FD	W	X
R7003	W	X
SDG subtotal:		4

Sample Number	Matrix	Exp	Sample Number	Matrix	Exp
SDG A8I290101					
R1100	W	X			
R1101	W	X			
R1102FD	W	X			
R1002	W	X			
R1003	W	X			
R1200	W	X			
R1203	W	X			
SDG subtotal:		7			

Laboratory QC Samples

Please see section 8.2.1

Number of Samples Analyzed:	38
Total Number of Analyses:	52

Exp = Explosives by SW-846 Method 8330

X: analysis was provided for validation
O: analysis was requested on Chain of Custody Record, but not provided for validation
NR: analysis was not requested on Chain of Custody Record

MS: matrix spike MSD: matrix spike duplicate Dup: matrix duplicate
RE: re-analysis DL: dilution analysis

W: water S: soil Sed: sediment QC: field blank (trip, equipment, rinseate, etc.)

2.0 Deliverables

With the exception of the following, all data deliverables as specified for Level III quality control were found in the package. The missing check standard summaries were provided as a resubmission.

- 9/21/98, 1738 Check Standard Report for SDGs A8I110171-A and A8I110171-B
- 9/15/98, 2041 and 9/16/98, 0018 Check Standard Reports for SDG A8I110171-A
- 9/25/98, 11:11 for SDG A8I240205
- 9/30/98, 1024 Check Standard Report for SDG A8I230103

2.1 Completeness Checklist

The following table summarizes the summary form information and raw data found in the package. Form numbers shown in parentheses refer to the

current U.S. EPA CLP Organics or Inorganics SOW; equivalent reporting of results in an alternate summary format has been determined to be acceptable.

Exp	Deliverable
X	Case Narrative
X	Chain of Custody Records/Traffic Reports/Tracking Records
X	Preservation Information
X	Sample Cross Reference with Unique Identifiers
X	Sample Results Summary Form (Form 1)
X	CLP Flagging used on Results Summary
X	Initial Calibration (RSD, correlation coefficient)
X/RS	Continuing Calibration Summary
X	Method/Preparation Blank Results Summary (Form 3)
X	Matrix Spike/Matrix Spike Duplicate Results Summary (Form 5A)
NR	Matrix Duplicate Results (Form 6)
X	Laboratory Control Sample (LCS)/ Blank Spike Results Summary (Form 7)
O	Control Charts
X	Surrogate Recovery
NR	Internal Standard
X	Legible Pages
X	Pages in Package Numbered and in Sequence
O	Electronic Data Deliverable (EDD)

X = Included in original Data Package O = Not Included and/or Not Available
NR = Not Required RS = Provided as a Resubmission

3.0 Detection Limits

The following is a table of samples and compounds having detection limits that do not meet the contract required or project-specific quantitation limits:

Sample ID	Analyte	Reported Quantitation Limit	Contract Required Quantitation Limit
all waters	2,4-dinitrotoluene	0.13 µg/L	0.1 µg/L
	2,6-dinitrotoluene	0.13 µg/L	0.1 µg/L
R7008, R7009	1,3,5-trinitrobenzene	3.2 µg/L	2 µg/L
R5112	1,3,5-trinitrobenzene	2.5 µg/L	2 µg/L

4.0 Holding Times

Samples were prepared and analyzed within holding times specified by the data validation guidelines. The holding time is from the date of sample collection to the date of analysis.

4.1 Sample Preservation

Sample temperatures in a number of coolers were greater than 6°C (4°C ± 2). The following table summarizes samples, SDGs, temperatures and qualifiers due to temperature preservation problems. pH requirements were met. All other samples were preserved properly.

SDG	Samples Affected	Fractions Affected*	Temperature (°C)	Qualifier
A8I110171-B	R7008, R7009	Exp	8.2	J-T/UJ-T
A8I190158	R9104FB	Exp	7.3, 10.4	J-T/UJ-T
A8I240205	R1000, R1001	Exp	6.7	J-T/UJ-T
A8I110156	R7004, R7005, R7006	Exp	7.4	J-T/UJ-T
A8I110171-A	R5107, R5100, R5109FB, R5101, R5102, R5103FD, R5110, R5111	Exp	8.2	J-T/UJ-T

* all compounds in a fraction are qualified

For a few SDGs, the sampling temperature was ***slightly*** greater than 6°C (<6.3°C). In these cases no qualifiers were applied due to thermometer stem correction considerations and since significant cooling was demonstrated.

4.2 Chain of Custody Records

All Chain of Custody Records were present and completed properly.

5.0 Calibration Quality Control

5.1 Initial Calibration - Correlation Coefficient

The required summary forms/information were provided and information was present to determine that correlation coefficients (r^2) were greater than 0.995. The initial calibration was not, however, run in triplicate per method specifications.

5.2 Continuing Calibration - %D

The continuing calibration standard (CCV) analyses were reported as required and had recoveries reported to be within the Level III specified control limits.

6.0 Blank Quality Control

6.1 Method/Preparation Blanks

A preparation/method blank was prepared and analyzed at the specified frequency. Although 1,3-dinitrobenzene was detected in the method blank associated with sample analyses in SDG A8I110171-A and A8I110171-B, associated sample results were either not detected or were greater than five times the blank amount and were not impacted.

7.0 Field QC Blanks

7.1 Field Blanks

The following table summarizes field blanks, results present within them and their associated samples.

SDG	Blank ID	Analyte	Amount (µg/L)	Associated Samples
A8I190158	9104FB	HMX 2-Nitrotoluene	0.19 J 0.17 J	R1000, R1001, R1002, R1003, R1100, R1101, R1102, R1200, R1203FD, R5000, R5001, R5002, R5003, R5112, R7005, R7011, R7012
A8I110171-A	5109FB	HMX 2,4-dinitrotoluene	0.25 J 0.19	R5100, R5101, R5102, R5103, R5104, R5105, R5106, R5107, R5108, R5110, R5111, R7000, R7001, R7002, R7003, R7004, R7006, R7008, R7009,

The following table summarizes samples and qualifiers associated with field blanks containing target analytes.

Sample ID	Compound	Sample Amount (µg/L)	Blank Amount (µg/L)	Qualifier
R1000	HMX	0.76	0.19 J	B
R1001	HMX	0.73	0.19 J	B
R1003	HMX	0.19 J	0.19 J	B
R1100	HMX	0.29 J	0.19 J	B
R1101	HMX	0.39 J	0.19 J	B
R1102FD	HMX	0.33 J	0.19 J	B
R5001	HMX	0.062 J	0.19 J	B
R5002	HMX	0.16 J	0.19 J	B

Sample ID	Compound	Sample Amount (µg/L)	Blank Amount (µg/L)	Qualifier
R5108	HMX	0.15 J	0.25 J	B
R7000	HMX	0.14 J	0.25 J	B
R7001	HMX	0.14 J	0.25 J	B
R7002FD	HMX	0.14 J	0.25 J	B
R7003	HMX	0.32 J	0.25 J	B
R7004	HMX	0.36 J	0.25 J	B
R1000	2-Nitrotoluene	0.11 J	0.17 J	B
R1001	2-Nitrotoluene	0.14 J	0.17 J	B
R1101	2-Nitrotoluene	0.14 J	0.17 J	B
R1102FD	2-Nitrotoluene	0.14 J	0.17 J	B
R1200	2-Nitrotoluene	0.17 J	0.17 J	B
R1203	2-Nitrotoluene	0.36	0.17 J	B
R5000	2-Nitrotoluene	0.10 J	0.17 J	B
R5001	2-Nitrotoluene	0.087 J	0.17 J	B
R5002	2-Nitrotoluene	0.073 J	0.17 J	B
R5108	2,4-dinitrotoluene	0.25	0.19	B
R7000	2,4-dinitrotoluene	0.78	0.19	B
R7001	2,4-dinitrotoluene	0.66	0.19	B
R7002FD	2,4-dinitrotoluene	0.50	0.19	B
R7006	2,4-dinitrotoluene	0.18	0.19	B

7.2 Equipment Rinseate Blanks

The following table summarizes field blanks, results present within them and their associated samples.

SDG	Blank ID	Analyte	Amount (µg/L)	Associated Samples
A8I030155	R5108ER	HMX	0.15 J	R5104, R5105, R5106
		Tetryl	22	
		2,4,6-trinitrobenzene	0.10 J	
		2-nitrotoluene	0.51	
		2,4-dinitrotoluene	0.25	

No qualification was required since there were no detected results for the above compounds in associated samples.

8.0 Accuracy

8.1 Laboratory Control Samples/Blank Spikes

8.1.1 Frequency

Blank spikes/laboratory control samples (LCS) were prepared and analyzed with each sample batch and for each matrix in the data package.

8.1.2 Control Charts

Although laboratory control charts were not present in any data package, the laboratory did include their internal QC limits.

8.1.3 Recovery

Blank spike/LCS (and blank spike duplicate, when analyzed) recoveries met control limits for target compounds specified by the Ravenna QAPP. The laboratory flagged some results for *non-target* compounds as being outside of their internal QC limits; these results, however, met QAPP limits.

8.1.4 Reanalyses

No reanalyses based on LCS performance were required.

8.2 Matrix Spikes / Matrix Spike Duplicates

8.2.1 Frequency

The matrix (pre-digest) spike frequency requirement was not met. The following table summarizes samples used for matrix spiking, their matrices, parameters and samples associated with that matrix spike sample.

Matrix Spike Sample	Matrix	Fraction	Associated Samples
R5102	Soil	Explosives	SDG A8I110171-B, A8I110171-A
None	water	Explosives	A8I110171-A
H8I260153-002	Soil	Explosives	SDG A8I190160
R1003	Water	Explosives	SDG A8I290101
H8I090138-002	Water	Explosives	SDG A8I110156
R7003	Water	Explosives	SDG A8I040101
R5104	Soil	Explosives	SDG A8I030155
None		Explosives	SDG A8I230102, A8I190158, A8I240205, A8I230103

For analyses where a matrix spike was not performed, LCS / LCS Duplicate analyses were performed. Since accuracy and precision could be assessed to some extent, no action was taken by the reviewer.

Some fractions in some packages contained a matrix QC analysisthat was found not to have been from the site in question. Although applied to samples per client specifications, application of matrix QC from other sites may result in qualifiers not completely representative of the sample's matrix since conditions are **not** expected to be consistent from site to site.

8.3.2 Recovery

Matrix spike / matrix spike duplicate recoveries were within QAPP specified control limits (75 - 125%) with the exception of the following. Only the compound in the sample used for spiking has been qualified per validation guidelines.

Matrix Spike Sample	Compound	MS %R	MSD %R	%R limits	%RPD	%RPD limits	Qualifier
R1003	tetryl[a]	161	167	50-150	--	--	none
R7003	Tetryl[a]	652	636	50-150	--	--	none
	1,3-dintrobenzene[a]	--	156	50-150	--	--	none
	2,4-dinitrotoluene	--	168	50-150	45	20	J-SD

[a] undetected results are not impacted by the high bias indicated by a high spike recovery; no qualifiers have been applied

9.0 Precision

9.1 Matrix Duplicates

9.1.1 Frequency

Matrix (pre-digest) duplicate analyses were not performed and are typically not a part of organics analyses.

9.1.2 Performance

Please see section 9.1.1.

9.2 Matrix Spike Duplicates

9.2.1 Frequency

Please see section 8.3.1 for a table summarizing matrix spike/matrix spike duplicate analyses.

9.2.2 Performance

Please see section 8.3.2 for a table summarizing matrix spike/matrix spiked duplicate analyses.

10.0 Surrogates

10.1 Frequency

Surrogates were analyzed at the specified frequency.

10.2 Recovery

With the exception of the following, surrogates met all criteria.

Sample ID	Surrogate	%R	%R limits	Qualifier	Affected Compounds
7008	1-chloro-3-nitrobenzene	0 D		None[a]	All explosives
7009	1-chloro-3-nitrobenzene	147	72-129	none[b]	All explosives
R5000DL	1-chloro-3-nitrobenzene	0 D		None[a]	All explosives
R5003DL	1-chloro-3-nitrobenzene	0 D		None[a]	All explosives
R5112	1-chloro-3-nitrobenzene	0 D		None[a]	All explosives
7011	1-chloro-3-nitrobenzene	0 D		None[a]	All explosives
7012	1-chloro-3-nitrobenzene	0 D		None[a]	All explosives
7012DL	1-chloro-3-nitrobenzene	0 D		None[a]	All explosives

[a] Results diluted out, no qualifiers applied.

[b] Undetected results are not impacted by the high bias indicated by a high surrogate recovery and have not been qualified.

10.3 Reanalysis

Reanalyses were performed as required.

11.0 Reanalyses

Reanalyses were performed when required. Please see sections 8.1.4 and 10.3.

12.0 Dilution Analyses

Secondary dilutions were performed when required. Please also see section 10.2.

Generally, undiluted analyses were not provided by the laboratory.

13.0 Case Narratives

Case narratives were generic for the most part and generally did a poor job of describing specific issues found in the data package. For some data packages, entire fractions were not addressed. In addition, in most cases where calibration problems existed, these were not addressed.

14.0 Field Duplicates

No detected results were reported in field duplicate pair R5102 and R5103FD. The results for other duplicate pairs and the RPD or duplicate difference value (Δ) for each analyte are summarized below. Qualifiers have been indicated for outliers.

Compound	Sample ID: R7001 (µg/L)	Duplicate ID: R7002FD (µg/L)	Difference (Δ) or RPD	Qualifer
HMX	0.14 J	0.14 J	0 %	
2,4-DNT	0.66	0.50	27.6 %	J-D
2,6-DNT	0.18	0.21	15.4 %	

Analyte	Sample ID: R1101 (µg/L)	Duplicate ID: R1102FD (µg/L)	Difference (Δ) or RPD	Qualifier
HMX	0.39 J	0.33 J	16.7 %	
Nitrobenzene	0.050 J	0.20 U	NC	
2-NT	0.14 J	0.14 J	0 %	

Analyte	Sample ID: R1101 (µg/L)	Duplicate ID: R1102FD (µg/L)	Difference (Δ) or RPD	Qualifier
2,6-NT	0.21	0.17	21.0 %	**

* precision problem indicated, qualifiers have been applied to the impacted compound in the sample and its duplicate only

** precision problem indicated, however, due to the low level of results and since the duplicate difference (0.04 µg/L) is well less than the control limit when using differences (0.04 µg/L), no qualifiers have been applied.

NC = not calculated

15.0 System Performance

Except as noted previously, the instrumental and analytical systems used in the analysis of these samples maintained an acceptable level of performance.

16.0 Contract Requirements

Please see sections 3.0, 4.1 and 10.2 for information concerning non-compliant situations.

17.0 Additional Comments

Please see the addendum report for Ravenna for Project Correspondence, Case Narratives, Chain of Custody Records and Matrix Spike/Matrix Spike Duplicate Summary Forms. LCS/LSC Dup summary forms have been included when matrix spike analyses were not performed.

18.0 Sample Data Qualifier Table

Site Name: Ravenna

Sample ID	R1000	R1001	R1002	R1003	R1100	R1101
Matrix	water	water	Water	water	water	water
Explosives						
HMX	BJT	BJT		B	B	B
RDX	UJT	UJT				
1,3,5-trinitrobenzene	UJT	UJT				
1,3-dinitrobenzene	UJT	UJT				
Tetryl	UJT	UJT				
Nitrobenzene	UJT	UJT				
2,4,6-trinitrotoluene	UJT	UJT				
2-nitrotoluene	BJT	BJT				B
2,4,-dinitrotoluene	JT	JT				
3-nitrotoluene	UJT	UJT				
4-nitrotoluene	UJT	UJT				
2,6-dinitrotoluene	UJT	UJT				
Nitroglycerin	UJT	UJT				

Site Name: Ravenna

Sample ID	R1102FD	R1200	R1203	R1203DL	R5000	R5000DL
Matrix	water	water	water	water	water	water
Explosives						
HMX	B					
RDX						
1,3,5-trinitrobenzene						
1,3-dinitrobenzene						
Tetryl						
Nitrobenzene						
2,4,6-trinitrotoluene						
2-nitrotoluene	B	B	B		B	
2,4,-dinitrotoluene						
3-nitrotoluene						
4-nitrotoluene						
2,6-dinitrotoluene						
Nitroglycerin						

Site Name: Ravenna

Sample ID	R5001	R5002	R5003	R5003DL	R5100	R5101
Matrix	water	water	water	water	soil	soil
Explosives						
HMX	B	B			UJT	UJT
RDX					UJT	UJT
1,3,5-trinitrobenzene					UJT	UJT
1,3-dinitrobenzene					UJT	UJT
Tetryl					UJT	UJT
Nitrobenzene					UJT	UJT
2,4,6-trinitrotoluene					UJT	UJT
2-nitrotoluene	B	B			UJT	UJT
2,4,-dinitrotoluene					UJT	UJT
3-nitrotoluene					UJT	UJT
4-nitrotoluene					UJT	UJT
2,6-dinitrotoluene					UJT	UJT
Nitroglycerin					UJT	UJT

Site Name: Ravenna

Sample ID	R5102	R5103FD	R5104	R5105	R5106	R5107
Matrix	soil	soil	soil	soil	soil	soil
Explosives						
HMX	UJT	UJT				UJT
RDX	UJT	UJT				JT
1,3,5-trinitrobenzene	UJT	UJT				UJT
1,3-dinitrobenzene	UJT	UJT				JT
Tetryl	UJT	UJT				JT
Nitrobenzene	UJT	UJT				UJT
2,4,6-trinitrotoluene	UJT	UJT				UJT
2-nitrotoluene	UJT	UJT				JT
2,4,-dinitrotoluene	UJT	UJT				UJT
3-nitrotoluene	UJT	UJT				UJT
4-nitrotoluene	UJT	UJT				UJT
2,6-dinitrotoluene	UJT	UJT				UJT
Nitroglycerin	UJT	UJT				UJT

Site Name: Ravenna

Sample ID	R5108	R5109FB	R5110	R5111	R5112	R7000
Matrix	water	water	soil	soil	soil	water
Explosives						
HMX	B	JT	UJT	UJT		B
RDX		UJT	UJT	UJT		
1,3,5-trinitrobenzene		UJT	UJT	UJT		
1,3-dinitrobenzene		UJT	UJT	UJT		
Tetryl		UJT	UJT	UJT		
Nitrobenzene		UJT	UJT	UJT		
2,4,6-trinitrotoluene		UJT	UJT	UJT		
2-nitrotoluene		UJT	UJT	UJT		
2,4,-dinitrotoluene	B	JT	UJT	UJT		B
3-nitrotoluene		UJT	UJT	UJT		
4-nitrotoluene		UJT	UJT	UJT		
2,6-dinitrotoluene		UJT	UJT	UJT		
Nitroglycerin		UJT	UJT	UJT		

Site Name: Ravenna

Sample ID	R7001	R7002FD	R7003	R7004	R7005	R7006
Matrix	water	water	water	water	water	water
Explosives						
HMX	B	B	B	BJT	UJT	UJT
RDX				UJT	JT	JT
1,3,5-trinitrobenzene				UJT	UJT	UJT
1,3-dinitrobenzene				UJT	UJT	UJT
Tetryl				UJT	UJT	UJT
Nitrobenzene				UJT	UJT	UJT
2,4,6-trinitrotoluene				UJT	UJT	UJT
2-nitrotoluene				UJT	UJT	UJT
2,4,-dinitrotoluene	BJD	BJD	JSD	UJT	JT	BJT
3-nitrotoluene				UJT	UJT	UJT
4-nitrotoluene				UJT	UJT	UJT
2,6-dinitrotoluene				UJT	UJT	UJT
Nitroglycerin				UJT	UJT	UJT

Site Name: Ravenna

Sample ID	R7008	R7009	R7011	R7012	R7012DL	R9104FB
Matrix	sawdust	sawdust	water	water	water	water
Explosives						
HMX	JT	UJT				JT
RDX	JT	UJT				UJT
1,3,5-trinitrobenzene	UJT	UJT				UJT
1,3-dinitrobenzene	JT	UJT				UJT
Tetryl	UJT	UJT				UJT
Nitrobenzene	UJT	UJT				UJT
2,4,6-trinitrotoluene	JT	UJT				UJT
2-nitrotoluene	UJT	UJT				JT
2,4,-dinitrotoluene	JT	UJT				UJT
3-nitrotoluene	JT	UJT				UJT
4-nitrotoluene	UJT	UJT				UJT
2,6-dinitrotoluene	UJT	UJT				UJT
Nitroglycerin	UJT	UJT				UJT

APPENDIX A – Data Qualifier Definitions

Definitions of Data Qualifiers

The following codes are considered the "EPA" qualifiers and specified for use by the various Functional Guidelines for data validation.

R: Rejected - Data are unusable (Note: Analyte may or may not be present).

U: Undetected; the analyte was not detected above the MDA

N: Tentatively Identified

J: Estimated

UJ: Undetected, but the number that is reported as the quantitation limit (MDA) is an estimated value

B: Impacted by an associated blank

The following subqualifiers give further detail of the type and amount of qualification a given data point has received.

-H: Qualified due to holding time violation

-T: Qualified due to sample preservation problems

-I: Qualified due to interference problems / internal standard

-D: Qualified due to precision problems (duplicate control limits not met)

-S: Qualified due to accuracy problems (matrix spike recovery criteria not met)

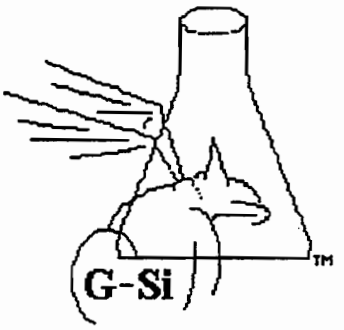
-C: Qualified due to instrument calibration problems

-L: Qualified due to accuracy problems (LCS recovery criteria not met)

-G: Qualified due to background problems

-K: Qualified due to negative blank value problems

-Q: Qualified for other reasons - refer to the text of the report



12/12/98

Joyce Dishner
IT Corporation
312 Directors Drive
Knoxville, TN 37923-4799
423-690-3211

Dear Joyce,

Please find enclosed the bound original and one copy of the Inorganics (Metals and Cyanide) data validation reports for your Ravenna Army Ammunition Plant project. I will send the invoice with the completed Explosives report once I receive the final laboratory responses.

Thank you for the opportunity to work with you on this project. Please let me know if there is anything else we can do for you or if you have questions.

Sincerely,

Roger Simon

Griffin-Schruers, incorporated
2215 S. Estes St.
Lakewood, CO 80227-2324
– 303-987-2801 (T) • 303-987-0317 (F) • 303-257-3982 (Cell)
ras@idcomm.com

DATA VALIDATION REPORT

Program:	U.S. Army Corps of Engineers, U.S. EPA
Site:	Ravenna Army Ammunition Plant
Sampling Date (Month/Year):	9/98
Client:	IT Corporation, Knoxville, TN
Analytical Laboratory:	Quanterra, North Canton, OH
Case No.:	N/A
Sample Delivery Group (SDG):	A8I030155, A8I110171-A, A8I110171-B, A8I190158, A8I190160, A8I230102, A8I230103, A8I240205, A8I290101, A8I040101 and A8I190156
Analyses:	Total Metals, Cyanide

Signatures:

Data Reviewer: Roger Simon Date: 12/11/98

QA/QC Review: Douglas J Kolb Date: 12/11/98
Doug Kolb

Senior Approval: Roger Simon Date: 12/11/98

Validation Summary Narrative

Due to the large number of minor qualifiers present, the data did not maintain as high a degree of quality as it could have. Many samples were impacted by temperatures greater than 6°C, which resulted in a large number of qualifiers. Since it is expected that appreciable cooling over ambient conditions was likely, these are considered to be minor estimations. Of more concern, however, was the laboratory's systematic problem with maintaining calibration integrity. Although many continuing calibration check outliers were found throughout the data, analyses were not terminated, problems corrected and affected samples reanlyzed. One calibration check standard for mercury had a 2% recovery. Therefore, mercury results in samples R1000 and R1001 were qualified as unusable (R). A number of matrix spike /matrix spike duplicate (MS/MSD) problems were found, most of which were minor with the exception of one cyanide MSD: the recovery for this standard was 3.5 %, which resulted in the cyanide result for sample R5108 being qualified as unusable. Although some minor documentation issues existed, the laboratory provided all missing data.

Table of Contents

1.0 Sample IDs

The following table summarizes sample IDs, matrix of each sample and analyses present in the data package for each sample.

Sample Number	Matrix	T	C
SDG A8I190158			
R9104FB	QC	X	X
SDG subtotal:		1	1
SDG A8I230103			
R7011	W	X	--
R7012	W	X	--
SDG subtotal:		2	0
SDG A8I030155			
R5104	S	X	X
R5105	S	X	X
R5106	S	X	X
R5108ER	QC	X	X
SDG subtotal:		4	4
SDG A8I290101			
R1100	W	X	--
R1101	W	X	--
R1102FD	W	X	--
R1002	W	X	--
R1003	W	X	--
R1200	W	X	--
R1203	W	X	--
SDG subtotal:		7	0
SDG A8I110171-B			
R7008	Sawdust	X	--
R7009	Sawdust	X	--
SDG subtotal:		2	0
SDG A8I040101			
R7004	W	X	--
R7005	W	X	--
R7006	W	X	--
SDG subtotal:		3	0

Sample Number	Matrix	T	C
SDG A8I190160			
R5112	sawdust	X	X
SDG subtotal:		1	1
SDG A8I240205			
R1000	W	X	--
R1001	W	X	--
SDG subtotal:		2	0
SDG A8I230102			
R5000	W	X	--
R5001	W	X	--
R5002	W	X	--
R5003	W	X	--
SDG subtotal:		4	0
SDG A8I110171-A			
R5107	S	X	X
R5100	S	X	X
R5109FB	QC	X	X
R5101	S	X	X
R5102	S	X	X
R5103FD	S	X	X
R5110	S	X	X
R5111	S	X	X
SDG subtotal:		8	8
SDG A8I190156			
R7000	W	X	--
R7001	W	X	--
R7002FD	W	X	--
R7003	W	X	--
SDG subtotal:		4	0

Sample Number	Matrix	T	C	Sample Number	Matrix	T	C

Laboratory QC Samples

Please see section 8.2.1

Number of Samples Analyzed:	38	18
Total Number of Analyses:	56	30

T = Total Metals by SW-846 Methods 6010A, 7470A, 7841
C = Cyanide by SW-846 Method 9010A

X: analysis was provided for validation
O: analysis was requested on Chain of Custody Record, but not provided for validation
NR: analysis was not requested on Chain of Custody Record

MS: matrix spike MSD: matrix spike duplicate Dup: matrix duplicate
RE: re-analysis DL: dilution analysis

W: water S: soil Sed: sediment QC: field blank (trip, equipment, rinseate, etc.)

2.0 Deliverables

All data deliverables as specified for Level III quality control were found in the package, with the exception of the following, which the laboratory provided as a resubmission: cyanide calibration data for SDGs A8I230102, A8I190158 and A8I190160; metals calibration and GFAA data for SDGs A8I190158, A8I110171-A, A8I110171-B, A8I230102, A8I290101 and A8I190160.

2.1 Completeness Checklist

The following table summarizes the summary form information and raw data found in the package. Form numbers shown in parentheses refer to the current U.S. EPA CLP Inorganics SOW; equivalent reporting of results in an alternate summary format has been determined to be acceptable.

ICP	GFAA	Hg	CN	Deliverable
X	X	X	X	Case Narrative
X	X	X	X	Chain of Custody Records/Traffic Reports/Tracking Records
X	X	X	X	Preservation Information
X	X	X	X	Sample Cross Reference with Unique Identifiers
X	X	X	X	Sample Results Summary Form (Form 1)
X	X	X	X	CLP Flagging used on Results Summary
X	X/RS	X/RS	X/RS	Initial Calibration: correlation coefficients, standards
X	X/RS	X/RS	X/RS	Initial and Continuing Calibration Verification (ICV/CCV Form 2A)
X	X	X	X	Method/Preparation Blank Results Summary (Form 3)
X	X	X	X	Matrix Spike/Matrix Spike Duplicate Results Summary (Form 5A)

ICP	GFAA	Hg	CN	Deliverable
O	O	O	O	Matrix Duplicate Results (Form 6)
X	X	X	X	Laboratory Control Sample (LCS) Summary (Form 7)
O	O	O	O	Control Charts
X	NR	NR	NR	Serial Dilution
X	X	X	X	GFAA Post-digestion spike results
O	O	O	O	Summary Preparation Log (Form 13)
O	O	O	O	Summary Run Log (Form 14)
X	X	X	X	Legible Pages
X	X	X	X	Pages in Package Numbered and in Sequence
NR	NR	NR	NR	Electronic Data Deliverable (EDD)

X = Included in original Data Package
O = Not Included and/or Not Available
NR = Not Required
RS = Provided as a Resubmission

3.0 Detection Limits

Instrument/method detection limits (uncorrected for preparation factors, dilutions, etc.) met Ravenna QAPP specifications.

4.0 Holding Times

With the exception of those listed below, samples were prepared and analyzed within holding times specified by the data validation guidelines. The holding time is from the date of sample collection to the date of analysis.

SDG	Sample	Fraction	Sampling Date	Analysis Date	Number of Days Out	Qualifier
A8I110171-A	R5107	Cyanide	9/11/98	10/1/98	6	UJ-H
A8I110171-A	R5100	Cyanide	9/11/98	10/1/98	6	UJ-H
A8I110171-A	R5102	Cyanide	9/11/98	10/1/98	6	UJ-H
A8I110171-A	R5103FD	Cyanide	9/11/98	10/1/98	6	UJ-H
A8I110171-A	R5110	Cyanide	9/11/98	10/1/98	6	UJ-H
A8I110171-A	R5111	Cyanide	9/11/98	10/1/98	6	UJ-H
A8I190160	R5112	Cyanide	9/17/98	10/7/98	6	UJ-H

4.1 Sample Preservation

Sample temperatures in a number of coolers were greater than 6°C (4°C ± 2). The following table summarizes samples, SDGs, temperatures and qualifiers due to temperature preservation problems. pH requirements were met. All other samples were preserved properly.

SDG	Samples Affected	Fractions Affected*	Temperature (°C)	Qualifier
A8I190158	R9104FB	Metals, Cyanide	7.3, 10.4	J-T/UJ-T
A8I110171-A	R5107, R5100, R5109FB, R5101, R5102, R5103FD, R5110, R5111	Metals, Cyanide	8.2	J-T/UJ-T
A8I110171-B	R7008, R7009	Metals	8.2	J-T/UJ-T
A8I240205	R1000, R1001	Metals	6.7	J-T/UJ-T
A8I110156	R7004, R7005, R7006	Metals	7.4	J-T/UJ-T

* all analytes in a fraction are qualified

For a few SDGs, the sampling temperature was ***slightly*** greater than 6°C (<6.3°C). In these cases no qualifiers were applied due to thermometer stem correction considerations and since significant cooling was demonstrated.

4.2 Chain of Custody Records

All Chain of Custody Records were present and completed properly.

5.0 Calibration Quality Control

5.1 Initial Calibration

5.1.1 Correlation Coefficient

The required summary forms/information were provided and information was present to determine that correlation coefficients (r^2) were greater than 0.995.

5.1.2 ICP Initial Calibration

The required summary forms/information were provided and information was present to verify that ICP initial calibration included at least standard and one blank.

5.1.3 Calibration Factors/ICVs

The required summary forms/information were provided and information was present to verify calibration factors/%RSDs/initial calibration verifications (ICVs) met specified criteria.

5.2 Continuing Calibration (%D / %R)

Except as noted in the following table, the continuing calibration standard (CCV) analyses were reported as required and had recoveries reported to be within the Level III specified control limits. In cases where a CCV did not meet requirements, the laboratory failed to terminate the analysis, take corrective action, recalibrate and reanalyze samples.

Samples Affected	Analyte	CCV	%R	Qualifier
R5109FB	Thallium	#3	112.5	none[c]
R7000, R7001, R7002FD, R7003	Thallium	#2	112.5	none[c]
R5000, R5001, R5002	Thallium	all	> 110.0	none[c]
R5003	Thallium	all	> 110.0	J-C
R7012	Thallium	all	> 110.0	None[c]
None[a]	manganese	#4	111.9	N/a
None[a]	manganese	#18	111.6	N/a
None[a]	manganese	#22	111.7	N/a
None[a]	Beryllium	#22	110.3	N/a
None[a]	arsenic	#22	111.0	N/a
None[a]	mercury	#2	79.8	N/a
R1000	Thallium	#1, #2	113.2, 112.5	none[c]
R1001	Thallium	#1, #2	113.2, 112.5	J-C
R1000, R1001	mercury	#1	2	R-C[b]
R9104FB	Thallium	all	> 110.0	none[c]

[a] no samples were directly bracketed by these out of control standards, thus no qualifiers were applied. Termination and reanalysis was not, however, performed.

[b] due to the extreme recovery of CCV1, the entire analytical run is considered questionable, thus the rejection of undetected results.

[c] since undetected results are not impacted by the high bias indicated by a high spike recovery, no qualifiers were applied

6.0 Blank Quality Control

6.1 Instrument Blanks

Instrument blanks were not analyzed.

6.2 ICB/CCBs

Initial and continuing calibration blanks (ICB/CCB) are not specified for Level III review. However, cursory review of these blanks indicated that all analyte values were less than their respective CRDLs, with the exception of a number of CCBs in the ICP run which were significantly over the CRDL. Since these CCBs did not bracket sample analyses, no action was taken. Please also see section 6.2.

6.3 Method/Preparation Blanks

A preparation/method blank was prepared and analyzed at the specified frequency. The following is a table of samples and analytes requiring data qualifiers due to reported contaminants in the preparation blanks. The samples and analytes listed below were reported to be less than five times the amount reported in the associated blank.

Sample ID	Analyte	Sample Amount (µg/L)		Blank Amount (µg/L)		Qualifier
R5109FB	Zinc	14.0	B	14.1	B	B
R7004	Zinc	51.1		14.1	B	B
R7005	Sodium	1130	B	508	B	B
	Zinc	22.0		14.1	B	B
R7006	Sodium	1230	B	508	B	B
	Zinc	34.1		14.1	B	B
R5001	Aluminum	336		74.5	B	B
	Mercury	0.097	B	0.074	B	B
	Zinc	76.8		15.2	B	B
R5002	Aluminum	251		74.5	B	B
	Mercury	0.083	B	0.074	B	B
	Zinc	42.7		15.2	B	B
R5003	Mercury	0.14	B	0.074	B	B
R1100	Zinc	25.2		17.5	B	B
R1101	Thallium	1.8	B	1.1	B	B
R1003	Zinc	47.0		17.5	B	B
R1002	Zinc	62.0		17.5	B	B
R1203	Zinc	68.1		17.5	B	B
R1001	Thallium	1.7	B	1.0	B	B

Sample ID	Analyte	Sample Amount (µg/L)	Blank Amount (µg/L)	Qualifier
R9104FB	mercury	0.075 B	0.074 B	B
	calcium	267 B	247 B	B
		(mg/kg)		
R5106	Calcium	343 B	92.2 B	B

7.0 Field QC Blanks

7.1 Field Blanks

The following table summarizes field blanks, results present within them and their associated samples.

SDG	Blank ID	Analyte	Amount (µg/L)	Associated Samples
A8I190158	9104FB	Mercury Calcium	0.075 B 267 B	R1000, R1001, R1002, R1003, R1100, R1101, R1102FD, R1200, R1203FD, R5000, R5001, R5002, R5003, R5112, R7005, R7011, R7012
A8I110171-A	5109FB	zinc	14.0 B	R5100, R5101, R5102, R5103FD, R5104, R5105, R5106, R5107, R5108, R5110, R5111, R7000, R7001, R7002, R7003, R7004, R7006, R7008, R7009,

The following table summarizes samples and qualifiers associated with field blanks containing target analytes.

Sample ID	Analyte	Sample Amount (µg/L)	Blank Amount (µg/L)	Qualifier
R1100	Calcium	509 B	267 B	B
R1203	Mercury	0.097 B	0.075 B	B
R5001	Mercury	0.097 B	0.075 B	B
R5002	Mercury	0.083 B	0.075 B	B
R5003	Mercury	0.14 B	0.075 B	B
R5108	Zinc	19.3 B	14.0 B	B
R7000	Zinc	23.6	14.0 B	B
R7001	Zinc	32.2	14.0 B	B
R7002FD	Zinc	13.6 B	14.0 B	B
R7003	Zinc	23.1	14.0 B	B
R7004	Zinc	51.1	14.0 B	B
R7006	Zinc	34.1	14.0 B	B
		(mg/kg)		
R5112	Mercury	0.037 B	0.075 B	B

7.2 Equipment Rinseate Blanks

The following table summarizes field blanks, results present within them and their associated samples.

SDG	Blank ID	Analyte	Amount (µg/L)	Associated Samples
A8I030155	R5108ER	Calcium Zinc	261 B 19.3 B	R5104, R5105, R5106

No qualification was required since there were no detected results for the above compounds in associated samples.

Sample ID	Analyte	Sample Amount (mg/kg)	Blank Amount (µg/L)	Qualifier
R5106	calcium	343 B	261 B	B

8.0 Accuracy

8.1 Laboratory Control Samples/Blank Spikes

8.1.1 Frequency

Blank spikes/laboratory control samples (LCS) were prepared and analyzed with each sample batch and for each matrix in the data package.

8.1.2 Control Charts

Although laboratory control charts were not present in any data package, the laboratory did include their internal QC limits.

8.1.3 Recovery

Blank spike/LCS recoveries met control limits specified by the Ravenna QAPP.

8.1.4 Reanalyses

Batch re-preparation and reanalysis was performed when required based on LCS analysis.

8.2 Matrix Spikes / Matrix Spike Duplicates

8.2.1 Frequency

The matrix (pre-digest) spike frequency requirement was not met. The following table summarizes samples used for matrix spiking, their matrices, parameters and samples associated with that matrix spike sample.

Matrix Spike Sample	Matrix	Fraction	Associated Samples
A8I110156-001	Water	Metals	SDG A8I110171-A
R5107 (A8I110171-001)	Soil	Metals	SDG A8I110171-A, SDG A8I110171-B
R5104 (A8I030155-002)	Soil	Metals	SDG A8I030155
R7003 (A8I040101-004)	water	Metals	SDG A8I030155
R7004	water	Metals	SDG A8I110156
A8I170106-001	Water	Metals	SDG A8I230102, A8I230103
R1003	water	metals	SDG A8I290101, A8I240205
A8I180160-008	Soil	Metals (-Hg)	SDG A8I190160
A8I160154-001	Soil	mercury	SDG A8I190160
A8I170106-001	water	Metals	SDG A8I190158
A8J020212-003	Water	Cyanide	SDG A8I230102
None	water	Cyanide	SDG A8I190158
A8I240135-003	water	Cyanide	SDG A8I190160
R5108, R5104	soil	Cyanide	SDG A8I030155
R5101, R5107	soil	Cyanide	SDG A8I110171-A

For analyses where a matrix spike was not performed, an LCS was performed. Since accuracy could be assessed to some extent, no action was taken by the reviewer.

Some fractions in some packages contained a matrix QC analysisthat was found not to have been from the site in question. Although applied to samples per client specifications, application of matrix QC from other sites may result in

qualifiers not completely representative of the sample's matrix since conditions are **not** expected to be consistent from site to site.

8.3.2 Recovery

Matrix spike / matrix spike duplicate recoveries were within the specified control limits (75 - 125%).

Associated Samples	Matrix	Analyte	MS %R	MSD %R	% RPD	Qualifier
R5100, R5101, R5102, R5103, R5107, R5110, R5111, R7008, R7009	s	Antimony	52	56	--	J-S
		Chromium	--	126	--	J-S
		Copper	--	130	--	J-S
R5104, R5105, R5106	S	Lead	56	56	--	J-S
		Antimony	46	50	--	J-S/UJ-S
		Calcium	61	59	--	J-S
		copper	12	12	--	J-S
R5108ER	W	Iron	--	195	54	J-SD
		Thallium	--	--	22	UJ-D
R7004, R7005, R7006	W	Iron	--	195	54	J-SD
		Thallium	--	--	22	UJ-D
R5000, R5001, R5002, R5003, R7011, R7012, R9104FB	W	Aluminum	163	131	--	J-S/none
		Iron	130	--	--	J-S/none
R1000, R1001	W	Aluminum	126	--	--	J-S
		Chromium	--	--	21	J-D
R5112	S	Antimony	61	59	--	J-S
		Arsenic	37	38	--	J-S
		Beryllium	73	74	--	UJ-S
		Cadmium	34	36	--	UJ-S
		Cobalt	51	--	200	J-SD
		Copper	0	12	--	J-S
		Manganese	14	15	--	J-S
		Nickel	24	33	--	J-S
		Selenium	44	44	--	J-S
		Silver	52	41	--	UJ-S
		Thallium	47	46	--	UJ-S
		Vanadium	40	38	--	UJ-S
		Zinc	9.5	0	200	J-SD
R5000, R5001, R5002, R5003	W	Cyanide	130	145	--	None[a]
R5108	W	Cyanide	--	3.5	188	R-S

[a] Undetected results are not impacted by the high bias indicated by a high matrix spike recovery; therefore, no qualifiers have been applied.

The following analytes in the MS/MSD samples listed below were greater than 4x the spike added; no qualifiers have been applied per validation guidelines.

R5107: Al, Fe, Mn, Na
R5104: Al, Fe, Mn
R1000: Fe
A8I180160-008: Al, Ba, Ca, Cr, Fe, Pb, Mn, Hg

In a number of cases, the laboratory has flagged results as being associated with an MS/MSD which did not meet *internal laboratory* limits. The reviewer has used the 75-125% recovery limits specified by the Ravenna QAPP as a basis for qualification.

9.0 Precision

9.1 Matrix Duplicates

9.1.1 Frequency

Matrix duplicate analysis was not performed. Since MS/MSD analyses and field duplicate analyses were present and accuracy could be assessed to some extent, no action was taken by the reviewer.

9.1.2 Performance

Not applicable; please see section 9.1.1.

9.2 Matrix Spike Duplicates

9.2.1 Frequency

The matrix spike /matrix spike duplicate frequency requirement was met. Please see section 8.3.1 for a table summarizing matrix spike/matrix spiked duplicate analyses.

9.2.2 Performance

Please see section 8.3.2 for a table summarizing matrix spike/matrix spiked duplicate analysis outliers; per the Ravenna QAPP, 20% RPD was used for waters while 35% RPD was used for soils.

10.0 GFAA Post-digestion spikes/MSA

10.1 Frequency

GFAA post-digestion analytical spikes and Method of Standard Additions (MSA) analyses all were performed at the specified frequency.

10.2 Recovery

With exceptions as noted in the following table, GFAA post-digestion analytical spike recoveries and Method of Standard Additions (MSA) correlation coefficients met all criteria.

Sample ID	Analyte	GFAA PDS recovery (%) or MSA correlation coefficient (r^2)	Qualifier
R7011	Thallium	59.5 %	J-I
R5003	Thallium	58 %	J-I
R7006	Thallium	129.5 %	None[a]
R7000	Thallium	117 %	None[a]
R5109FB	Thallium	125 %	None[a]

[a] No qualifiers were applied since undetected sample results are not impacted by the high bias indicated by a high spike recovery.

10.3 Reanalyses at Dilution

Reanalyses at dilution were corrrectly performed on samples for which GFAA post-digestion analytical spike recoveries were less than 40%.

11.0 Reanalyses

Reanalyses were performed when required. Please see sections 8.1.4 and 10.3.

12.0 Dilution Analyses

12.1 Dilution Analyses

Secondary dilutions were performed when required. Please see section 10.3.

Undiluted analyses were not provided by the laboratory.

12.2 Serial Dilution

Although not specified by SW-846, the laboratory analyzed and reported serial dilution results for a number of SDGs. The following table summarizes serial dilution batching, out of control analytes and resultant qualifiers. When available, the reviewer used serial dilution results as a basis for data evaluation/qualification.

Serial Dilution Sample	Matrix	Analyte	%D	Qualifier	Associated Samples
R5100	Soil	Arsenic	21.2	J-I	R5100, R5101, R5102, R5103, R5107, R5110, R5111, R7008, R7009
R5106	Soil	zinc	58.9	J-1	R5104, R5105, R5106
R7000	Water	zinc	100	J-I	R7000, R7001, R7002FD, R7003
R1100	Water	Calcium	24.8	J-I	R1100, R1101, R1102FD, R1003, R1002, R1200, R1203
		zinc	366	J-I	
R1001	Water	Aluminum	22.2	J-I	R1000, R1001
		Magnesium	19.4	J-I	
		zinc	78.1	J-I	
SDG A8I110156				No serial dilution reported.	
SDG A8I230102				No serial dilution reported.	
SDG A8I190160				No serial dilution reported.	
SDG A8I190158				No serial dilution reported.	

13.0 Case Narratives

Case narratives were for the most part generic and generally did a poor job of describing specific issues found in the data packages. For some data packages, entire fractions were not addressed. In addition, in most cases where calibration problems existed, these were not addressed.

14.0 Field Duplicates

14.1 Batching

The results for the duplicate pair and the RPD or duplicate difference value (Δ) for each analyte are summarized below. QAPP RPD criteria of less than 35% for waters and less than 50% for soils was applied when both the sample and duplicate values were greater than 5xCRDL. The duplicate difference (Δ; absolute value of sample value minus duplicate value) was used when either or both of the sample/duplicate values were less than the CRDL. For waters, the

both of the sample/duplicate values were less than the CRDL. For waters, the difference requirement was to be less than the CRDL, while for soils, the difference was to be less than 2xCRDL. Results outside of control limits have been marked with an "*", with the control limit shown in parentheses.

Analyte	Sample ID: R5102 (mg/kg)		Duplicate ID: R5103FD (mg/kg)		Difference (Δ) or RPD		
Silver	1.2	U	1.2	U	NC		
Aluminum	16500		12600		26.8	%	
Arsenic	8.7		9.7		10.9	%	
Barium	145		96.3		48.7	Mg/kg	
Beryllium	0.79		0.43	B	0.36	Mg/kg	
Cadmium	0.59	U	0.58	U	NC		
Calcium	54100		26700		67.8	%	* (50)
Chromium	15.7		11.9		27.5	%	
Cobalt	6.0		5.9		0.1	Mg/kg	
Lead	9.5		10.3		8.1	%	
Copper	11.3		12.4		1.1	Mg/kg	
Antimony	0.30	B	0.32	B	0.02	Mg/kg	
Iron	19800		16400		18.8	%	
Selenium	0.76		0.96		0.2	Mg/kg	
Potassium	1320		999		321	Mg/kg	
Magnesium	3940		2530		1410	Mg/kg	
Manganese	1760		932		6.2	%	
Sodium	244	B	109	B	135	Mg/kg	
Nickel	9.1		10		0.9	Mg/kg	
Vanadium	19.2		17.3		1.9	Mg/kg	
Mercury	0.037	B	0.035	B	0.002	Mg/kg	
Thallium	1.0		0.76	U	0.24	Mg/kg	
Zinc	38.8		41.9		7.7	%	
Total Cyanide	0.59	U	0.66		0.07	Mg/kg	
Total Cyanide – RE1	0.99		1.3		0.31	Mg/kg	

Analyte	Sample ID: R1101 (µg/L)		Duplicate ID: R1102FD (µg/L)		Difference (Δ) or RPD		
Silver	10.0	U	10.0	U	NC		
Aluminum	562		374		188	µg/L	
Arsenic	3.5	B	5.0	U	1.5	µg/L	
Barium	10.8	B	7.2	B	3.2	µg/L	
Beryllium	4.0	U	4.0	U	NC		
Cadmium	5.0	U	0.69	B	4.31	µg/L	
Calcium	3200	B	2280	B	920	µg/L	
Chromium	27.0		64.5		37.5	µg/L	* (10)
Cobalt	50.0	U	50.0	U	NC		
Lead	11.1		9.5		1.6	µg/L	
Copper	11.8	B	7.6	B	3.2	µg/L	
Antimony	5.0	U	5.0	U	NC		
Iron	21500		18400		15.5	%	
Selenium	5.0	U	5.0	U	NC		
Potassium	540	B	653	B	113	µg/L	
Magnesium	568	B	422	B	146	µg/L	
Manganese	194		161		18.6	%	
Sodium	1390	B	587	B	803	µg/L	
Nickel	40.0	U	40.0	U	NC		
Vanadium	50.0	U	50.0	U	NC		
Mercury	0.20	U	0.20	U	NC		

Analyte	Sample ID: R1101 (µg/L)		Duplicate ID: R1102FD (µg/L)		Difference (Δ) or RPD		
Thallium	1.8	B	2.0	U	0.2	µg/L	
Zinc	140		233		45.7	%	* (20)

Analyte	Sample ID: R7001 (µg/L)		Duplicate ID: R7002FD (µg/L)		Difference (Δ) or RPD	
Silver	10.0	U	10.0	U	NC	
Aluminum	149	B	164	B	15	µg/L
Arsenic	5.0	U	10.0	U	NC	
Barium	200	U	50.0	U	NC	
Beryllium	4.0	U	3.0	U	NC	
Cadmium	5.0	U	25.0	U	NC	
Calcium	920	B	5.0	U	915	µg/L
Chromium	10.0	U	10.0	U	NC	
Cobalt	50.0	U	50.0	U	NC	
Lead	3.0	U	3.0	U	NC	
Copper	25.0	U	25.0	U	NC	
Antimony	5.0	U	5.0	U	NC	
Iron	100	U	81.7	B	19.3	µg/L
Selenium	5.0	U	5.0	U	NC	
Potassium	9660		8050		1610	µg/L
Magnesium	87.8	B	5000	U	NC	
Manganese	15.0	U	15.0	U	NC	
Sodium	1430	B	1130	B	300	µg/L
Nickel	40.0	U	40.0	U	NC	
Vanadium	50.0	U	50.0	U	NC	
Mercury	0.20	U	0.20	U	NC	
Thallium	2.0	U	2.0	U	NC	
Zinc	32.2		13.6		18.6	µg/L

NC = not calculated

14.2 Performance

The following table summarizes field duplicate analytes that did not meet criteria and associated samples and qualifiers.

Affected Samples	Analyte	RPD or Δ	Control Limit	Qualifier
R5102, R5103FD	Calcium	67.8 %	50 %	J-D
R1101, R1102FD	Chromium	37.5 µg/L	10 µg/L	J-D
R1101, R1102FD	Zinc	45.7 %	35 %	J-D

15.0 System Performance

Except as noted previously, the instrumental and analytical systems used in the analysis of these samples maintained an acceptable level of performance. In addition, it is noted that the 9/30 ICP run for SDG A8I290101 contained a large number of CCVs and CCBs that were badly out of control. The laboratory failed to terminate the run, perform corrective action and reanalyze samples analyzed after the outlier events.

16.0 Contract Requirements

Please see sections 4.0, 4.1, 5.2, 6.2 and 15.0 for information concerning non-compliant situations.

17.0 Additional Comments

Please see the addendum report for Ravenna for Project Correspondence, Case Narratives, Chain of Custody Records and Matrix Spike/Matrix Spike Duplicate Summary Forms. LCS/LSC Dup summary forms have been included when matrix spike analyses were not performed.

The laboratory reanalyzed a set of samples for cyanide due to an out of control LCS. The reanalysis results have been used by the reviewer, while the original analysis results have been marked out.

18.0 Sample Data Qualifier Table

Site Name: Ravenna Army Ammunition Plant

Sample ID	R1000	R1001	R1002	R1003	R1100	R1101	R1102FD
Matrix	water	water	water	water	water	water	water
Silver	JT	UJT					
Aluminum	JTSI	JTSI					
Arsenic	UJT	UJT					
Barium	JT	JT					
Beryllium	UJT	UJT					
Cadmium	JT	JT					
Calcium	JT	JT	JI	JI	BJI	JI	JI
Chromium	JTD	JTD				JD	JD
Cobalt	UJT	UJT					
Lead	JT	JT					
Copper	JT	JT					
Antimony	UJT	UJT					
Iron	JT	JT					
Selenium	UJT	UJT					
Potassium	JT	JT					
Magnesium	JTI	JTI					
Manganese	JT	JT					
Sodium	JT	JT					
Nickel	JT	UJT					
Vanadium	UJT	UJT					
Mercury	RC	RC					
Thallium	UJT	BJTC				B	
Zinc	JTI	JTI	BJI	BJI	BJI	JDI	JDI

Site Name: Ravenna Army Ammunition Plant

Sample ID	R1200	R1203	R5000	R5001	R5002	R5003	R5100
Matrix	water	water	water	water	water	water	Soil
Silver							UJT
Aluminum			JS	BJS	BJS	JS	JT
Arsenic							JTI
Barium							JT
Beryllium							JT
Cadmium							JT
Calcium	JI	JI					JT
Chromium							JTS
Cobalt							JT
Lead							JT
Copper							JTS
Antimony							JTS
Iron			JS	JS	JS	JS	JT
Selenium							JT
Potassium							JT
Magnesium							JT
Manganese							JT

Site Name: Ravenna Army Ammunition Plant

Sample ID	R1200	R1203	R5000	R5001	R5002	R5003	R5100
Matrix	water	water	water	water	water	water	Soil
Sodium							JT
Nickel							JT
Vanadium							JT
Mercury		B		B	B	B	UJT
Thallium						JCI	JT
Zinc	JI	BJI		B	B		JT
Total Cyanide	--	--					UJHT

Site Name: Ravenna Army Ammunition Plant

Sample ID	R5101	R5102	R5103FD	R5104	R5105	R5106	R5107
Matrix	soil	soil	soil	soil	soil	soil	Soil
Silver	UJT	UJT	UJT				UJT
Aluminum	JT	JT	JT				JT
Arsenic	JTI	JTI	JTI				JTI
Barium	JT	JT	JT				JT
Beryllium	JT	JT	JT				JT
Cadmium	JT	UJT	UJT				UJT
Calcium	JT	JTD	JTD	JS	JS	BJS	JT
Chromium	JTS	JTS	JTS				JTS
Cobalt	JT	JT	JT				JT
Lead	JT	JT	JT	JS	JS	JS	JT
Copper	JTS	JTS	JTS	JS	JS	JS	JTS
Antimony	JTS	JTS	JTS	JS	UJS	UJS	JTS
Iron	JT	JT	JT				JT
Selenium	JT	JT	JT				JT
Potassium	JT	JT	JT				JT
Magnesium	JT	JT	JT				JT
Manganese	JT	JT	JT				JT
Sodium	JT	JT	JT				JT
Nickel	JT	JT	JT				JT
Vanadium	JT	JT	JT				JT
Mercury	JT	JT	JT				JT
Thallium	UJT	JT	UJT			JC	UJT
Zinc	JT	JT	JT	JI	JI	JI	JT
Total Cyanide	UJT	JHT	JHT				UJHT

Site Name: Ravenna Army Ammunition Plant

Sample ID	R5108ER	R5109FB	R5110	R5111	R5112	R7000	R7001
Matrix	water	Water	soil	soil	Soil	water	Water
Silver		UJT	UJT	UJT	UJS		
Aluminum		UJT	JT	JT			
Arsenic		UJT	JTI	JTI	JS		

Site Name: Ravenna Army Ammunition Plant

Sample ID	R5108ER	R5109FB	R5110	R5111	R5112	R7000	R7001
Matrix	water	Water	soil	soil	Soil	water	Water
Barium		UJT	JT	JT			
Beryllium		UJT	JT	JT	UJS		
Cadmium		UJT	UJT	JT	UJS		
Calcium		UJT	JT	JT			
Chromium		UJT	JTS	JTS			
Cobalt		UJT	JT	JT	JSD		
Lead		UJT	JT	JT			
Copper		UJT	JTS	JTS	JS		
Antimony		UJT	JTS	JTS	JS		
Iron	JSD	UJT	JT	JT			
Selenium		UJT	JT	JT	JS		
Potassium		UJT	JT	JT			
Magnesium		UJT	JT	JT			
Manganese		UJT	JT	JT	JS		
Sodium		UJT	JT	JT			
Nickel		UJT	JT	JT	JS		
Vanadium		UJT	JT	JT	UJS		
Mercury		UJT	JT	JT	B		
Thallium	UJD	UJT	UJT	UJT	UJS		
Zinc	B	BJT	JT	JT	JSD	BJI	BJI
Total Cyanide	RS	UJT	UJHT	UJHT	UJH	--	--

Site Name: Ravenna Army Ammunition Plant

Sample ID	R7002FD	R7003	R7004	R7005	R7006	R7008	R7009
Matrix	water	Water	water	water	water	Sawdust	Sawdust
Silver			UJT	UJT	UJT	UJT	UJT
Aluminum			JT	JT	JT	JT	JT
Arsenic			UJT	JT	UJT	JTI	JTI
Barium			JT	UJT	UJT	JT	JT
Beryllium			UJT	UJT	UJT	UJT	UJT
Cadmium			UJT	UJT	UJT	UJT	UJT
Calcium			JT	JT	JT	JT	JT
Chromium			JT	UJT	UJT	JTS	JTS
Cobalt			UJT	UJT	UJT	UJT	UJT
Lead			JT	JT	UJT	JT	JT
Copper			JT	UJT	UJT	JTS	JTS
Antimony			UJT	UJT	UJT	JTS	JTS
Iron			JTSD	JTSD	JTSD	JT	JT
Selenium			UJT	UJT	UJT	JT	JT
Potassium			JT	JT	JT	JT	JT
Magnesium			JT	JT	UJT	JT	JT
Manganese			JT	JT	UJT	JT	JT
Sodium			JT	BJT	BJT	JT	JT
Nickel			UJT	UJT	UJT	JT	JT
Vanadium			UJT	UJT	UJT	JT	UJT
Mercury			UJT	UJT	JT	JT	JT

Site Name: Ravenna Army Ammunition Plant

Sample ID	R7002FD	R7003	R7004	R7005	R7006	R7008	R7009
Matrix	water	Water	water	water	water	Sawdust	Sawdust
Thallium			UJTD	UJTD	UJTD	UJT	UJT
Zinc	BJI	BJI	BJT	BJT	BJT	JT	JT

Site Name: Ravenna Army Ammunition Plant

Sample ID	R7011	R7012	R9104FB				
Matrix	water	Water	Water				
Silver			UJT				
Aluminum	JS	JS	UJT				
Arsenic			UJT				
Barium			UJT				
Beryllium			UJT				
Cadmium			UJT				
Calcium			BJT				
Chromium			UJT				
Cobalt			UJT				
Lead			UJT				
Copper			UJT				
Antimony			UJT				
Iron	JS	JS	UJT				
Selenium			UJT				
Potassium			UJT				
Magnesium			UJT				
Manganese			UJT				
Sodium			UJT				
Nickel			UJT				
Vanadium			UJT				
Mercury			BJT				
Thallium	JI		UJT				
Zinc			UJT				
Total Cyanide	--	--	UJT				

APPENDIX A – Data Qualifier Definitions

Definitions of Data Qualifiers

The following codes are considered the "EPA" qualifiers and specified for use by the various Functional Guidelines for data validation.

R: Rejected - Data are unusable (Note: Analyte may or may not be present).

U: Undetected; the analyte was not detected above the MDA

N: Tentatively Identified

J: Estimated

UJ: Undetected, but the number that is reported as the quantitation limit is an estimated value

B: Impacted by an associated blank

The following subqualifiers give further detail of the type and amount of qualification a given data point has received.

-H: Qualified due to holding time violation

-T: Qualified due to sample preservation problems

-I: Qualified due to interference problems

-D: Qualified due to precision problems (duplicate control limits not met)

-S: Qualified due to accuracy problems (matrix spike recovery criteria not met)

-C: Qualified due to instrument calibration problems

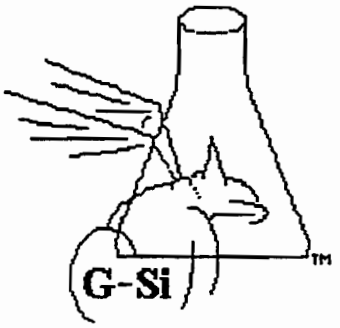
-L: Qualified due to accuracy problems (LCS recovery criteria not met)

-G: Qualified due to background problems

-K: Qualified due to negative blank value problems

-I: Qualified due to interferences (i.e., from serial dilution or GFAA post spikes)

-Q: Qualified for other reasons - refer to the text of the report



12/10/98

Joyce Dishner
IT Corporation
312 Directors Drive
Knoxville, TN 37923-4799
423-690-3211

Dear Joyce,

Please find enclosed a bound original and one copy, each, of the Organics and TCLP/Reactive Cyanide/Sulfide/Flashpoint/ Corrosivity data validation reports for your Ravenna Army Ammunition Plant project. The metals report will be sent under separate cover. I will send the invoice with the completed Explosives report once I receive the final laboratory responses.

Thank you for the opportunity to work with you on this project. Please let me know if there is anything else we can do for you or if you have questions.

Sincerely,

Roger Simon

Griffin-Schruers, incorporated
2215 S. Estes St.
Lakewood, CO 80227-2324
303-987-2801 (T) • 303-987-0317 (F) • 303-257-3982 (Cell)
ras@idcomm.com

Griffin-Schruers, incorporated

DATA VALIDATION REPORT

Program:	U.S. Army Corps of Engineers, U.S. EPA
Site:	Ravenna Army Ammunition Plant
Sampling Date (Month/Year):	9/98
Client:	IT Corporation, Knoxville, TN
Analytical Laboratory:	Quanterra, North Canton, OH
Case No.:	N/A
Sample Delivery Group (SDG):	A8I230116
Analyses:	TCLP Volatiles, Semivolatiles, Pesticides, Herbicides and Metals, Reactive Cyanide and Sulfide

Signatures:

Data Reviewer: Roger Simon Date: 12/10/98

QA/QC Review: Doug Kolb Date: 12/10/98

Senior Approval: Roger Simon Date: 12/10/98

Validation Summary Narrative

Aside from some minor calibration outliers and holding time violations, data were of reasonable quality. The laboratory's frequency of analysis of matrix QC (matrix spikes and matrix duplicates) was spotty; this resulted in no accuracy information being available for reactive cyanide and reactive sulfide. Although some minor documentation issues existed, these were not sufficient to impact data quality. The laboratory's reporting limit did not meet the regulatory level for chlordane.

Table of Contents

1.0 Sample IDs

The following table summarizes sample IDs, matrix of each sample and analyses present in the data package for each sample.

Sample Number	Matrix	TCLP V	TCLP B	TCLP P	TCLP H	TCLP M	R-C/S	Fp	Corr
SDG A8I230116									
R1201	TCLP	X	X	X	X	X	X	X	X
R1202TB	QC	X							

Laboratory QC Samples

Please see sections 8.2.1 and 9.1.1

Number of Samples Analyzed:	2	1	1	1	1	1	1	1
Total Number of Analyses:	4	3	1	3	3	2	2	2

TCLP = Toxicity Characteristic Leachate Procedure
V = Volatiles by SW-846 Method 8260B B = Semivolatiles by SW-846 Method 8270C
P = Pesticdes by SW-846 Method 8081A H = Herbicides by SW-846 Method 8151A
M = Metals by SW-846 Method 6010B C = Cyanide by SW-846 Method 7.3.3
R = Reactive S = Sulfide by SW-846 Method 7.3.4 Fp = Flashpoint by ASTM Method D 92-90
Corr = Corrosivity (pH) by SW-846 Method 9045A

X: analysis was provided for validation
O: analysis was requested on Chain of Custody Record, but not provided for validation
NR: analysis was not requested on Chain of Custody Record

MS: matrix spike MSD: matrix spike duplicate Dup: matrix duplicate
RE: re-analysis DL: dilution analysis

W: water S: soil Sed: sediment QC: field blank (trip, equipment, rinseate, etc.)

2.0 Deliverables

With the exception of the Pesticide PEM from 10/7/98, 1112, all data deliverables as specified for Level III quality control were found in the package. The aforementioned PEM standard was provided by the laboratory in a raw data format.

2.1 Completeness Checklist

The following table summarizes the summary form information and raw data found in the package. Form numbers shown in parentheses refer to the current U.S. EPA CLP Organics or Inorganics SOW; equivalent reporting of results in an alternate summary format has been determined to be acceptable.

	Deliverable
X	Case Narrative
X	Chain of Custody Records/Traffic Reports/Tracking Records
X	Preservation Information
X	Sample Cross Reference with Unique Identifiers
X	Sample Results Summary Form (Form 1)
X	CLP Flagging used on Results Summary
X	Initial Calibration (Corr. Coefficients, %RSD, min RRF, standards)
X/RS	Continuing Calibration Verification
X	Method/Preparation Blank Results Summary (Form 3)
X	Matrix Spike/Matrix Spike Duplicate Results Summary (Form 5A)
X	Matrix Duplicate Results (Form 6)
X	Laboratory Control Sample (LCS)/ Blank Spike Results Summary (Form 7)
O	Control Charts
X	Internal Standard (Form 8)
X	Surrogates (Form 2)
X	Legible Pages
X	Pages in Package Numbered and in Sequence
NR	Electronic Data Deliverable (EDD)

X = Included in original Data Package
O = Not Included and/or Not Available
NR = Not Required
RS = Provided as a Resubmission

3.0 Detection Limits

The following is a table of samples and compounds having detection limits that do not meet regulatory limits:

Sample ID	Compound/ Analyte	Reported Detection Limit (mg/L)	Regulatory Level (mg/L)
R1201	Chlordane	0.05	0.03

4.0 Holding Times

Samples were prepared and analyzed within holding times specified by the data validation guidelines except as noted in the following table. The holding time is from the date of sample collection to the date of analysis.

Sample	Fraction*	Sampling Date	TCLP Extract Date	Number of Days Out	Qualifier
R1201	Volatiles	9/20/98	10/8/98	4	J-H/UJ-H
R1202	Volatiles	9/20/98	10/8/98	4	J-H/UJ-H

* all compounds in a fraction are qualified

4.1 Sample Preservation

Samples were preserved properly.

4.2 Chain of Custody Records

All Chain of Custody Records were present and completed properly.

5.0 Calibration Quality Control

5.1 Initial Calibration

5.1.1 Correlation Coefficient

The required summary forms/information were provided and information was present to determine that correlation coefficients (r^2) were greater than 0.995.

5.1.2 ICP Initial Calibration

The required summary forms/information were provided and information was present to verify that ICP initial calibration included at least standard and one blank.

5.1.3 GC/MS Tune

The required summary forms/information were provided and information was present to verify that GC/MS tuning requirements were met.

5.1.4 Calibration Factors/ICVs

Calibration factors/%RSDs/initial calibration verifications (ICVs) met specified criteria with the exception of toxaphene which had a %RSD = 21.0 on the second column and was qualified as estimated (UJ-C).

5.1.5 Minimum RRFs

The required summary forms/information were provided and information was present to verify that minimum RRFs for target compounds were obtained.

5.1.6 Other

No initial calibration information (standard normality verifications, etc.) was provided for titrimetric cyanide and sulfide analyses. Since these were titrimetric analyses and dependent primarily on previously titrated standard normalities, results have been qualified as estimated (UJ-Q) in lieu of rejected.

5.2 Continuing Calibration

5.2.1 %D / %R

Except as noted below, the continuing calibration standard (CCV) analyses were reported as required and had recoveries reported to be within the Level III specified control limits.

Samples Affected	Compound/Analyte	Date/Time	%D or % R	Qualifier
None*	mercury	9/30/98	79.8 % R	None
R1201	2,4-D	10/17/98 1039	16.5 % D	UJ-C
R1201	Lindane	10/7/98 1900	19.8 % D (1°)	UJ-C
	Heptachlor		38.7, 18.2 % D (1°, 2°)	UJ-C
	Endrin		31.6 % D (2°)	UJ-C
	Methoxychlor		75.6 % D (2°)	UJ-C

* an out of control mercury CCV was noted in the same run as sample R1201. Since sample R1201 was bracketed by CCV standards that met control criteria, no action was taken by the reviewer. The laboratory failed, however, to terminate the run and generate a new calibration curve after the out of control event.

Continuing check standards were not analyzed with reactive cyanide, flashpoint or reactive sulfide.

For volatiles, the laboratory quantitated directly off the initial calibration (i.e., no Form 7 check standard was available). The reviewer compared the mid-point standard responses of the ICAL with the ICAL average to verify calibration.

5.2.2 Minimum RRFs

The required summary forms/information were provided and information was present to verify that minimum RRFs were obtained.

6.0 Blank Quality Control

6.1 Instrument Blanks

Instrument blanks were not analyzed.

6.2 ICB/CCBs

Initial and continuing calibration blanks (ICB/CCB) are not specified for Level III review. However, cursory review of these blanks indicated that all analyte values were less than their respective CRDLs.

6.3 Method/Preparation Blanks

A preparation/method blank was prepared and analyzed at the specified frequency. With the exception of chloroform in the volatile method blank, no compounds/analytes were detected. No qualifiers were required since chloroform was not reported as detected in samples R1201 or R1202TB.

7.0 Field QC Blanks

7.1 Field Blanks

No field blanks were associated with samples in this SDG.

7.2 Equipment Rinseate Blanks

No rinseate blanks were associated with samples in this SDG.

7.3 Trip Blanks

Toluene (*not a target compound*) was reported as present (0.020 mg/L) in trip blank R1202TB. Since toluene was not reported in sample R1201, no qualification was required.

7.4 Ambient Conditions Blanks

Ambient conditions blanks were not sampled.

8.0 Accuracy

8.1 Laboratory Control Samples/Blank Spikes

8.1.1 Frequency

Blank spikes/laboratory control samples (LCS) were prepared and analyzed with each sample batch and for each matrix in the data package with the exception of reactive cyanide and reactive sulfide. Since neither an LCS nor matrix spike analysis was provided and accuracy could not be assessed, all reactive cyanide and sulfide results have been qualified as estimated (UJ-Q).

8.1.2 Control Charts

Although laboratory control charts were not present in any data package, the laboratory did include their internal QC limits.

8.1.3 Recovery

Blank spike/LCS recoveries met control limits specified by the Ravenna QAPP.

8.1.4 Reanalyses

No re-analyses based on LCS analyses were required.

8.2 Matrix Spikes / Matrix Spike Duplicates

8.2.1 Frequency

The matrix (pre-digest) spike frequency requirement was not met. The following table summarizes samples used for matrix spiking, their matrices, parameters and samples associated with that matrix spike sample.

Matrix Spike Sample	Matrix	Fraction	Associated Samples
R1202TB	TCLP	Volatiles	R1201
R1201	TCLP	Semivolatiles, herbicides	R1201
none	TCLP	Pesticide, Reactive Cyanide, Reactive Sulfide, Flashpoint, Corrosivity	R1201
A8I260167-002	TCLP	Metals	R1201

For Pesticides and corrosivity, where a matrix spike was not performed, an LCS was performed. Since accuracy could be assessed to some extent, no action was taken by the reviewer.

Matrix spike analysis is not applicable to flashpoint analysis.

Some fractions in some packages contained a matrix QC analysis that was found not to have been from the site in question. Although applied to samples per client specifications, application of matrix QC from other sites may result in qualifiers not completely representative of the sample's matrix since conditions are **not** expected to be consistent from site to site.

8.2.2 Recovery

Except as noted below, matrix spike / matrix spike duplicate recoveries were within the specified control limits (75 - 125%). For organics, only the compound in the sample used for spiking has been qualified per validation guidelines.

Matrix Spike Sample	Compound	MS %R	MSD %R	%R limits	%RPD	%RPD limits	Qualifier
R1201	Pyridine	24	11	30-140	71	20	UJ-SD
	Cresol (total)	--	--	--	25	20	UJ-D
	o-cresol	--	--	--	24	20	UJ-D
	m, p-cresol	--	--	--	25	20	UJ-D

Some compounds were identified as not meeting laboratory criteria; they did, however, meet QAPP criteria and were not summarized above.

9.0 Precision

9.1 Matrix Duplicates

9.1.1 Frequency

The matrix (pre-digest) duplicate frequency requirement was not met since metals analyses did not have a duplicate performed. Since, however, matrix spike/matrix spike duplicate analyses were performed for metals and precision could be assessed to some extent, no action was taken by the reviewer. The following table summarizes samples used for matrix duplicate analysis, their matrices, parameters and samples associated with those matrix spike samples.

Matrix Duplicate Sample	Matrix	Analyte	Associated Samples
H8I210120-001	soil	Reactive cyanide, reactive sulfide	R1201
R1201	soil	Corrosivity	R1201
A8I260167-002	soil	Flash Point	R1201

Some fractions in some packages contained a matrix QC analysis that was found not to have been from the site in question. Although applied to samples per client specifications, application of matrix QC from other sites may result in qualifiers not completely representative of the sample's matrix since conditions are **not** expected to be consistent from site to site.

9.1.2 Performance

Matrix (pre-digest) duplicate differences were within specified control limits (20% RPD or the duplicate difference less than the MDA for results less than five times the MDA).

9.2 Matrix Spike Duplicates

9.2.1 Frequency

The matrix spike /matrix spike duplicate frequency requirement was met. Please see section 8.2.1 for a table summarizing matrix spike/matrix spiked duplicate analyses.

9.2.2 Performance

Matrix spike/matrix spike duplicate differences met contract-specified control limits (20% RPD for waters, 35% for soils).

10.0 SMCs/Surrogates

10.1 Frequency

System Monitoring Compounds (SMCs)/surrogates were analyzed at the specified frequency.

10.2 Recovery

With the exception of the following, system Monitoring Compounds (SMCs)/surrogates met all criteria.

Sample ID	Surrogate	%R	%R limits	Qualifier	Affected Compouds
R1201	DCB	0 D		None[a]	

[a] Results diluted out, no qualifiers applied.

10.3 Reanalysis

Reanalyses were not required.

11.0 Internal Standard

11.1 Frequency

Internal standards were analyzed at the specified frequency.

11.2 Recovery

Internal standard recoveries and retention times met all criteria.

11.3 Reanalysis

Reanalyses were performed as required.

12.0 Reanalyses

Reanalyses were performed when required. Please see sections 8.1.4, 10.3, and 11.3.

13.0 Dilution Analyses

13.1 Dilution Analyses

Secondary dilutions were performed when required. Please see sections 10.2.

Undiluted analyses were not provided by the laboratory.

13.2 Serial Dilution

Because the ICP serial dilution analysis was performed on a different client's sample, the laboratory did not include an Inorganics Form 9. Since all metals results were reported as "not detected," a lack of serial dilution analysis is considered inconsequential. Had a serial dilution analysis been performed, no outliers would have been obtained since all sample results were less than 50x IDL.

14.0 Case Narratives

Case narratives were for the most part generic and generally did a poor job of describing specific issues found in the data package. For some data packages, entire fractions were not addressed. In addition, in most cases where calibration problems existed, these were not addressed.

15.0 Field Duplicates

No field duplicates were present in this SDG.

16.0 System Performance

Except as noted previously, the instrumental and analytical systems used in the analysis of these samples maintained an acceptable level of performance.

17.0 Contract Requirements

Please see sections 4.0, 5.1.6, 5.2.1, 8.1.1 and 18.0 for information concerning non-compliant situations.

18.0 Additional Comments

The laboratory did not meet the quarterly requirement for mercury instrument detection limit determination.

19.0 Sample Data Qualifier Table

Site Name: Ravenna
SDG A8I230116

Compound/Analyte	R1201	R1202			R1201	
Matrix	Leach	QC			leach	
TCLP Volatiles				**TCLP Pesticides**		
Benzene	UJH	UJH		Chlordane (technical)		
Carbon tetrachloride	JH	UJH		Endrin	UJC	
Chlorobenzene	UJH	UJH		Heptachlor	UJC	
Chloroform	UJH	UJH		Heptachlor epoxide		
1,2-dichloroethane	UJH	UJH		Lindane	UJC	
1,1-dichloroethylene	UJH	UJH		Methoxychlor	UJC	
Toluene	--	JH		Toxaphene	UJC	
Methyl ethyl ketone	UJH	UJH				
Tetrachloroethylene	UJH	UJH		**TCLP Herbicides**		
Vinyl chloride	UJH	UJH		2,4-D	UJC	
				2,4,5-TP (Silvex)		
TCLP Semivolatiles						
o-cresol	UJD	--		**TCLP Metals**		
m-cresol & p-cresol	UJD	--		Arsenic		
1,4-dichlorobenzene		--		Barium		
2,4-dinitrotoluene		--		Cadmium		
Hexachlorobenzene		--		Chromium		
Hexachlorobutadiene		--		Lead		
Hexachloroethane		--		Selenium		
Nitrobenzene		--		Silver		
Pentachlorophenol		--		Mercury		
Pyridine	UJSD	--				
2,4,5-trichlorophenol		--		**Other**		
2,4,6-trichlorophenol		--		matrix	soil	
Cresols (total)	UJD	--		Corrosivity		
				Flashpoint		
				Reactive Cyanide	UJQ	
				Reactive Sulfide	UJQ	

-- = not analyzed

APPENDIX A – Data Qualifier Definitions

Definitions of Data Qualifiers

The following codes are considered the "EPA" qualifiers and specified for use by the various Functional Guidelines for data validation.

R: Rejected - Data are unusable (Note: Analyte may or may not be present).

U: Undetected; the analyte was not detected above the MDA

N: Tentatively Identified

J: Estimated

UJ: Undetected, but the number that is reported as the quantitation limit (MDA) is an estimated value

B: Impacted by an associated blank

The following subqualifiers give further detail of the type and amount of qualification a given data point has received.

-H: Qualified due to holding time violation

-P: Qualified due to sample preservation problems

-I: Qualified due to interference problems

-D: Qualified due to precision problems (duplicate control limits not met)

-S: Qualified due to accuracy problems (matrix spike recovery criteria not met)

-C: Qualified due to instrument calibration problems

-L: Qualified due to accuracy problems (LCS recovery criteria not met)

-G: Qualified due to background problems

-K: Qualified due to negative blank value problems

-T: Qualified due to chemical tracer/internal standard problems

-Q: Qualified for other reasons - refer to the text of the report

Griffin-Schruers, incorporated

DATA VALIDATION REPORT

Program:	U.S. Army Corps of Engineers, U.S. EPA
Site:	Ravenna Army Ammunition Plant
Sampling Date (Month/Year):	9/98
Client:	IT Corporation, Knoxville, TN
Analytical Laboratory:	Quanterra, North Canton, OH
Case No.:	N/A
Sample Delivery Group (SDG):	A8I110156, A8I110171-A, A8I110171-B, A8I190158, A8I190159, A8I230103 and A8I240174
Analyses:	Volatiles, Semivolatiles, Pesticides, Herbicides

Signatures:

Data Reviewer: Roger Simon Date: 12/10/98

QA/QC Review: Doug Kolb Date: 12/10/98

Senior Approval: Roger Simon Date: 12/10/98

Validation Summary Narrative

Due to the large number of minor qualifiers present, the data did not maintain as high a degree of quality as it could have. Nearly every sample was impacted by temperatures greater than 6°C, which resulted in a large number of qualifiers. Since it is expected that appreciable cooling over ambient conditions was likely, these are considered to be minor estimations. All blank values were well less than 2x the quantitation limit (accounting for dilution), although methylene chloride results were generally flagged with a "B". Detection limits for vinyl chloride, toluene, and a number of semivolatile compounds failed to meet the QAPP specified criteria. Minor calibration problems were noted for a variety of compounds which resulted in qualification. Finally, in sample R7004, two semivolatile internal standards did not meet response criteria. In this case, as well as some where surrogate recoveries were out of specifications, the laboratory did not reanalyze the samples.

Table of Contents

1.0 Sample IDs

The following table summarizes sample IDs, matrix of each sample and analyses present in the data package for each sample.

Sample Number	Matrix	V	B	P	H
SDG A8I110156					
R7004	W	X	X	--	--
R7005	W	X	X	--	--
R7006	W	X	X	--	--
R7007TB	QC	X	--	--	--
SDG subtotal:		4	3	0	0
SDG A8I110171-A					
R5109FB	QC	X	X	--	--
R5113TB	QC	X	--	--	--
SDG subtotal:		2	1	0	0
SDG A8I110171-B					
R7009	Sawdust	X	X	--	--
SDG subtotal:		1	1	0	0
SDG A8I190158					
R9104FB	QC	--	--	X	X
R9100	W	--	--	X	X
R9101	W	--	--	X	X
R9102	W	--	--	X	X
SDG subtotal:		0	0	4	4
SDG A8I190159					
R9103	W	--	--	X	X
SDG subtotal:		0	0	1	1
SDG A8I230103					
R7010TB	QC	X	--	--	--
R7011	W	X	X	--	--
SDG subtotal:		2	1	0	0

Sample Number	Matrix	V	B	P	H
SDG A8I240174					
R9105	W	--	--	X	X
SDG subtotal:		0	0	1	1

Laboratory QC Samples

Please see section 8.2.1

Number of Samples Analyzed:	9	6	6	6
Total Number of Analyses:	17	14	6	12

V = Volatiles by SW-846 Method 8260B B = Semivolatiles by SW-846 Method 8270C
P = Pesticdes by SW-846 Method 8081A H = Herbicides by SW-846 Method 8151A

X: analysis was provided for validation
O: analysis was requested on Chain of Custody Record, but not provided for validation
NR: analysis was not requested on Chain of Custody Record

MS: matrix spike MSD: matrix spike duplicate Dup: matrix duplicate
RE: re-analysis DL: dilution analysis

W: water S: soil Sed: sediment QC: field blank (trip, equipment, rinseate, etc.)

2.0 Deliverables

With the exception of the following, all data deliverables as specified for Level III quality control were found in the package.

- GC/MS Volatile Standard Data (ICAL/CCAL) for SDG A8I230103
- GC/MS Volatile Tune Data for SDG A8I230103
- GC/MS Semivolatile Tune Raw Data for SDG A8I230103

Missing data was provided by the laboratory. In response to a question concerning herbicide column identification, the laboratory provided a copy of data originally provided in the data package and did not identify which column was primary and which was secondary. The reviewer has therefore followed standard GC assessment procedures and based herbicide qualification decisions on a 'worst case' scenario.

2.1 Completeness Checklist

The following table summarizes the summary form information and raw data found in the package. Form numbers shown in parentheses refer to the current U.S. EPA CLP Organics and/or Inorganics SOWs; equivalent reporting

of results in an alternate summary format has been determined to be acceptable.

Deliverable				
V	B	P	H	
X	X	X	X	Case Narrative
X	X	X	X	Chain of Custody Records/Traffic Reports/Tracking Records
X	X	X	X	Preservation Information
X	X	X	X	Sample Cross Reference with Unique Identifiers
X	X	X	X	Sample Results Summary Form (Form 1)
X	X	X	X	CLP Flagging used on Results Summary
X/RS	X	X	X	Initial Calibration: Correlation Coeff. / RRF / %RSD
X/RS	X	NR	NR	Initial Calibration: GC/MS Tune
X/RS	X	X	X	Continuing Calibration Verification
X	X	X	X	Method/Preparation Blank Results Summary (Form 3)
X	X	O	X	Matrix Spike/Matrix Spike Duplicate Results Summary (Form 5A)
NR	NR	NR	NR	Matrix Duplicate Results (Form 6)
X	X	X	X	Laboratory Control Sample (LCS)/ Blank Spike Results Summary (Form 7)
O	O	O	O	Control Charts
X	X	NR	NR	Internal Standard
X	X	X	X	Surrogate/SMC
X	X	X	X	Legible Pages
X	X	X	X	Pages in Package Numbered and in Sequence
NR	NR	NR	NR	Electronic Data Deliverable (EDD)

X = Included in original Data Package
O = Not Included and/or Not Available
NR = Not Required
RS = Provided as a Resubmission

3.0 Detection Limits

The following is a table of samples and analytes having quantitation limits that do not meet the contract required or project-specific CRQLs:

Sample ID	Compound	Reported Quantitation Limit	CRQL per Ravenna QAPP
All waters	Vinyl chloride	10 µg/L	2 µg/L
	toluene	5 µg/L	2 µg/L
	Pentachlorophenol	10 µg/L	5 µg/L
	Dimethyl phthalate	10 µg/L	5 µg/L
	Diethyl phthalate	10 µg/L	5 µg/L
	di-n-butyl phthalate	10 µg/L	5 µg/L
	di-n-octyl phthalate	10 µg/L	5 µg/L
	Bis(2-ethylhexyl) phthalate	10 µg/L	5 µg/L
	Butylbenzyl phthalate	10 µg/L	5 µg/L
	Benzo[a]pyrene	10 µg/L	0.2 µg/L
All soils	Vinyl chloride	3.5 mg/kg	2 mg/kg

4.0 Holding Times

Samples were prepared and analyzed within holding times specified by the data validation guidelines. The holding time is from the date of sample collection to the date of extraction and from the date of extraction to the date of analysis.

4.1 Sample Preservation

Sample temperature in a number of coolers were greater than 6°C (4°C ± 2). The following table summarizes samples, SDGs, temperatures and qualifiers due to temperature preservation problems. pH requirements were met. All other samples were preserved properly.

SDG	Samples Affected	Fractions Affected*	Temperature (°C)	Qualifier
A8I110171-A	R5109FB	V, B	8.2	J-T/UJ-T
A8I110171-A	R5113TB	V	8.2	J-T/UJ-T
A8I110156	R7004, R7005, R7006	V, B	7.4	J-T/UJ-T
A8I110156	R7007TB	V	7.4	J-T/UJ-T
A8I110171-B	R7009	V, B	8.2	J-T/UJ-T
A8I190158	R9104FB, R9100, R9101, R9102	P, H	7.3, 10.4	J-T/UJ-T

* all compounds in a fraction are qualified

4.2 Chain of Custody Records

All Chain of Custody Records were present and completed properly.

5.0 Calibration Quality Control

5.1 Initial Calibration

5.1.1 Correlation Coefficient

The required summary forms/information were provided and information was present to determine that correlation coefficients (r^2) were greater than 0.995.

5.1.2 GC/MS Tune

GC/MS tuning requirements were met.

5.1.3 Calibration Factors/%RSDs

Calibration factors/%RSDs met specified criteria.

The following tables summarizes samples, calibration factors / %RSDs that did not meet criteria and associated qualifiers.

SDG	Samples Affected	Compound	Date/Time	Instrument	%RSD or r^2	Qualifier
A8I230103	R7011	4-nitroaniline	10/8 0947	A4HP7	30.6	UJ-C
A8I110171-A	R5109FB	4-chloroaniline 3-nitroaniline	9/20 0617	A4HP6	46.2 64.2	UJ-C UJ-C
A8I110171-B	R7009	4-chloroaniline 3-nitroaniline	9/23 0956	A4HP7	36.5 37.8	UJ-C UJ-C
A8I110156	R7004, R7005, R7006	4-chloroaniline 3-nitroaniline	9/20 0617	A4HP6	46.2 64.2	UJ-C UJ-C
A8I110171-A	R9105FB	MCPA	10/7	2°	0.992	UJ-C
A8I190158	R9100, R9101, R9102, R9103	Toxaphene	9/19 1402	1°, 2°	43.5, 31.9	UJ-C
A8I190159	R9104FB	Toxaphene	9/19 1402	1°, 2°	43.5, 31.9	UJ-C
A8I240174	R9105	Toxaphene	9/19 1402	1°, 2°	43.5, 31.9	UJ-C

5.1.4 Minimum RRFs

Minimum RRFs were obtained for target compounds.

5.2 Continuing Calibration

5.2.1 %D / %R

The continuing calibration standard (CCV) analyses were reported as required and had recoveries reported to be within the Level III specified control limits.

SDG	Samples Affected	Compound	Date/Time	Instrument	%D	Qualifier
A8I110171-A	R5109FB, R5113TB	Acetone	9/20 1709	A3UX7	43.8	UJ-C
		2-butanone			38.0	UJ-C
		2-hexanone			27.0	UJ-C
A8I110156	R7007TB	Acetone	9/20 1709	A3UX7	43.8	UJ-C
		2-butanone			38.0	UJ-C
		2-hexanone			27.0	UJ-C
A8I110156	R7004, R7005, R7006	Acetone	9/21 0947	A3UX7	53.4	UJ-C
		2-butanone			50.3	UJ-C
		2-hexanone			42.4	UJ-C
		4-methyl-2-pentanone			28.7	UJ-C
A8I230103	R7010TB, R7011	Acetone	9/25 1112	A3UX7	50.9	J-C/UJ-C
		2-butanone			49.8	UJ-C
		2-hexanone			30.9	UJ-C
		4-methyl-2-pentanone			44.5	UJ-C
A8I110156	R7005 RE, R7006 RE	Acetone	9/22 0946	A3UX7	32.2	UJ-C
		2-butanone			32.8	UJ-C
A8I230103	R7011	3-nitroaniline	10/9 0815	A4HP7	-52.5	UJ-C
		4-nitroaniline			-38.2	UJ-C
		4-nitrophenol			-23.5	UJ-C
		carbazole			-56.6	UJ-C
A8I110171-A	R5109FB	4-chloroaniline	9/21 0652	A4HP7	-50.7	UJ-C
		3-nitroaniline			-106	UJ-C
		3,3'-dichlorobenzidine			-27.4	UJ-C
A8I110171-B	R7009	3,3'-dichlorobenzidine	9/25 0831	A4HP7	-26.3	UJ-C
A8I110156	R7004, R7005 R7006	4-chloroaniline	9/21 0652	A4HP7	-50.7	UJ-C
		3-nitroaniline			-106	UJ-C
		3,3'-dichlorobenzidine			-27.4	UJ-C
A8I240174	R9105	All Herbicides except 2,4-DB	10/9 1503	2°	>15 %	J-C/UJ-C

5.2.2 Minimum RRFs

Minimum RRFs were obtained for target compounds.

6.0 Blank Quality Control

6.1 Instrument Blanks

Instrument blanks were not analyzed.

6.2 Method/Preparation Blanks

A preparation/method blank was prepared and analyzed at the specified frequency. The following is a table of samples and analytes requiring data

qualifiers due to reported contaminants in the preparation blanks. The samples and analytes listed below were reported to be less than five times the amount reported in the associated blank and were not re-analyzed.

SDG	Sample ID	Analyte	Sample Amount (ug/L)	Blank Amount (ug/L)	Qualifier
A8I110156	R7004	Methylene chloride	2.2 J	0.67 J	B
	R7005	Methylene Chloride	62	0.67 J	B
	R7006	Methylene Chloride	1.8 J	0.67 J	B
A8I110171-B	R7009	Methylene Chloride	2900 JB	44 J	B

Methylene chloride values in associated method blanks have been adjusted for dilution factors as a basis for applying blank flags.

7.0 Field QC Blanks

7.1 Field Blanks

The following table summarizes field blanks, results present within them and their associated samples.

SDG	Blank ID	Analyte	Amount	Associated Samples
A8I190158	9104FB	None reported		R7011, R9100, R9101, R9102, R9103, R9105
A8I110171-A	5109FB	Methylene chloride	0.93 J	R7004, R7005, R7006, R7009

The following table summarizes samples and qualifiers associated with field blanks containing target analytes.

SDG	Sample ID	Analyte	Sample Amount (ug/L)	Blank Amount (ug/L)	Qualifier
A8I110156	R7004	Methylene	2.2 J	0.93 J	B
	R7005	Chloride	62		B
	R7006		1.8 J		B
			(mg/kg)		
A8I110171-B	R7009	Methylene Chloride	2900 J	0.93 J	B

7.2 Equipment Rinseate Blanks

Not applicable.

7.3 Trip Blanks

The following table summarizes trip blanks, results present within them and their associated samples.

SDG	Blank ID	Analyte	Amount	Associated Samples
A8I110156	R7007TB	Methylene chloride	0.64 J	R7005, R7006
A81110171-A	R5113TB	None reported		R7009
A8I230103	R7010TB	None reported		R7011

The following table summarizes samples and qualifiers associated with field blanks containing target analytes.

SDG	Sample ID	Analyte	Sample Amount (ug/L)	Blank Amount (ug/L)	Qualifier
A8I110156	R7006	Methylene	1.8 J	0.64 J	B
	R7005	Chloride	62		B

7.4 Ambient Conditions Blanks

Ambient conditions blanks were not sampled.

8.0 Accuracy

8.1 Laboratory Control Samples/Blank Spikes

8.1.1 Frequency

Blank spikes/laboratory control samples (LCS) were prepared and analyzed with each sample batch and for each matrix in the data package.

8.1.2 Control Charts

Although laboratory control charts were not present in any data package, the laboratory did include their internal QC limits. Control limits specified by the QAPP were used for evaluation of data.

8.1.3 Recovery

Blank spike/LCS (and blank spike duplicate, when analyzed) recoveries met control limits specified by the Ravenna QAPP.

8.1.4 Reanalyses

Not applicable.

8.2 Matrix Spikes / Matrix Spike Duplicates

8.2.1 Frequency

The matrix (pre-digest) spike frequency requirement was not met. The following table summarizes samples used for matrix spiking, their matrices, parameters and samples associated with that matrix spike sample.

Matrix Spike Sample	Matrix	Fraction	Associated Samples
"LAB MS/MSD"	W	Volatiles, semivolatiles	SDG A8I230103
"LAB MS/MSD" R5109FB	W	Volatiles Semivolatiles	SDG A8I110171-A
"LAB MS/MSD" "LAB MS/MSD"	W W	Volatiles Semivolatiles	SDG A8I110156
R7009	Sawdust	Volatiles, semivolatiles	SDG A8I110171-B
None	W	Pesticides	SDG A8I190158, A8I190159, A8I240174
R9105 "LAB MS/MSD"	W W	Herbicides Herbicides	SDG A8I240174 SDG A8I190159
R9104FB	W	Herbicides	SDG A8I190158

The reviewer noted that samples R9104FB and R5109FB, used by the laboratory as matrix spike samples, are field blanks. These samples may not be completely representative of sample matrix for other non-blank water samples in the data package.

For analyses where a matrix spike was not performed, LCS / LCS Duplicate analyses were performed. Since accuracy and precision could be assessed to some extent, no action was taken by the reviewer.

Some fractions in some packages contained a matrix QC analysisthat was found not to have been from the site in question. Although applied to samples per client specifications, application of matrix QC from other sites may result in qualifiers not completely representative of the sample's matrix since conditions are **not** expected to be consistent from site to site.

8.3.2 Recovery

Matrix spike / matrix spike duplicate recoveries were within QAPP specified control limits with the exception of the following. Only the compound in the sample used for spiking has been qualified per validation guidelines.

Matrix Spike Sample	Compound	MS %R	MSD %R	%R limits	%RPD	%RPD limits	Qualifier
"LAB MS/MSD"	Benzene[a]	36	35	50-150	--	--	None
R7009	4-chloro-3-methylphenol[b]	176	154	30-140	--	--	None
R9105	2,4-D	790	0[c]		200[c]	--	None
	2,4,5-TP	0*	0[c]	--	[c]	--	None
	2,4,5-T	0*	0[c]	--	[c]	--	None

[a] no qualifiers have been applied since the MS/MSD sample was not identified
[b] no qualifiers have been applied since 4-chloro-3-methylphenol results in sample R7009 were not detected; undetected results are not impacted by the high bias indicated by a high spike recovery.
[c] results diluted out, no qualifiers applied

9.0 Precision

9.1 Matrix Duplicates

9.1.1 Frequency

Matrix (pre-digest) duplicate analyses were not performed and are typically not a part of organics analyses.

9.1.2 Performance

Please see section 9.1.1.

9.2 Matrix Spike Duplicates

9.2.1 Frequency

Please see section 8.2.1 for a table summarizing matrix spike/matrix spiked duplicate analyses.

9.2.2 Performance

With the exception of compounds affected by sample dilution problems, matrix spike/matrix spike duplicate differences met contract-specified control limits (20% RPD for waters, 35% for soils).

10.0 SMCs/Surrogates

10.1 Frequency

System Monitoring Compounds (SMCs)/surrogates were analyzed at the specified frequency.

10.2 Recovery

With the exception of the following, system Monitoring Compounds (SMCs)/surrogates met all criteria.

Sample ID	Surrogate	%R	%R limits	Qualifier	Affected Compouds
R7005	Bromofluorobenzene	118	86-115	J-S / none[a]	All detected volatiles
R7011	Terphenyl-d_{14}	15	33-141	None[b]	
R7009	2-fluorobiphenyl	0 D		None[c]	
R9101	TCM	0 D		None[c]	
R9105	DCB	0 D		None[c]	
LCS (8273107)	DCB	308		None[d]	
R9105	DCAA	177 D	30-130	J-S / none	All detected herbicides
R9105 MS	DCAA	0 D		None[c]	
R9105 MSD	DCAA	134 D		None[d]	

[a] Undetected results are not impacted by the high bias indicated by a high surrogate recovery and have not been qualified.

[b] No qualifiers are required when only one base neutral or one acid compound is out and recoveries are greater than 10%.

[c] Results diluted out, no qualifiers applied.

[d] Qualifiers are not applied to QC samples.

10.3 Reanalysis

Reanalyses were performed as required.

11.0 Internal Standard

11.1 Frequency

Internal standards were analyzed at the specified frequency.

11.2 Recovery

With the exception of the following, internal standard recoveries and retention times met all criteria.

Sample ID	IS	Response or rt	Limits	Qualifier	Affected Compouds
R7004	IS5 (CRY)	743149	808992 – 3235968	J-I/UJ-I	benzo[a]anthracene, bis(2-ethylhexyl) phthalate, butylbenzyl phthalate, chrysene, 3,3'-dichlorobenzidine, pyrene
R7004	IS6 (PRY)	632916	697438 – 2789752	J-I/UJ-I	Benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, dibenz[a,h]anthracene, di-n-octylphthalate, indeno[1,2,3-cd]pyrene

11.3 Reanalysis

Reanalyses were not performed.

12.0 Reanalyses

Please see sections 8.1.4, 10.3 and 11.3 for details concerning reanalyses.

13.0 Dilution Analyses

Secondary dilutions were performed when required. Please see sections 10.2.

Undiluted analyses were not provided by the laboratory.

Dilution analyses resulted in over-range methylene chloride results for samples R7005 RE-1 and R7006 RE-2. These results have therefore been qualified as estimated (J-C).

14.0 Case Narratives

Case narratives were for the most part generic and generally did a poor job of describing specific issues found in the data package. For some data packages, entire fractions were not addressed. In addition, in most cases where calibration problems existed, these were not addressed.

15.0 Field Duplicates

Field duplicate pairs were not present for analyses in this report.

16.0 System Performance

Except as noted previously, systems maintained an adequate level of performance.

17.0 Contract Requirements

Please see sections 3.0, 4.1, 5.1.3, 5.2.1, 8.2.1, 10.2 and 11.2 for information concerning non-compliant situations.

18.0 Additional Comments

Please see the addendum report for Ravenna for Project Correspondence, Case Narratives, Chain of Custody Records and Matrix Spike/Matrix Spike Duplicate Summary Forms. LCS/LSC Dup summary forms have been included when matrix spike analyses were not performed.

19.0 Sample Data Qualifier Table

Site Name: Ravenna

Sample ID	R7004	R7005	R7005 RE-1	R7006	R7006 RE-1	R7007TB	R5109FB	R5113TB
Matrix	water	water	water	water	water	QC	QC	QC
Volatiles								
1,2-dichloroethene (total)	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
1,2-dichloropropane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Cis-1,3-dichloropropene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Trans-1,3-dichloropropene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Ethylbenzene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
2-hexanone	UJTC	UJTC	UJT	UJTC	UJT	UJTC	UJTC	UJTC
Methylene chloride	BJT	BJTS	JTC	BJT	JTC	JT	JT	UJT
4-methyl-2-pentanone	UJTC	UJTC	UJT	UJTC	UJT	UJT	UJT	UJT
Styrene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
1,1,2,2-tetrachloroethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Tetrachloroethene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Toluene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
1,1,1-trichloroethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
1,1,2-trichloroethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Trichloroethene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Vinyl chloride	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Xylenes (total)	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Acetone	UJTC	UJTC	UJTC	UJTC	UJTC	UJTC	UJTC	UJTC
Benzene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Bromodichloromethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Bromoform	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Bromomethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
2-butanone	UJTC	UJTC	UJTC	UJTC	UJTC	UJTC	UJTC	UJTC
Carbon disulfide	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Carbon tetrachloride	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Chlorobenzene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Dibromochloromethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Chloroethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Chloroform	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Chloromethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
1,1-dichloroethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
1,2-dichloroethane	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
1,1-dichloroethene	UJT	UJT	UJT	UJT	UJT	UJT	UJT	UJT
Semivolatiles								
Acenaphthene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Acenaphthylene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Anthracene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Benzo[a]anthracene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Benzo[b]fluroanthene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Benzo[k]fluoranthene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Benzo[g,h,i]perylene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Benzo[a]pyrene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Bis(2-chloroethoxy)methane	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Bis(2-chloroethyl) ether	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A

Site Name: Ravenna

Sample ID	R7004	R7005	R7005 RE-1	R7006	R7006 RE-1	R7007TB	R5109FB	R5113TB
Matrix	water	water	water	water	water	QC	QC	QC
2,2'-Oxybis(1-Chloropropane)	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Bis(2-ethylhexyl) phthalate	UJTI	UJT	N/A	JT	N/A	N/A	UJT	N/A
4-bromophenyl phenyl ether	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Butyl benzyl phthalate	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
4-chloroaniline	UJTC	UJTC	N/A	UJTC	N/A	N/A	UJTC	N/A
4-chloro-3-methylphenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2-chloronaphthalene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2-chlorophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
4-chlorophenyl phenyl ether	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Chrysene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Dibenz[a,h]anthracene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Dibenzofuran	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
di-n-butyl phthalate	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
1,2-dichlorobenzene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
1,3-dichlorobenzene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
1,4-dichlorobenzene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
3,3'-dichlorobenzidine	UJTCI	UJTC	N/A	UJTC	N/A	N/A	UJTC	N/A
2,4-dichlorophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Diethyl phthalate	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2,4,-dimethylphenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Dimethyl phthalate	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
di-n-octyl phthalate	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
4,6-dinitro-2-methylphenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2,4-dinitrophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2,4-dinitrotoluene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2,6-dinitrotoluene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Fluoranthene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Fluorene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Hexachlorobenzene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Hexachlorobutadiene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Hexachloroethane	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Indeno[1,2,3-cd]pyrene	UJTI	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Isophorone	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2-methylnapthalene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2-methylphenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Naphthalene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2-nitroaniline	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
3-nitroaniline	UJTC	UJTC	N/A	UJTC	N/A	N/A	UJTC	N/A
4-nitroaniline	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Nitrobenzene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2-nitrophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
4-nitrophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
N-nitroso-di-n-propyl amine	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
N-nitroso diphenyl amine	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Pentachlorophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Phenanthrene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Phenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Pyrene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
1,2,4-trichlorobenzene	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
2,4,5-trichlorophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A

Site Name: Ravenna

Sample ID	R7004	R7005	R7005 RE-1	R7006	R7006 RE-1	R7007TB	R5109FB	R5113TB
Matrix	water	water	water	water	water	QC	QC	QC
2,4,6-trichlorophenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
Carbazole	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A
4-methylphenol	UJT	UJT	N/A	UJT	N/A	N/A	UJT	N/A

Site Name: Ravenna

Sample ID	R7009	R7010TB	R7011			
Matrix	water	QC	water			
Volatiles						
1,2-dichloroethene (total)	UJT					
1,2-dichloropropane	UJT					
Cis-1,3-dichloropropene	UJT					
Trans-1,3-dichloropropene	UJT					
Ethylbenzene	UJT					
2-hexanone	UJT	UJC	UJC			
Methylene chloride	BJT					
4-methyl-2-pentanone	UJT	UJC	UJC			
Styrene	UJT					
1,1,2,2-tetrachloroethane	UJT					
Tetrachloroethene	UJT					
Toluene	JT					
1,1,1-trichloroethane	UJT					
1,1,2-trichloroethane	UJT					
Trichloroethene	UJT					
Vinyl chloride	UJT					
Xylenes (total)	UJT					
Acetone	UJT	UJC	JC			
Benzene	UJT					
Bromodichloromethane	UJT					
Bromoform	UJT					
Bromomethane	UJT					
2-butanone	UJT	UJC	UJC			
Carbon disulfide	UJT					
Carbon tetrachloride	UJT					
Chlorobenzene	UJT					
Dibromochloromethane	UJT					
Chloroethane	UJT					
Chloroform	UJT					
Chloromethane	UJT					
1,1-dichloroethane	UJT					
1,2-dichloroethane	UJT					
1,1-dichloroethene	UJT					
Semivolatiles						
Acenaphthene	UJT					
Acenaphthylene	UJT					

Site Name: Ravenna

Sample ID	R7009	R7010TB	R7011			
Matrix	water	QC	water			
Anthracene	UJT					
Benzo[a]anthracene	UJT					
Benzo[b]fluroanthene	UJT					
Benzo[k]fluoranthene	UJT					
Benzo[g,h,i]perylene	UJT					
Benzo[a]pyrene	UJT					
Bis(2-chloroethoxy)methane	UJT					
Bis(2-chloroethyl) ether	UJT					
2,2'-Oxybis(1-Chloropropane)	UJT					
Bis(2-ethylhexyl) phthalate	JT					
4-bromophenyl phenyl ether	UJT					
Butyl benzyl phthalate	UJT					
4-chloroaniline	UJTC					
4-chloro-3-methylphenol	UJT					
2-chloronaphthalene	UJT					
2-chlorophenol	UJT					
4-chlorophenyl phenyl ether	UJT					
Chrysene	UJT					
Dibenz[a,h]anthracene	UJT					
Dibenzofuran	UJT					
di-n-butyl phthalate	UJT					
1,2-dichlorobenzene	UJT					
1,3-dichlorobenzene	UJT					
1,4-dichlorobenzene	UJT					
3,3'-dichlorobenzidine	UJTC					
2,4-dichlorophenol	UJT					
Diethyl phthalate	UJT					
2,4,-dimethylphenol	UJT					
Dimethyl phthalate	UJT					
di-n-octyl phthalate	UJT					
4,6-dinitro-2-methylphenol	UJT					
2,4-dinitrophenol	UJT					
2,4-dinitrotoluene	UJT					
2,6-dinitrotoluene	UJT					
Fluoranthene	UJT					
Fluorene	UJT					
Hexachlorobenzene	UJT					
Hexachlorobutadiene	UJT					
Hexachloroethane	UJT					
Indeno[1,2,3-cd]pyrene	UJT					
Isophorone	UJT					
2-methylnapthalene	UJT					
2-methylphenol	UJT					
Naphthalene	UJT					
2-nitroaniline	UJT					
3-nitroaniline	UJTC		UJC			
4-nitroaniline	UJT		UJC			
Nitrobenzene	UJT					
2-nitrophenol	UJT					
4-nitrophenol	UJT		UJC			
N-nitroso-di-n-propyl amine	UJT					
N-nitroso diphenyl amine	UJT					

Site Name: Ravenna

Sample ID	R7009	R7010TB	R7011			
Matrix	water	QC	water			
Pentachlorophenol	UJT					
Phenanthrene	UJT					
Phenol	UJT					
Pyrene	UJT					
1,2,4-trichlorobenzene	UJT					
2,4,5-trichlorophenol	UJT					
2,4,6-trichlorophenol	UJT					
Carbazole	UJT		UJC			
4-methylphenol	UJT					

Site Name: Ravenna

Sample ID	R9104FB	R9100	R9101	R9102	R9103	R9105
Matrix	QC	water	water	water	water	water
Pesticides						
Alpha-BHC	UJT	UJT	UJT	UJT		
Beta-BHC	UJT	UJT	UJT	UJT		
Delta-BHC	UJT	UJT	UJT	UJT		
Gamma-BHC (lindane)	UJT	UJT	UJT	UJT		
Heptachlor	UJT	UJT	UJT	UJT		
Aldrin	UJT	UJT	UJT	UJT		
Heptachlor Epoxide	UJT	UJT	UJT	UJT		
Endosulfan I	UJT	UJT	UJT	UJT		
Dieldrin	UJT	UJT	UJT	UJT		
4,4'-DDE	UJT	JT	UJT	UJT		
Endrin	UJT	UJT	UJT	UJT		
Endosulfan II	UJT	UJT	UJT	UJT		
4,4'-DDD	UJT	UJT	UJT	UJT		
Endosulfan Sulfate	UJT	UJT	UJT	UJT		
4,4'-DDT	UJT	UJT	JT	UJT		
Methoxychlor	UJT	UJT	UJT	UJT		
Endrin Ketone	UJT	UJT	UJT	UJT		
Endrin Aldehyde	UJT	UJT	UJT	UJT		
Alpha-Chlordane	UJT	JT	JT	UJT		
Gamma-Chlordane	UJT	UJT	JT	UJT		
Toxaphene	UJTC	UJTC	UJTC	UJTC	UJC	UJC
Herbicides						
2,4-D	UJT	UJT	UJT	UJT		UJC
Dalapon						UJC
2,4-DB						
Dicamba						UJC
Dichlorprop						UJC
Dinoseb						UJC
MCPA						UJC
MCPP						UJC
2,4,5-TP (Silvex)	UJT	UJT	UJT	UJT		UJC
2,4,5-T	UJT	JT	JT	JT		JCS

APPENDIX A – Data Qualifier Definitions

Definitions of Data Qualifiers

The following codes are considered the "EPA" qualifiers and specified for use by the various Functional Guidelines for data validation.

R: Rejected - Data are unusable (Note: Analyte may or may not be present).

U: Undetected; the analyte was not detected above the MDA

N: Tentatively Identified

J: Estimated

UJ: Undetected, but the number that is reported as the quantitation limit (MDA) is an estimated value

B: Impacted by an associated blank

The following subqualifiers give further detail of the type and amount of qualification a given data point has received.

-H: Qualified due to holding time violation

-T: Qualified due to sample preservation problems

-I: Qualified due to interference problems

-D: Qualified due to precision problems (duplicate control limits not met)

-S: Qualified due to accuracy problems (matrix spike, surrogate recovery criteria not met)

-C: Qualified due to instrument calibration problems

-L: Qualified due to accuracy problems (LCS recovery criteria not met)

-G: Qualified due to background problems

-K: Qualified due to negative blank value problems

-Q: Qualified for other reasons - refer to the text of the report

APPENDIX D

WASTE DISPOSAL MANIFEST RECORDS

NON-HAZARDOUS WASTE MANIFEST

Please print or type - (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. OH5210020736

Manifest Document No. 121698RA

2. Page 1 of 1

3. Generator's Name and Mailing Address
330 358-7311
Ravenna Army Ammunition Plant
845 State Route 5
Ravenna, OH 44266-9297

4. Generator's Phone ( )

5. Transporter 1 Company Name: DFL Oilfield Services, LLC

6. US EPA ID Number

A. State Transporter's ID

B. Transporter 1 Phone 330 792-8416

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Everclear of Ohio, Ltd.
3700 Oakwood Ave.
Austintown, OH 44515

10. US EPA ID Number: OHR000015792

E. State Facility's ID

F. Facility's Phone 330 792-2120

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. Waste Water	01	Vac.	1500 gallons	
b.				
c.				
d.				

GENERATOR

G. Additional Descriptions for Materials Listed Above

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
Nothing Follows

NON-HAZARDOUS WASTE

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Mark Patterson Right. Signature: [signature] Date: Month 12 Day 16 Year 98

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Shane A. Pratt Signature: [signature] Date: Month 12 Day 16 Year 98

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name Signature Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name Signature Date: Month Day Year

CF14 Printed by Labelmaster, An American Labelmark Co., Chicago IL 60646 (800) 621-5808

READ INSTRUCTIONS ON BACK OF MANIFEST

WASTE MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF
ENVIRONMENTAL QUALITY

DO NOT WRITE IN THIS SPACE
ATT. ☐ DIS. ☐ REJ. ☐ PR. ☐

Required under authority of Part 111 and Part 121 of Act 451, 1994, as amended.

Failure to file may subject you to criminal and/or civil penalties under Sections 324.11151 or 324.12116 MCL

Please print or type.

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. D H 5 2 1 0 0 2 0 7 3 6 | Manifest Document No. | 2. Page 1 of | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Ravenna Army Ammunition Plant
8451 State Route 5; Ravenna, OH 44266-9297
4. Generator's Phone (330) 358-7311

A. State Manifest Document Number: MI 7615757
B. State Generator's ID: Same

5. Transporter 1 Company Name: Dart Trucking Company, Inc.
6. US EPA ID Number: O H D 0 0 9 8 6 5 8 2 5
C. State Transporter's ID:
D. Transporter's Phone: 800-538-2516

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
Wayne Disposal, Inc.
49350 N. I-94 Service Drive
Belleville, MI 48111
10. US EPA ID Number: M I D 0 4 8 0 9 0 6 3 3
G. State Facility's ID
H. Facility's Phone: 800/592-5489

	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID NUMBER). HM	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.	Non RCRA Non DOT Regulated Material (Ceramic Bricks, Burlap Bags)		D M	71	P	NONE
b.	Plastic & Tarps		DM	11		
c.						
d.						

J. Additional Descriptions for Materials Listed Above
A. App#121498WM

K. Handling Codes: a. b. c. d.

15. Special Handling Instructions and Additional Information
Emergency Contact: Capitol Environmental Services (800) 560-2374

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR; if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: Mark C. Patterson | Signature: Mark C. Patterson | Date Month Day Year: 1 2 1 7 98

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Brooks E. Burd | Signature | Date Month Day Year: 1 2 1 7 98

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date Month Day Year

19. Discrepancy Indication Space

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

GENERATOR

TRANSPORTER

FACILITY

ALL SPILLS MUST BE REPORTED TO THE MICHIGAN POLLUTION EMERGENCY ALERTING SYSTEM, IN MICHIGAN AT 1-800-292-4706 OR OUT OF STATE AT 517-373-7660 AND THE NATIONAL RESPONSE CENTER AT 1-800-424-8802 WITHIN 24 HOURS PER DAY.

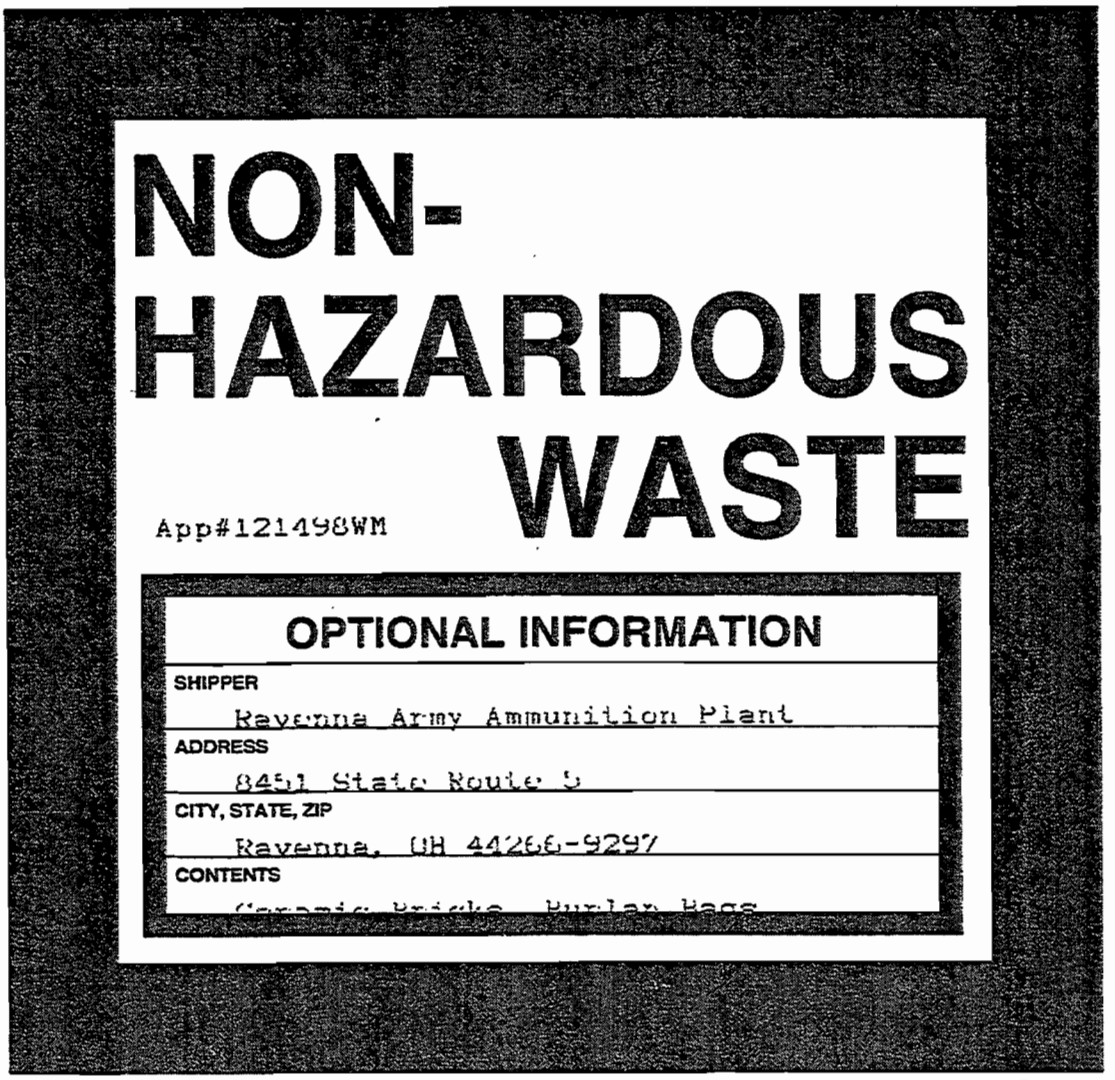
INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	12	18	98
	NO.			
	SHEET		OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME: RVAAP	PROJECT NO. 775574
FIELD ACTIVITY SUBJECT: Labels	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:



VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

WASTE MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

DO NOT WRITE IN THIS SPACE
ATT. ☐ DIS: ☐ REJ. ☐ PR. ☐

Required under authority of Part 111 and Part 121 of Act 451, 1994, as amended.

Failure to file may subject you to criminal and/or civil penalties under Sections 324.11151 or 324.12116 MCL.

Please print or type.

Form Approved. OMB No. 2050-0039.

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: OH5210020736
Manifest Document No.:
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Ravenna Army Ammunition Plant
8451 State Route 5; Ravenna, OH 44266-9297

4. Generator's Phone (330 358-7311

A. State Manifest Document Number: MI 7615768
B. State Generator's ID: Same

5. Transporter 1 Company Name: Dart Trucking Company, Inc.
6. US EPA ID Number: OHD009865825
C. State Transporter's ID:
D. Transporter's Phone: 800-538-2516

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Transporter's ID:
F. Transporter's Phone:

9. Designated Facility Name and Site Address
City Environmental, Inc.
1923 Frederick Street
Detroit, MI 48211
10. US EPA ID Number: MID980991566
G. State Facility's ID:
H. Facility's Phone: 313/923-0080

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID NUMBER).	HM	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. RQ, Hazardous Waste Solid, N.O.S., 9, NA3077, PGIII (Wood/Cut up Pallets)	X	25	DM	5000 est. 25	P	D001 D008
b.						
c.						
d.						

J. Additional Descriptions for Materials Listed Above
A. App# 26388H
Also D007 ERG-171

K. Handling Codes: a. b. c. d.

15. Special Handling Instructions and Additional Information
Emergency Contact: Capitol Environmental Services (800) 560-2374

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR; if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Date (Month Day Year)
Timothy M. Morgan	Timothy M. Morgan	12 18 98

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)
Dale Schaef	Dale Schaef 953	12 18 98

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date (Month Day Year)

GENERATOR

ALL SPILLS MUST BE REPORTED TO THE MICHIGAN POLLUTION EMERGENCY ALERTING SYSTEM, IN MICHIGAN 1-800-292-4706 OR OUT OF STATE AT 517-373-7660 AND THE NATIONAL RESPONSE CENTER AT 1-800-424-8802 24 HOURS PER DAY.

INTERNATION TECHNOLOGY CORPORATIO

PROJECT NAME:

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACT

HAZARDOUS WASTE

FEDERAL AND/OR STATE LAWS PROHIBIT IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY, THE U.S. ENVIRONMENTAL PROTECTION AGENCY, OR THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION.

ACCUMULATION START DATE _____

E.P.A. WASTE NO. D001 D007, D008

D.O.T. PROPER SHIPPING NAME RQ, Hazardous Waste Solid, N.O.S.,

AND 9, III (Wood/Cut up Pallets)

U.N. OR N.A. NO. NA3077

GENERATOR NAME Ravenna Army Ammunition Plant

ADDRESS 8451 State Route 5

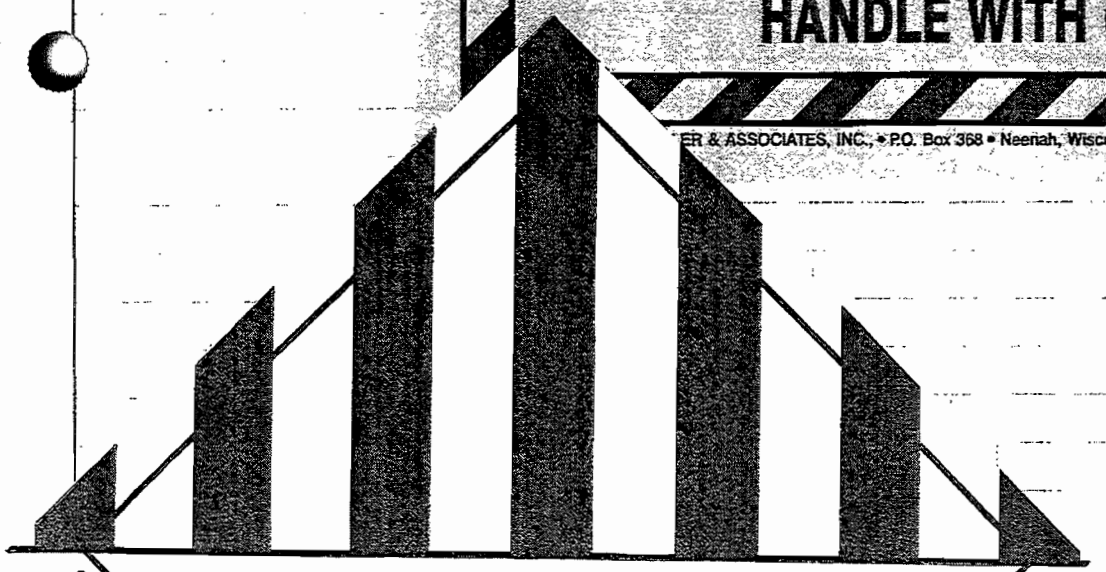
CITY Ravenna **STATE** OH

E.P.A. I.D. NO. OH5210020736 App#

MANIFEST DOCUMENT NO. 17615768

HAZARDOUS WASTE HANDLE WITH CARE

ER & ASSOCIATES, INC., • P.O. Box 368 • Neenah, Wisconsin 54957-0368 • (800) 327-6868 93-HML-C



90-HML-S

Published by: J.J. KELLER & ASSOCIATES, INC. Neenah, Wisconsin 54957-0368 • (800) 327-6868

VI

...S AND SPECIFICATIONS, AND
...DERS AND IMPORTANT DECISIONS.

WEATHER COND.

...TANT TELEPHONE CALLS:

9

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

USL City Environmental, Inc.
1923 Frederick Street
Detroit, MI 48211
(313) 923-0090
(313) 923-3375 (Sales Fax)
(313) 923-0217 (Admin. Fax)

GENERATOR FILE COPY

APPROVAL NO.

MI7615768 — MANIFEST NO.

11a — LINE ITEM

<NOTICE>

FROM GENERATOR FOR WASTES THAT DO NOT MEET LAND DISPOSAL TREATMENT STANDARDS

The following wastes do not meet the treatment standards specified in Part 268 Subpart D.

(Check all boxes that apply.)

__ This shipment includes F001-F005 spent solvents, as identified on the attached sheet. (2)

__ This shipment includes F039 multi-source leachate, as identified on the attached sheet(s). (3)

X This shipment includes D001 and/or D002 wastes as identified below. (1)

X This shipment includes one or more TC metals D004-D011 identified below. (1)

__ This shipment includes one or more TC organics D012-D043 identified below. (1)

Hazardous Waste No.	Hazardous Subcategory(4)	Treatability group(5)
D001	N/A	NWW
D007	N/A	NWW
D008	N/A	NWW

(1) Must include Form E (Underlying Hazardous Constituents)
(2) Must include Form D (F001-F005)
(3) Must include Form E (F039)
(4) Subcategory (if any) can be determined from 40 CFR 268.40
(5) Treatability group is either "wastewater" or "nonwastewater"

Signature

Date

Rev. 8/98

FORM A