FINAL HAZARD RANKING SYSTEM PACKAGE

CENTREDALE MANOR
RESTORATION PROJECT
NORTH PROVIDENCE, RHODE ISLAND
CERCLIS ID NO.: RID981203775

Volume IV of IV
Attachment C (References)

Prepared For:

U.S. Environmental Protection Agency
Region I
Office of Site Remediation and Restoration
1 Congress Street, Suite 1100
Boston, MA 02114-2023

CONTRACT NO. 68-W5-0009

TDD NO. 99-05-0104

PCS NO. 7045

DC Number A-4339

Prepared by:

Roy F. Weston, Inc. (WESTON®)
Superfund Technical Assessment and Response Team (START)
217 Middlesex Turnpike
Burlington, MA 01803

13 October 1999

FINAL SUMMARY REPORT
FOR
EXPANDED SITE INSPECTION
CENTREDALE MANOR SITE
NORTH PROVIDENCE, RHODE ISLAND

Prepared For:
U.S. Environmental Protection Agency
Region I
Office of Site Remediation and Restoration
1 Congress Street, Suite 1100
Boston, MA 02114-2023

CONTRACT NO. 68-W5-0009

CERCLIS NO. RID981203755
TDD NO. 98-06-0017
PCS NO. 5366
DC NO. A-3698

Submitted By:
Roy F. Weston, Inc. (WESTON®)
Superfund Technical Assessment and Response Team (START)
217 Middlesex Turnpike
Burlington, MA 01803

9 March 1999

Region I START
Reviewed and Approved:

Sean P. Kennedy — 3/9/99
Sean P. Kennedy, Date
Site Leader

Daniel Keefe — 3/9/99
Daniel Keefe, Date
Project Leader

QA Review — 3/9/99
QA Review, Date

Work Order No. 11098-031-001-5366-70

DISCLAIMER

This report was prepared solely for the use and benefit of the U.S. Environmental Protection Agency Region I (EPA Region I), Office of Site Remediation and Restoration for the specific purposes set forth in the contract between the EPA Region I and the Roy F. Weston, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START). Professional services performed and reports generated by START have been prepared for EPA Region I purposes as described in the START contract. The information, statements, and conclusions contained in the report were prepared in accordance with the statement of work, and contract terms and conditions. The report may be subject to differing interpretations or misinterpretation by third parties who did not participate in the planning, research or consultation processes. Any use of this document or the information contained herein by persons or entities other than the EPA Region I shall be at the sole risk and liability of said person or entity. START, therefore, expressly disclaims any liability to persons other than the EPA Region I who may use or rely upon this report in any way or for any purpose.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

The Roy F. Weston, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START) was requested by the U.S. Environmental Protection Agency Region I (EPA Region I), Office of Site Remediation and Restoration to perform an Expanded Site Inspection (ESI) of the Centredale Manor Site consisting of the Centredale Manor property, located at 2074 Smith Street in North Providence, Providence County, Rhode Island, portions of the Brook Village property, and sections of the Woonasquatucket River. Tasks were conducted in accordance with technical specifications provided by EPA Region I. A Preliminary Assessment (PA) of the Centredale Manor property was conducted by the NUS Corporation, Inc. Field Investigation Team (NUS/FIT) in August 1986. NUS/FIT conducted a Screening Site Inspection (SSI) of the Centredale Manor property in October 1990, and WESTON completed a Site Inspection Prioritization (SIP) of the Centredale Manor property in May 1997. These previous investigations indicated the presence of organic and inorganic substances in soil, sediment, and surface water on and in the vicinity of the property. On the basis of the information provided in these reports, the Centredale Manor Site ESI was initiated.

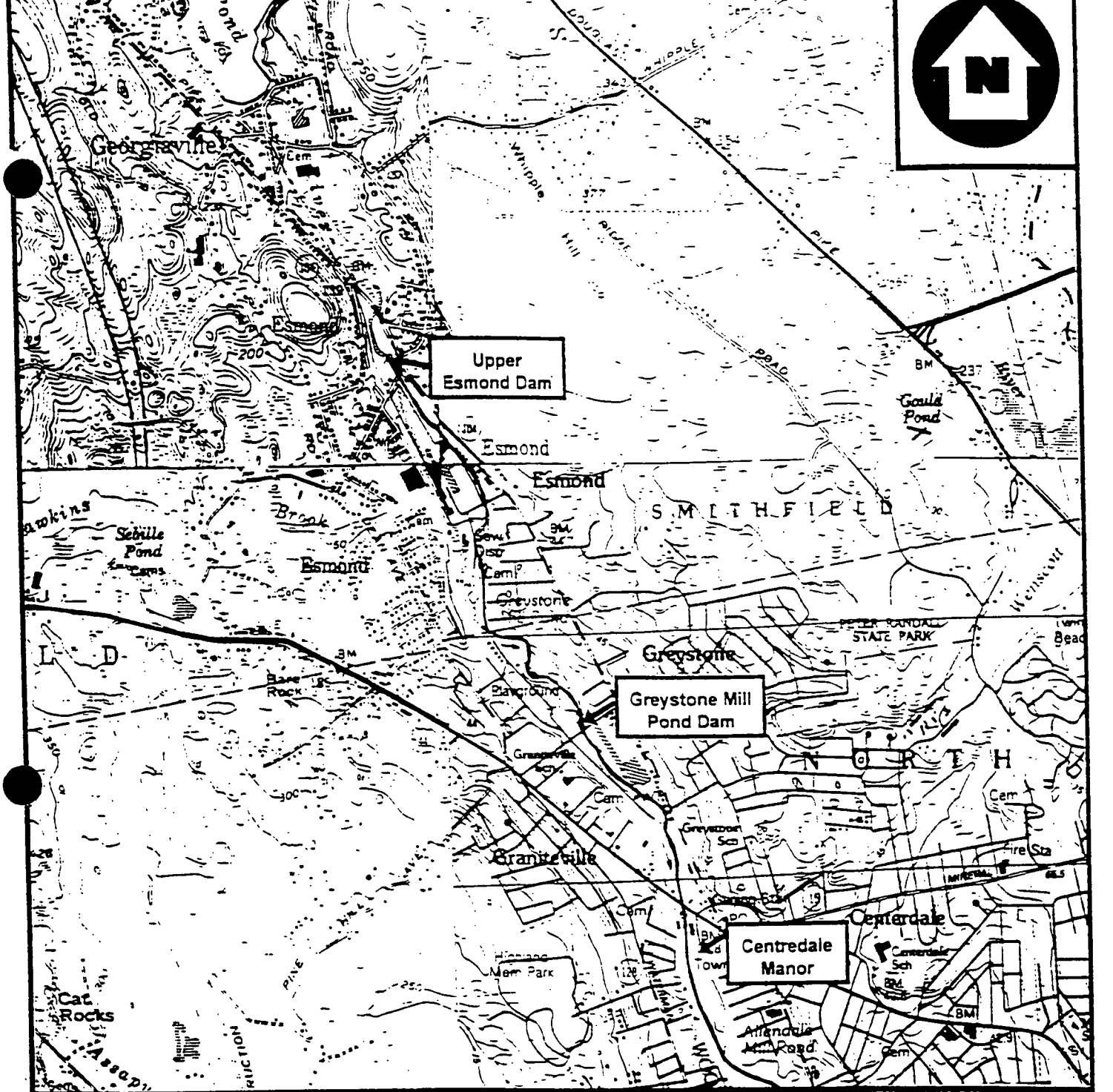
Background information used in the generation of this report was obtained through file searches conducted at the EPA Region I and Rhode Island Department of Environmental Management (RI DEM), telephone interviews with town officials, conversations with persons knowledgeable of the Centredale Manor Site, and conversations with other Federal, State, and local agencies.

This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA Region I regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State, or local regulations. ESIs are intended to provide a preliminary screening of sites to facilitate EPA Region I's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

SITE DESCRIPTION

The Centredale Manor property, portions of the Brook Village property, and sections of the Woonasquatucket River (upstream of, adjacent to, and downstream of the Centredale Manor property) were investigated as part of the Centredale Manor Site ESI investigation (Figures 1A, 1B, and 1C). The Centredale Manor property is located at 2074 Smith Street (also referred to as Route 44 in the CERCLIS database) in North Providence, Providence County, Rhode Island at geographic coordinates 41° 51' 29.5" north latitude and 71° 30' 28.5" west longitude [13].

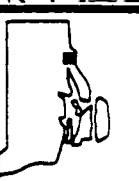
According to the Town of North Providence Tax Assessor's Office, the 4.74-acre Centredale Manor property is registered as Plat 14, Lot 250. The property is bordered by Brook Village Apartments to the north, a small wooded area and an unpaved perennial drainage channel (drainage channel) to the east, a wooded area to the south, and the Woonasquatucket River to the west (Figure 2). George Waterman Road and a residential area are located approximately 100 feet west of the river, up a steep embankment [1, pp. 1, 3].



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15' MINUTE U.S.G.S. QUADRANGLE(S):
PROVIDENCE, RI 1987; PAWTUCKET, RI-MA 1949 (PHOTOREVISED 1970 AND 1975);
GEORGIAVILLE, RI 1954 (PHOTOREVISED 1970 AND 1975); NORTH SCITUATE, RI 1955 (PHOTOREVISED 1970 AND 1975)

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET



QUADRANGLE LOCATION

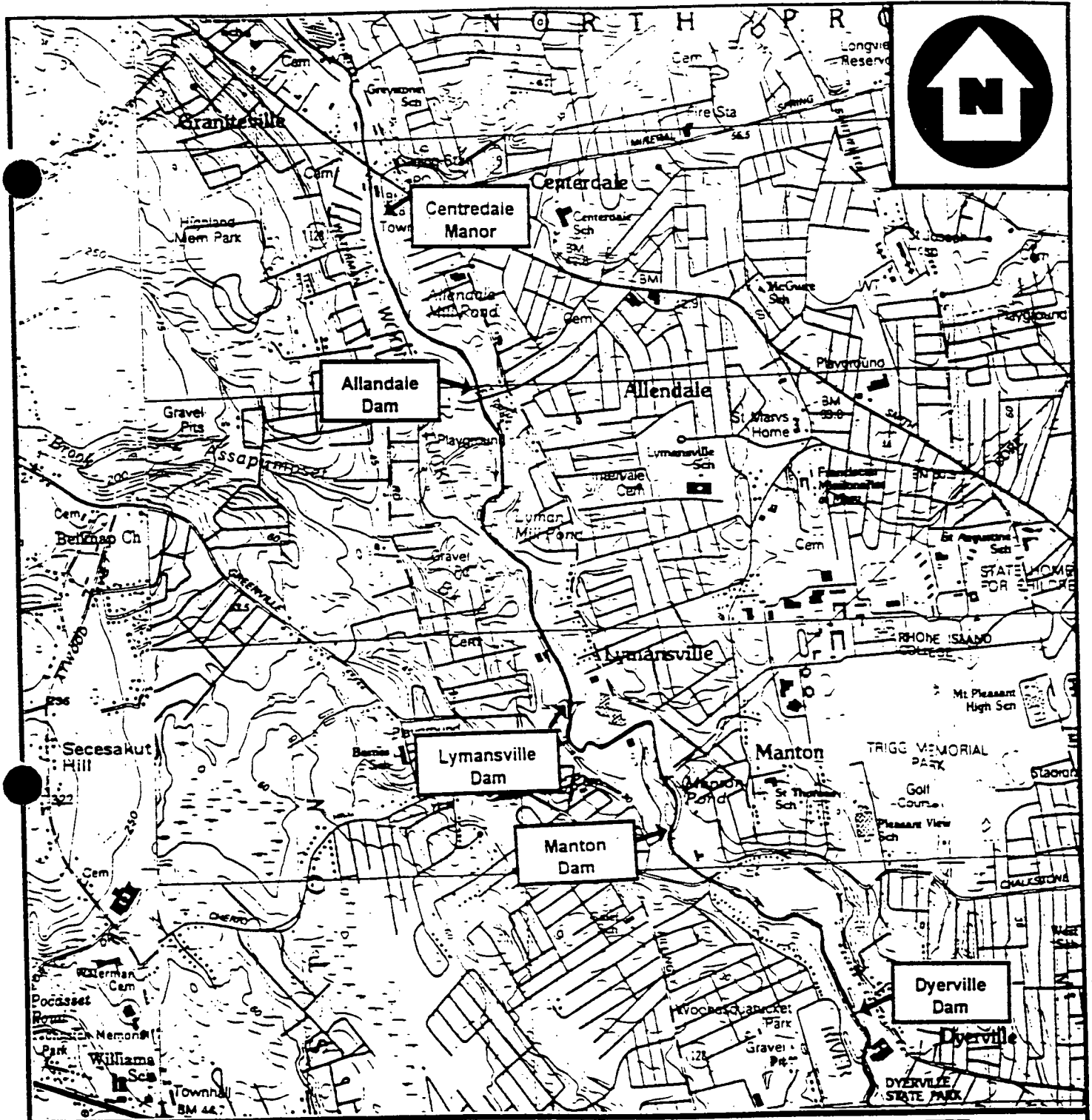
LOCATION MAP

WOONASQUATUCKET RIVER (NORTH)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

WESTON®
MANAGERS DESIGNERS/CONSULTANTS
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	8/17/98

FILE NAME:	
S:\98060017\FIG1A	FIGURE 1A



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15' MINUTE U.S.G.S. QUADRANGLE(S):
PROVIDENCE, RI 1987; NORTH SCITUATE, RI 1955 (PHOTOREVISED 1970 AND 1975)

1 MILE
1 1/2 0 1
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

QUADRANGLE LOCATION

LOCATION MAP

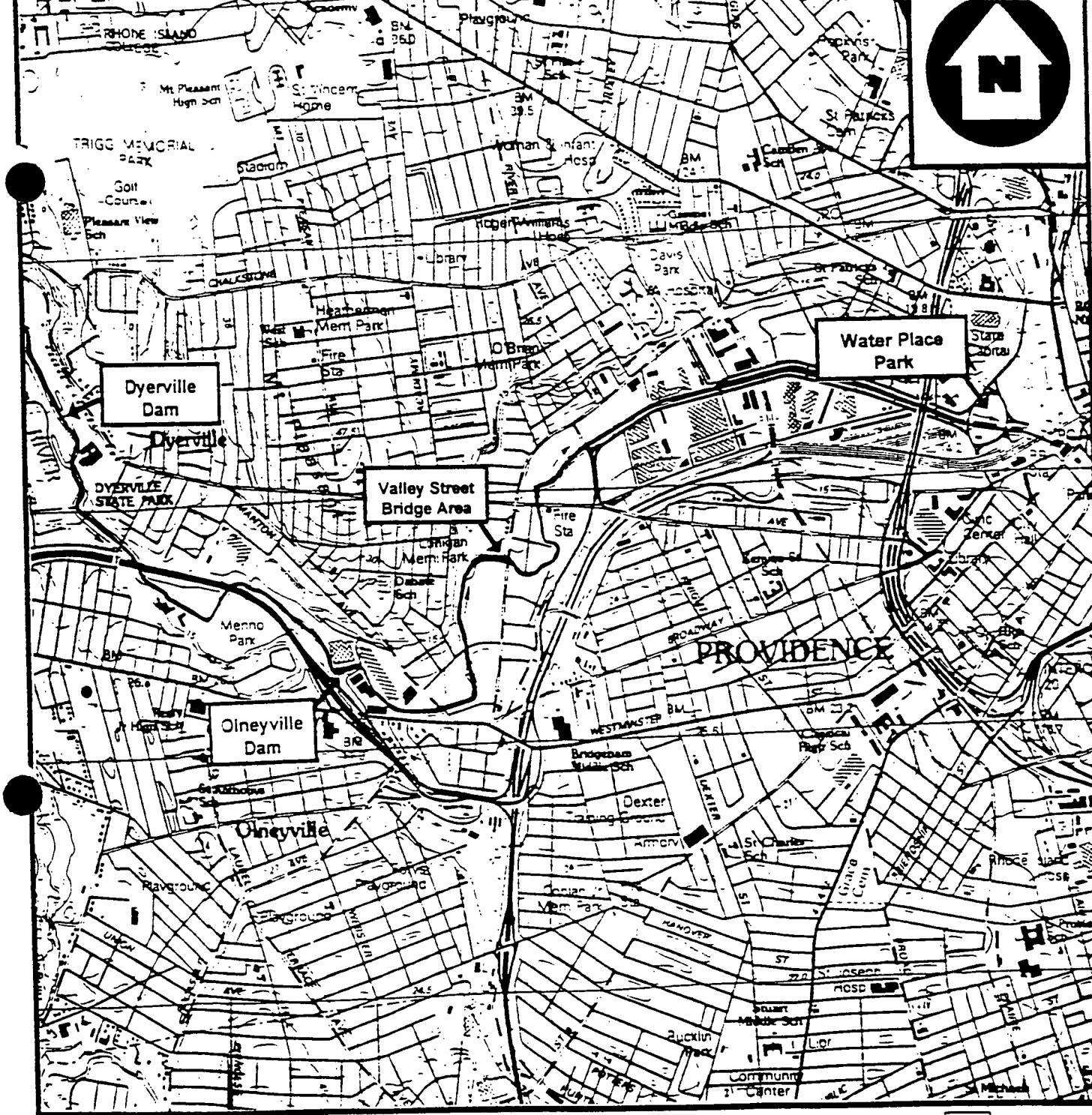
WOONASQUATUCKET RIVER (CENTRAL)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

WESTON® MANAGERS DESIGNERS/CONSULTANTS
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	8/17/98

FILE NAME: S:\98060017\FIG1B

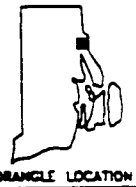
FIGURE 1B



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15' MINUTE U.S.G.S. QUADRANGLE(S):
PROVIDENCE, RI 1987

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET



QUADRANGLE LOCATION

LOCATION MAP

WOONASQUATUCKET RIVER (SOUTH)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

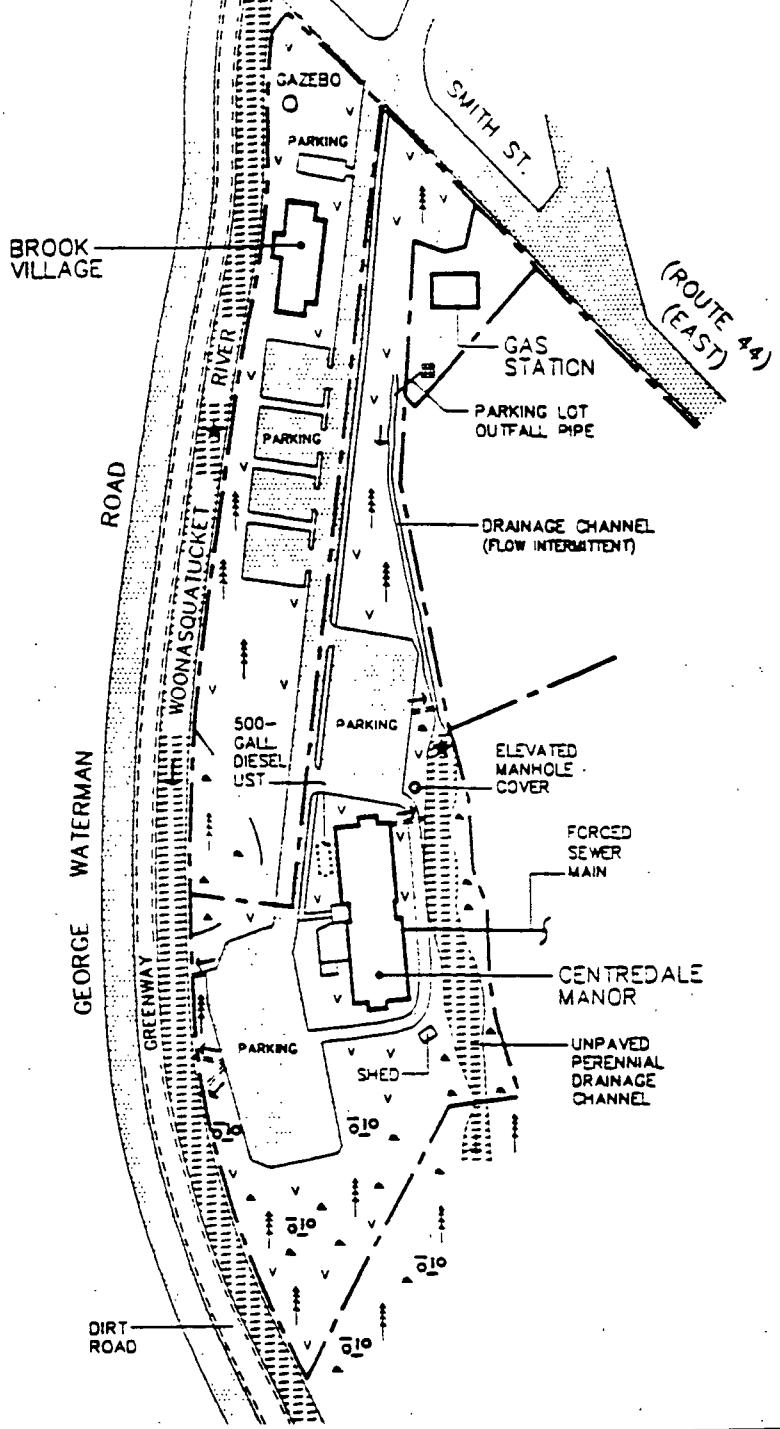
WESTON® MANAGERS DESIGNERS/CONSULTANTS

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	8/17/98

FILE NAME: S:\98060017\FIG1C

FIGURE 1C



SOURCES:

NORTH PROVIDENCE TAX ASSESSORS PLAT MAP - PLAT NO. 14 DECEMBER 1992, REVISED DECEMBER 1994

WESTON/START FIELD BOOK NO. 00343-S FOR CENTREDALE MANOR - 1998

NOT TO SCALE

LEGEND

- SURFACE WATER
- FLOW DIRECTION
- DRUM, DEBRIS, OR METAL FRAGMENTS
- V GRASS
- PROPERTY LINE
- PAVED DRAINAGE SWALE
- PAVED AREAS
- WETLANDS
- UNDERGROUND STORAGE TANK (UST)
- WOODED AREA
- CATCHBASIN
- PROBABLE POINT OF ENTRY TO SURFACE WATER PATHWAY
- INTERMITTENT STREAM (DURING FLOOD PERIODS)

SITE SKETCH

CENTREDALE MANOR PROPERTY
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

WESTON® MANAGERS DESIGNERS/CONSULTANTS
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	3/9/99

FILE NAME:	
S:\98060017\FIG2	FIGURE 2

An eight-story apartment building housing approximately 135 elderly and handicapped residents, known as Centredale Manor, which was constructed in February 1982, currently occupies the property. Two paved parking lots are located to the north and west of the building (Figure 2). The areas around the parking lots and the building are landscaped with a grass ground cover. A 500-gallon underground storage tank (UST) containing diesel fuel is located approximately 100 feet west of the building. The tank is leak tested biannually and has reportedly not failed integrity testing to date [1, p. 3].

The highest elevation on the property is approximately 200 feet above mean sea level and located in the central portion of the property. Topography on the property is relatively flat with a downward slope to the east, towards the drainage channel. During the ESI on-site reconnaissance, areas of stressed vegetation were observed on the northwest side of the property between the Centredale Manor and Brook Village parking lots and in the southern portion of the property along the overland flow route between on-site paved areas and the Woonasquatucket River [3].

The majority of residences and businesses in the vicinity of the property are served by the City of Providence public water supply system [8]. The nearest public drinking water supply well to the Centredale Manor property is located 0.8 miles to the west of the property at the Pied Piper Nursery School and serves an estimated 130 people. An estimated 1,351 people are served by public drinking water wells within 4-radial miles of the property. Approximately 8,130 people are served by private drinking water wells within 4-radial miles of the property. The nearest private drinking water well to the Centredale Manor property is the Yacht Club Bottling Works, Inc., located approximately 0.12 miles northeast of the property [1, pp. 3, 12].

The Centredale Manor Site is located in the Woonasquatucket Regional River Basin. An undefined overland flow route exists for precipitation that falls on the property. As a result, run-off from the property travels as sheet flow into either the Woonasquatucket River or the drainage channel. The most upstream probable points of entry (PPEs) from sheet flow are located adjacent to the Brook Village building (along the Woonasquatucket River) and in the drainage channel located east of the Centredale Manor building (Figure 2). From the drainage channel PPE, the surface water travels along the eastern perimeter of the property and converges with the Woonasquatucket River approximately 0.3 miles downstream of the property. The mean annual flow rate of the drainage channel is estimated to be 5 cubic feet per second (cfs). The drainage channel is not known to be a fishery [1, p. 14].

From the Woonasquatucket River PPE, surface water travels approximately 0.1 miles along the western perimeter of the property, reaches the confluence with the drainage channel 0.3 miles south of the property and travels south for approximately 5.7 miles before discharging into the Providence River. The Providence River continues south approximately 8 miles before discharging into the Narragansett Bay. The mean annual flow rate of the Woonasquatucket River in the vicinity of the property is estimated to be 73 cfs based on historical flow rate information from a gaging station located 0.1 miles north of the property. The Providence River and Narragansett Bay are tidally influenced [1, p. 14].

There are also two defined surface water overland flow routes on the property. A number of paved drainage swales exist to divert overland flow to either the drainage channel or to the Woonasquatucket River (Figure 2) [1, p. 16].

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

In 1936, Centredale Worsted Mills sold the property on which Centredale Manor is located (Lot 250) to Olneyville Wool Combing Company. In 1940, the Olneyville Wool Combing Company sold Lot 250 to three individuals (H. Sweet, W. Clark, and M. Sweet). In April 1943, these three individuals sold Lot 250 to two different individuals (H. Bonino, and J. Buonanno), who owned it for three months before transferring it to Centredale Enterprises, Inc., in July of 1943. Centredale Enterprises, Inc. held title to Lot 250 until 1971, when it was sold to two individuals (J. Buonanno and E. Ricci) and one business entity (Centredale Properties Corporation). Centredale Properties Corporation sold its interest in Lot 250 to J. Buonanno and E. Ricci in 1979. They held title until 1982, when Lot 250 was sold to Centredale Manor Associates. Centredale Manor Associates sold Lot 250 to the Cornerstone Corporation in 1995 [9].

No information regarding the types of textile activities conducted on the property by either the Centredale Worsted Mill or the Olneyville Wool Combing Company was found in available file information. These companies operated on the property during the 1930s through the mid-1940s [1, p. 5].

A chemical manufacturing facility (Atlantic Chemical Company, Inc., which changed its name in 1953 to Metro-Atlantic, Inc.) and a drum recycling facility (New England Container Co., Inc.) reportedly operated at the property between 1943 and 1971. Additional information regarding operations at these facilities is currently being sought by EPA. In the mid-1970s, the existing buildings at the property were demolished. Further information regarding the demolition of the buildings is also being sought by EPA [9].

In October and November 1977, the Rhode Island Department of Health (RI DOH) conducted several investigations at the Centredale Manor property in response to complaints of odors and fumes at the property. Approximately 60 55-gallon drums were found on the property in a swampy area near the Woonasquatucket River. A bluish-white smoke was observed in association with an unknown number of ruptured drums, reportedly containing sulfuric acid. On 10 November 1977, Acme Services removed 10 drums which reportedly contained sulfuric acid from the swampy area. No information regarding where the drums were transported and/or disposed of was available. The remaining drums were reportedly left on the property [1, p. 5].

From December 1979 to March 1981, RI DEM periodically inspected the property. During these inspections, RI DEM observed and inventoried approximately 400 drums. The drums were reported to be in various stages of deterioration. An unknown number of drums were found to contain residual solid and liquid material. Legible drum labels and visual inspection of residual materials indicated that caustics, halogenated solvents, polychlorinated biphenyls (PCBs), and ink wastes (potentially containing heavy metals) may have been contained in the drums. During the inspections, approximately 150 drums (of the 400 drums) were observed scattered along the bank of the Woonasquatucket River [1. p. 5].

In 1981, Marshall Contractors, Inc. (Marshall) and Robinson, Green and Beretta, Inc. performed a feasibility study of the property for the property owners, J. Buonanno and E. Ricci. The

feasibility study was conducted to investigate the potential commercial development of the property as an apartment complex. In October 1981, Marshall reportedly discovered a smoking drum of sulfuric acid. On 16 October 1981, Jet-Line Services manifested, removed, and transported the drum of sulfuric acid to an approved disposal facility. The Jet-Line Services drum removal activities were supervised by Marshall and RI DEM [1, p. 5].

On 23 November 1981, a Notice of Violation and Order (Order) was issued by RI DEM to the property owners, J. Buonanno and E. Ricci, for violations of the State Hazardous Waste Management Act [1, p. 6]. The Order indicates that various State rules and regulations, including the following, were violated:

- Hazardous Waste Management Facility Operating Permit Rules and Regulations-Landfills
- Hazardous Waste Generator Rules and Regulations
- Hazardous Waste Treatment and Storage Rules and Regulations
- Hazardous Waste Operating Permit Rules and Regulations-Landfills

The 1981 Order required that the owners of the property, J. Buonanno and E. Ricci, complete the following activities: 1) identify all hazardous materials on site by sampling and chemical analysis; 2) repackage and properly manifest and dispose of all hazardous wastes on site; 3) comply with items 1 and 2 immediately [9].

In February 1982, Marshall oversaw the characterization of soils at the Centredale Manor property with supervision by RI DEM. On 2 February 1982, Guild Drilling collected two composite soil samples from 10 soil borings advanced in the proposed apartment building construction area. The samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and eight extraction procedure for toxicity (EP TOX) metals to determine if soils in the construction area would be considered hazardous waste. Analyses of soil samples indicated the presence of chloroform, toluene, trichloroethylene, bis(2-ethylhexyl)phthalate, and barium at concentrations below the then current (1982) RI DEM regulatory levels. Ultimately, 6,000 cubic yards of excavated soil were removed and disposed of as non-hazardous solid waste [1, p. 6].

On 22 February 1982, C. Pezza and Sons, Inc. excavated and staged approximately 400 drums on the property under the supervision of RI DEM. Drums which were verified to be empty were crushed and sent to a solid waste facility for disposal as non-hazardous waste. Approximately 30 drums with residual materials were stockpiled on the property [1, p. 6].

On 27 February 1982, Goldberg, Zoino & Associates, Inc. (GZA), under contract to Marshall and being supervised by RI DEM, collected eight composite samples from stockpiled drums which contained chemical residues. The drums were categorized, separated, and composited for sampling based on similar contents. Samples were analyzed for VOCs and eight EP TOX metals. Analyses of the drum samples indicated the presence of xylene, toluene, ethyl benzene, cadmium, chromium, lead, and silver at concentrations ranging from 0.21 parts per million (ppm) to 47,000 ppm. Based on these analyses, eight of the 30 drums with residual materials were reported to contain hazardous materials. On 2 June 1982, Jet-Line Services transported the eight drums off

site for disposal at an approved facility. The remaining drums were disposed of as non-hazardous solid waste [1, p. 6].

In 1982, construction of the Centredale Manor complex was completed. A Fresh Water Wetland Applicability Determination, required for the construction of the complex, concluded that the construction of Centredale Manor represented an insignificant alteration of the nearby fresh water wetland located on the western side of the property adjacent to the Woonasquatucket River [1, p. 6].

In 1986, RI DEM received information from the Providence Journal which indicated that several 5,000-gallon USTs used to store hazardous waste were buried on the Centredale Manor property. A ground-penetrating radar survey was conducted by Geo-Centers, Inc. on 24 March 1986, to locate the alleged buried USTs. The survey concluded that there were no buried USTs on the property; however, other metallic debris, possibly buried drums, were potentially present along the western edge of the property [1, p. 6].

On 21 August 1986, NUS/FIT completed an EPA PA of the Centredale Manor property. Based on the previous history of the property, NUS/FIT concluded that groundwater, surface water, soil, and sediment at the property were potentially impacted. Based on the findings of the PA, an SSI was recommended [1, p. 7].

On 15 October 1990, an EPA SSI for Centredale Manor property was completed by NUS/FIT. As part of this investigation, on 27 March 1990, NUS/FIT collected 10 soil samples, including one trip blank, one duplicate/replicate, and one reference sample from the Centredale Manor property. The soil samples were analyzed through the EPA Contract Laboratory Program (CLP) for VOCs, SVOCs, pesticide/PCB, and metals analyses. The trip blank was analyzed for VOCs only. A total of six VOCs and 29 SVOCs were detected, including the compound 4-chloroaniline at a concentration of 32,000 parts per billion (ppb) in the samples submitted for analysis. 4-Chloroaniline is commonly found in dyes used in textile mill operations and may be related to the mills which occupied the property in the 1930s and 1940s. Four pesticides, two PCB congeners (Aroclors 1242 and 1254), and six inorganic elements were also detected in the NUS/FIT soil samples [1, p. 7].

On 10 September 1994, RI DEM collected surface water samples from the Woonasquatucket River. These samples were collected to determine the impact of a cyanide spill which occurred upstream of the property. One sample was collected from the Woonasquatucket River adjacent to the Centredale Manor property. Laboratory analyses detected elevated concentrations of cadmium, copper, cyanide, lead, and nickel at concentrations ranging from 8 ppb and 250 ppb. No known reference or quality assurance/quality control (QA/QC) samples were collected [1, p. 7]. RI DEM did not conduct dioxin analysis on these samples [9].

Approximately ten deteriorated empty 55-gallon drums were observed on 4 October 1995 during the WESTON on-site reconnaissance of the property which was conducted as part of the EPA SIP investigation of the property. The drums were located along the Woonasquatucket River and in the southern wooded area within 200 feet of the building [1, p. 7].

As part of the EPA SIP, WESTON personnel collected sediment samples on 27 March 1996. Nine sediment samples, including three reference samples, were collected from eight locations associated with the property. The sediment samples were analyzed through EPA CLP for VOCs, SVOCs, pesticide/PCB, total metals, and cyanide analyses. Three sediment samples were collected from the Woonasquatucket River and six sediment samples were collected from wetlands along the drainage channel [1, p. 7].

Analytical results of 1996 WESTON sediment samples indicated the presence of several VOCs, SVOCs, and inorganic elements at concentrations greater than or equal to three times the reference sample concentrations. No pesticides or PCBs were detected in the sediment samples [1, pp. 19 - 21]. WESTON did not conduct dioxin analysis of these samples as part of this EPA SIP [9].

Two VOCs were detected in samples collected from wetlands located on the southeast portion of the property along the drainage channel. 2-Butanone and chlorobenzene were detected at 21 ppb and 11 ppb, respectively. Thirteen SVOCs were detected in sediment samples ranging from 350 ppb to 8,500 ppb. The SVOCs detected in WESTON sediment samples were primarily polynuclear aromatic hydrocarbons (PAHs) [1, p. 21].

Ten inorganic elements were also detected in sediment samples ranging from 1.7 ppm to 20,000 ppm. Many of the elements and compounds detected in sediment samples were also previously detected in NUS/FIT soil samples above reference concentrations and in samples collected from drums removed from the property in 1982. This indicates that previous on-site disposal practices may have impacted the surface water quality downstream of the Centredale Manor property [1, p. 22].

In June 1996, fish were collected from the Woonasquatucket River and fish tissue samples were analyzed by EPA Narragansett Laboratory and Providence Urban Initiative personnel. The fish tissue samples were analyzed for cadmium, copper, chromium, nickel, lead, zinc, mercury, PCB congeners, hexachlorobenzene, DDE, DDD, DDT, lindane, chlordane, nonachlor, and dioxin homologues [2, Appendix B]. Based on elevated dioxin levels detected in fish tissue samples, a fish consumption advisory was issued by RI DOH [2, p. 1].

In January 1997, the EPA Office of Ecosystem Protection and the Rhode Island State Program requested assistance from the EPA Office of Environmental Measurement and Evaluation (OEME) to examine and evaluate ambient sediment quality in the Woonasquatucket River and to identify sources that may have caused the elevated concentrations of contaminants in fish tissue [2, p. 1].

In October 1997, OEME personnel conducted water and sediment sampling. Sediment and water column measurements were collected at seven dam locations along the Woonasquatucket River. The area investigated extended from the Esmond Dam area of North Providence, to just upstream of the Valley Street Bridge in Providence (Figure 1). Dioxin contamination was detected at all seven sampling locations. Dioxin levels in the sediment samples at two dams, Allendale Dam and Lymansville Dam, were significantly higher than at the other sediment sampling locations [2, p. 2].

According to the 1997 OEME report, numerous PAHs, chlorinated pesticides, PCBs, and inorganic elements were also detected at all seven locations at concentrations that may pose a chronic risk to the benthic community as well as upper food chain receptors. In addition, because of the biomagnification potential of dioxin and, based on New York Department of Environmental Conservation sediment guidelines that take into consideration upper food chain impacts, as well as the total organic carbon (TOC) values present in the river, the possibility of acute effects to piscivorus (fish consumers) is also present [2, pp. 2-3].

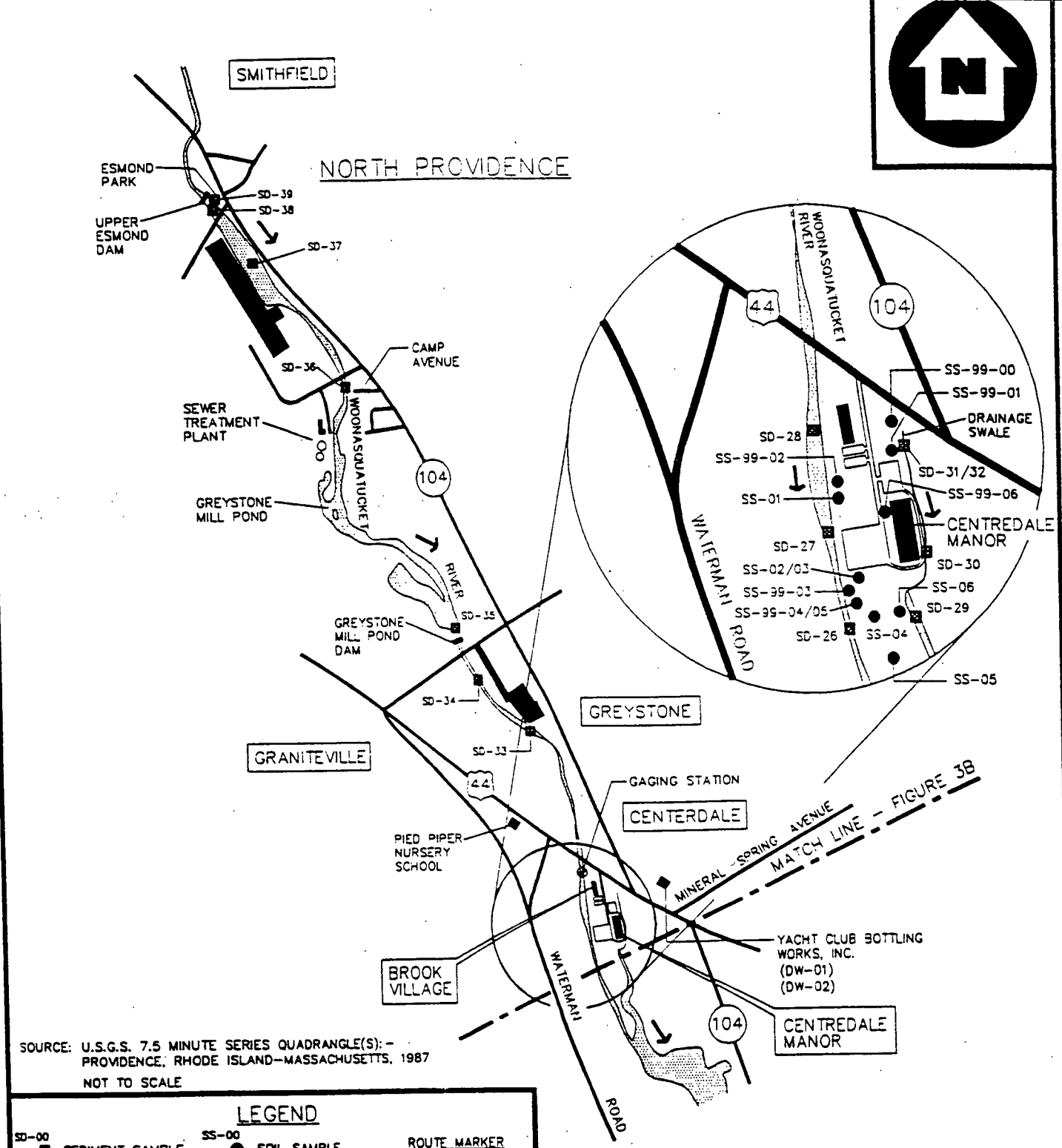
In June 1998, START initiated an ESI of the Centredale Manor Site under direction of EPA. The ESI was initiated to assess: the presence of dioxin/furan and hexachloroxanthene (HCX) contamination on the Centredale Manor property; the extent of contamination in areas of potential human exposure; and potential source areas located upstream of the Centredale Manor property. No prior analysis for the presence of dioxin and HCX had been performed on the Centredale Manor property.

On 31 July 1998, START personnel performed an on-site reconnaissance to identify soil and sediment sampling locations on the Centredale Manor and Brook Village properties and along the Woonasquatucket River between the Esmond Dam area of North Providence, to Waterplace Park in Providence. The investigation covers an area of approximately 10.0 stream miles along the Woonasquatucket River [3].

On 9 September 1998, START personnel collected five soil samples from the Centredale Manor property, one soil sample from the Brook Village property, 35 sediment samples from the Woonasquatucket River, and four sediment samples from the drainage channel. All sampling activities were conducted in accordance with the EPA approved Task Work Plan, dated 31 August 1998. The soil and sediment samples were submitted to the EPA Region VII laboratory for dioxin and HCX analyses, to an EPA CLP laboratory for SVOC and pesticide/PCB analyses, and to a Delivery of Analytical Services (DAS) laboratory for TOC analysis. Sample locations are depicted on Figures 3A, 3B, and 3C and described in Table 1.

Complete analytical results of START soil samples including quantitation and detection limits are presented in Attachment A (for SVOCs and pesticides/PCBs), Attachment B (for dioxins and hexachloroxanthene), and Attachment C (for TOCs). Sample results quantified with a "J" on analytical tables are considered approximate because of limitations identified during CLP and DAS data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

Results for soil samples collected from the Centredale Manor Site which exceed the RI DEM (1996) Residential Direct Exposure Criteria (RI DEC) values are summarized in Table 2. Substances for which no RI DEC values have been established (i.e. carbazole, endosulfan sulfate, 4-methylphenol, isophrone, di-n-butylphthalate, dibenzofuran, butylbenzylphthalate, 4,4'-DDD, 4,4'-DDE, beta-BHC, and heptachlor) are not included in Table 2, but are presented in Attachment A [10]. For comparative purposes, dioxin results are compared to the EPA Region I Dioxin Residential Action Level of 1 ppb. In addition, HCX results are listed; however, no benchmark value is available.



SOURCE: U.S.G.S. 7.5 MINUTE SERIES QUADRANGLE(S): - PROVIDENCE, RHODE ISLAND-MASSACHUSETTS, 1987

NOT TO SCALE

LEGEND

- SD-00 ■ SEDIMENT SAMPLE LOCATION (8/9/98)
- FLOW DIRECTION
- BUILDING
- SS-00 ● SOIL SAMPLE LOCATION (9/9/98)
- SS-99 ● SOIL SAMPLE LOCATION (1/15/99)

ROUTE MARKER

- U.S. ROUTE
- STATE ROUTE

SAMPLE LOCATION MAP

WOONASQUATUCKET RIVER (NORTH)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

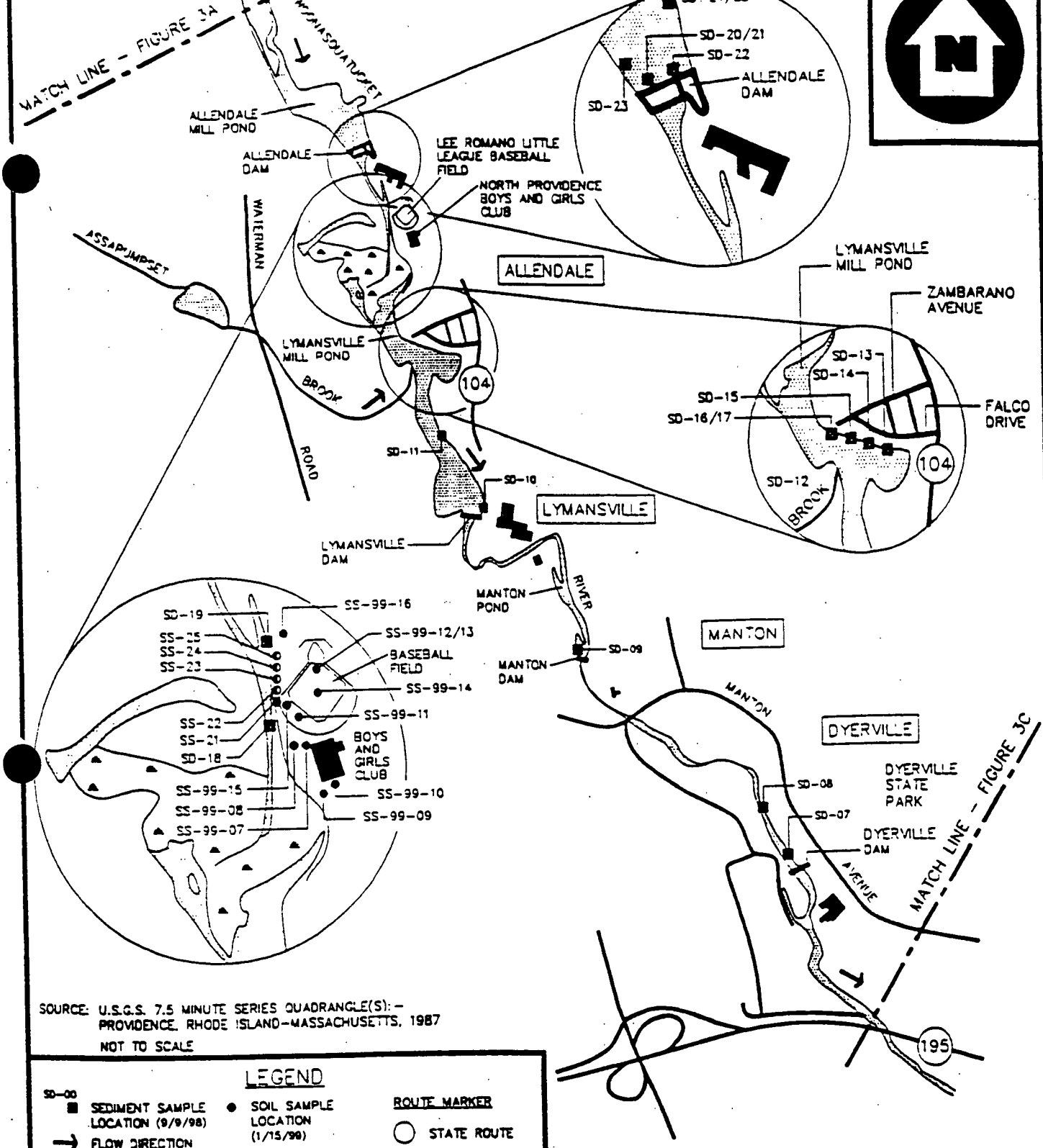
WESTON® MANAGERS DESIGNERS/CONSULTANTS

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	8/14/98

FILE NAME: S:\98060017\FIG1CX

FIGURE 3A



SOURCE: U.S.G.S. 7.5 MINUTE SERIES QUADRANGLE(S):- PROVIDENCE, RHODE ISLAND-MASSACHUSETTS, 1987

NOT TO SCALE

LEGEND

SD-00 SEDIMENT SAMPLE LOCATION (9/9/98)

FLOW DIRECTION

BUILDING

WETLAND

SOIL SAMPLE LOCATION (1/15/99)

SOIL SAMPLE LOCATION (1/27/99)

ROUTE MARKER

STATE ROUTE

SAMPLE LOCATION MAP

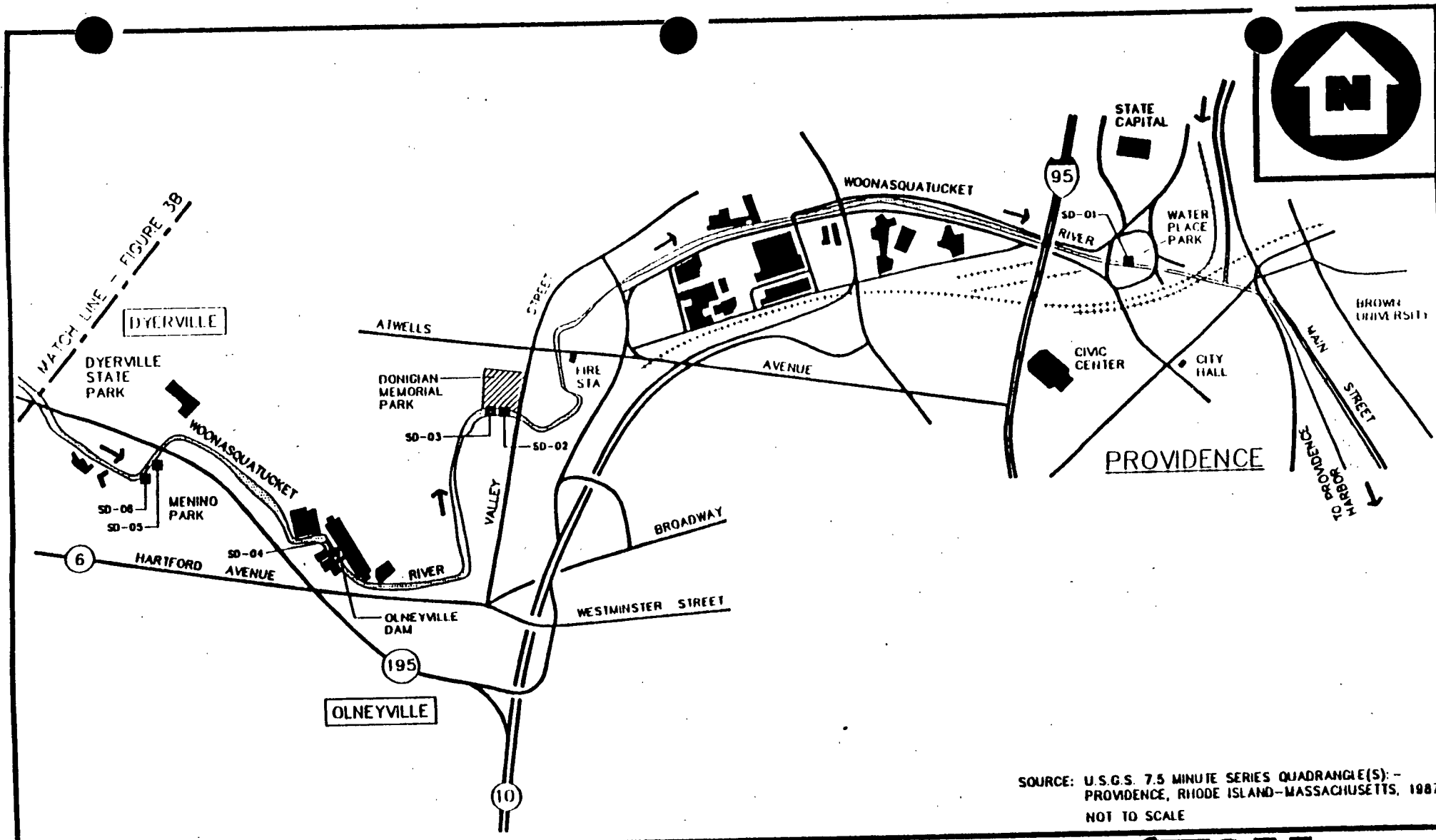
WOONASQUATUCKET RIVER (CENTRAL)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

WESTON® MANAGERS DESIGNERS/CONSULTANTS

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	8/14/98

FILE NAME:	
S:\98060017\FIG1BX	FIGURE 3B



SOURCE: U.S.G.S. 7.5 MINUTE SERIES QUADRANGLE(S): - PROVIDENCE, RHODE ISLAND-MASSACHUSETTS, 1987

NOT TO SCALE

LEGEND

SD-00 ■ SEDIMENT SAMPLE LOCATION (9/9/98)

→ FLOW DIRECTION

▬ BUILDING

+++++ RAILROAD TRACKS

ROUTE MARKER

⬠ INTERSTATE HIGHWAY

○ STATE ROUTE

SAMPLE LOCATION MAP

WOONASQUATUCKET RIVER (SOUTH)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

WESTON® MANAGERS DESIGNERS/CONSULTANTS
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	8/14/98

FILE NAME: S:\98060017\FIG1AX

FIGURE 3C

A total of eight SVOCs and one pesticide (dieldrin) were detected in various soil samples above the respective RI DEC values. Dioxin results exceeded the EPA Region I Residential Action Level for dioxin (1 ppb) at four sample locations and ranged from 3.0 J ppb to 6.3 J ppb. In regards to soil samples collected, the greatest number of SVOCs and the highest concentrations of SVOCs and dioxin were detected in soil sample SS-04 (Figure 3A) [4; 7].

Table 1

Sample Summary: Centredale Manor Site
Samples Collected by START on 9 September 1998

Sample Location No.	Traffic Report No.	Time (hours)	Remarks	Sample Depth (Inches)	Sample Coordinates
MATRIX: Soil					
SS-01	APA72 DAFZ73 AAL24-001	0920	Grab	3 to 12	41° 51′ 23.5″ north 71° 29′ 12.5″ west
SS-02	APA73 DAFZ74 AAL24-002	0950	Grab	0 to 16	41° 51′ 18.7″ north 71° 29′ 9.9″ west
SS-03	APA74 DAFZ75 AAL24-003	1005	Grab	30 to 42	41° 51′ 18.7″ north 71° 29′ 9.9″ west
SS-04	APA75 DAFZ76 AAL24-004	1050	Grab	0 to 18	41° 51′ 17.9″ north 71° 29′ 9.5″ west
SS-05	APA76 DAFZ77 AAL24-005	1130	Grab	0 to 18	41° 51′ 17.7″ north 71° 29′ 8.2″ west
SS-06	APA77 DAFZ78 AAL24-006	1110	Grab	0 to 24	42° 51′ 18.2″ north 71° 29′ 7.7″ west
MATRIX: Sediment					
SD-01 (MS/MSD)	APA78 DAFZ79 AAL24-007	0819	Grab	0 to 6	41° 49′ 37.7″ north 71° 24′ 50.6″ west
SD-02	APA79 DAFZ80 AAL24-008	0835	Grab	0 to 3	41° 49′ 21.4″ north 71° 26′ 25.0″ west
SD-03	APA80 DAFZ81 AAL24-009	0850	Grab	0 to 3	41° 49′ 21.2″ north 71° 26′ 30.0″ west

Table 1

Sample Summary: Centredale Manor Site
Samples Collected by START on 9 September 1998
(Continued)

Sample Location No.	Traffic Report No.	Time (hours)	Remarks	Sample Depth (Inches)	Sample Coordinates
MATRIX: Sediment (Continued)					
SD-04	APA81 DAFZ82 AAL24-010	0900	Grab	0 to 6	41° 49' 6.3" north 71° 26' 56.5" west
SD-05	APA82 DAFZ83 AAL24-011	0938	Grab	0 to 6	41° 49' 15.3" north 71° 27' 18.0" west
SD-06	APA83 DAFZ84 AAL24-012	0950	Grab	0 to 6	41° 49'13.9" north 71° 27' 19.4" west
SD-07	APA84 DAFZ85 AAL24-013	0955	Grab	0 to 6	41° 49' 40.4" north 71° 27' 47.4" west
SD-08	APA85 DAFZ86 AAL24-014	1022	Grab	0 to 3	41° 49' 47.5" north 71° 27' 52.3" west
SD-09	APA86 DAFZ87 AAL24-015	1036	Grab	0 to 6	41° 50' 6.5" north 71° 28' 21.2" west
SD-10	APA87 DAFZ88 AAL24-016	1115	Grab	0 to 6	41° 50' 22.4" north 71° 28' 35.9" west
SD-11	APA88 DAFZ89 AAL24-017	1135	Grab	0 to 12	41° 50' 33.3" north 71° 28' 43.4" west
SD-12	APA89 DAFZ90 AAL24-018	1238	Grab	0 to 12	41° 50' 41.3" north 71° 28' 50.9" west
SD-13	APA90 DAFZ91 AAL24-019	1215	Grab	0 to 12	41° 50' 41.4" north 71° 28' 43.1" west
SD-14	APA91 DAFZ92 AAL24-020	1230	Grab	0 to 6	41° 50' 41.8" north 71° 28' 44.7" west

Table 1

Sample Summary: Centredale Manor Site
Samples Collected by START on 9 September 1998
(Continued)

Sample Location No.	Traffic Report No.	Time (hours)	Remarks	Sample Depth (Inches)	Sample Coordinates
MATRIX: Sediment (Continued)					
SD-15	APA92 DAFZ93 AAL24-021	1250	Grab	0 to 6	41° 50′ 42.3″ north 71° 28′ 46.0″ west
SD-16	APA93 DAFZ94 AAL24-022	1315	Grab	0 to 6	41° 50′ 42.8″ north 71° 28′ 48.3″ west
SD-17	APA94 DAFZ95 AAL24-023	1315	Grab, Duplicate of SD-16	0 to 6	41° 50′ 42.8″ north 71° 28′ 48.3″ west
SD-18 (MS/MSD)	APA95 DAFZ96 AAL24-024	1155	Grab	0 to 3	41° 50′ 57.0″ north 71° 28′ 49.7″ west
SD-19	APA96 DAFZ97 AAL24-025	1110	Grab	0 to 3	41° 50′ 53.7″ north 71° 28′ 49.8″ west
SD-20	APA97 DAFZ98 AAL24-026	1406	Grab	0 to 3	41° 51′ 3.9″ north 71° 28′ 54.8″ west
SD-21	APA98 DAFZ99 AAL24-027	1415	Grab	6 to 25	41° 51′ 3.9″ north 71° 28′ 59.8″ west
SD-22	APA99 DAF01A AAL24-028	1411	Grab	0 to 3	41° 51′ 4.2″ north 71° 28′ 53.2″ west
SD-23	APB00 DAF02A AAL24-029	1355	Grab	0 to 3	41° 50′ 4.4″ north 71° 28′ 56.2″ west
SD-24	APB01 DAF03A AAL24-030	1356	Grab	0 to 3	41° 51′ 6.8″ north 71° 28′ 53.9″ west
SD-25	APB02 DAF04A AAL24-031	1356	Grab, Duplicate of SD-24	0 to 3	41° 51′ 6.8″ north 71° 28′ 53.9″ west

Table 1

Sample Summary: Centredale Manor Site
Samples Collected by START on 9 September 1998
(Continued)

Sample Location No.	Traffic Report No.	Time (hours)	Remarks	Sample Depth (Inches)	Sample Coordinates
MATRIX: Sediment (Continued)					
SD-26	APB03 DAF05A AAL24-032	1320	Grab	0 to 6	41° 51′ 17.7″ north 71° 29′ 10.1″ west
SD-27	APB04 DAF06A AAL24-033	1420	Grab	0 to 6	41° 51′ 23.8″ north 71° 29′ 13.4″ west
SD-28	APB05 DAF07A AAL24-034	1450	Grab	0 to 6	41° 51′ 28.7″ north 71° 29′ 13.5″ west
SD-29	APB06 DAF08A AAL24-035	1350	Grab	0 to 6	41° 51′ 18.0″ north 71° 29′ 7.6″ west
SD-30	APB07 DAF09A AAL24-036	1415	Grab	0 to 6	41° 51′ 21.2″ north 71° 29′ 8.4″ west
SD-31	APB08 DAF10A AAL24-037	1435	Grab	0 to 6	41° 51′ 28.1″ north 71° 29′ 11.0″ west
SD-32	APB09 DAF11A AAL24-038	1435	Grab, Duplicate of SD-31	0 to 6	41° 51′ 28.1″ north 71° 29′ 11.0″ west
SD-33	APB10 DAF12A AAL24-039	1515	Grab	0 to 3	41° 51′ 47.4″ north 71° 29′ 21.5″ west
SD-34	APB11 DAF13A AAL24-040	1520	Grab	0 to 3	41° 51′ 48.6″ north 71° 29′ 25.1″ west
SD-35 (MS/MSD)	APB12 DAF14A AAL24-041	1526	Grab	0 to 3	41° 51′ 58.9″ north 71° 29′ 35.8″ west
SD-36	APB13 DAF15A AAL24-042	1546	Grab	0 to 3	41° 52′ 23.2″ north 71° 29′ 48.7″ west

Table 1

Sample Summary: Centredale Manor Site
Samples Collected by START on 9 September 1998
(Concluded)

Sample Location No.	Traffic Report No.	Time (hours)	Remarks	Sample Depth (Inches)	Sample Coordinates
MATRIX: Sediment (Concluded)					
SD-37	APB17 DAF16A AAL24-043	1547	Grab	0 to 6	41° 52′ 36.7″ north 71° 29′ 59.9″ west
SD-38	APB18 DAF17A AAL24-044	1600	Grab	0 to 6	41° 52′ 44.0″ north 71° 30′ 6.2″ west
SD-39	APB19 DAF18A AAL24-045	1602	Grab	0 to 3	41° 52′ 44.1″ north 71° 30′ 7.0″ west
MATRIX: Aqueous					
RB-01	APB20 DAF19A	1250	Grab	NA	NA
Matrix: Performance Evaluation Samples					
PE-503338	APB24	0500	SVOC	NA	NA
PE-501151	APB25	0500	SVOC	NA	NA
PE-501688	APB26	0500	SVOC	NA	NA
PE-0023053	APB27	0500	Pest/PCB	NA	NA
PE-0021565	APB28	0500	Pest/PCB	NA	NA
PE-0000466	APB29	0500	Pest/PCB	NA	NA
PE-TT03728	APB30	0500	Aroclor 1260	NA	NA
PE-TT01048	APB31	0500	Aroclor 1260	NA	NA
PE-TT00153	APB32	0500	Aroclor 1260	NA	NA

MS/MSD = Matrix Spike/Matrix Spike Duplicate
NA = Not Applicable
SVOC = Semivolatile Organic Compound
Pest/PCB = Pesticide/Polychlorinated Biphenyl

[3]

Table 2

Soil Sample Results from Centredale Manor Site
Above Residential Direct Exposure Criteria

Sample Location	Compound	Sample Concentration	Direct Exposure Criteria* (Residential)
SS-01 (APA72) (DAFZ73) (AAL24-001)	**SVOCs**		
	Chrysene	0.420 J mg/kg	0.4 mg/kg
	Benzo(a)pyrene	0.460 mg/kg	0.4 mg/kg
	DIOXINS		
	Dioxins†	R ppb	1.0 ppb
	Hexachloroxanthene	R ppb	NA
SS-02 (APA73) (DAFZ74) (AAL24-002)	**SVOCs**		
	Chrysene	0.450 J mg/kg	0.4 mg/kg
	PESTICIDES/PCBs		
	Dieldrin	0.14 J,EB mg/kg	0.04 mg/kg
	DIOXINS		
	Dioxins†	4.7 J ppb	1.0 ppb
	Hexachloroxanthene	263 J ppb	NA
SS-03 (APA74) (DAFZ75) (AAL24-003)	**DIOXINS**		
	Hexachloroxanthene	9.9 ppb	NA
SS-04 (APA75) (DAFZ76) (AAL24-004)	**SVOCs**		
	Benzo(a)anthracene	2.4 mg/kg	0.9 mg/kg
	Chrysene	2.2 mg/kg	0.4 mg/kg
	Benzo(b)fluoranthene	3.2 mg/kg	0.9 mg/kg
	Benzo(k)fluoranthene	0.960 mg/kg	0.9 mg/kg
	Benzo(a)pyrene	2.6 mg/kg	0.4 mg/kg
	Indeno(1,2,3-cd)pyrene	1.5 mg/kg	0.9 mg/kg
	Dibenz(a,h)anthracene	0.460 mg/kg	0.4 mg/kg
	Benzo(g,h,i)perylene	1.3 mg/kg	0.8 mg/kg

Table 2

Soil Sample Results from Centredale Manor Site
Above Residential Direct Exposure Criteria (Concluded)

Sample Location	Compound	Sample Concentration	Direct Exposure Criteria* (Residential)
SS-04 (concluded)	**DIOXINS**		
	Dioxins†	6.3 J ppb	1.0 ppb
	Hexachloroxanthene	168.2 J ppb	NA
SS-05 (APA76) (DAFZ77) (AAL24-005)	**SVOCs**		
	Chrysene	0.470 J mg/kg	0.4 mg/kg
	Benzo(a)pyrene	0.500 mg/kg	0.4 mg/kg
	DIOXINS		
	Dioxins†	3.4 J ppb	1.0 ppb
	Hexachloroxanthene	63.2 ppb	NA
SS-06 (APA77) (DAFZ78) (AAL24-006)	**SVOCs**		
	Chrysene	0.710 J mg/kg	0.4 mg/kg
	Benzo(a)pyrene	0.690 J mg/kg	0.4 mg/kg
	DIOXINS		
	Dioxins†	3.0 J ppb	1.0 ppb
	Hexachloroxanthene	48.3 J ppb	NA

J = The associated numerical value is an estimated quantity.
EB = The compound was identified in an aqueous equipment blank (EB) that was used to assess field contamination associated with soil/sediment samples.
R = Value was rejected due to insufficient of non-compliant quality control.
mg/kg = Milligrams per kilogram.
ppb = Parts per billion.
NA = Not Applicable.
PCBs = Polychlorinated Biphenyls.
SVOCs = Semivolatile Organic Compounds.

* For SVOCs, the RI DEM Residential Direct Exposure Criteria (1993, amended 1996) is presented for comparison purposes. For dioxins, the EPA Region I Residential Action Level is presented for comparison purposes. No benchmark concentration is available for hexachloroxanthene.

† Values presented for dioxins are the 2,3,7,8-tetrachlorodibenzo dioxin toxicity equivalence on a dry-weight basis.

[4; 7;10]

Complete analytical results of START sediment samples including quantitation and detection limits are presented in Attachment A (for SVOCs and pesticides/PCBs), Attachment B (for dioxin and hexachloroxanthene), and Attachment C (for TOCs). Sample results quantified with a "J" on analytical tables are considered approximate because of limitations identified during CLP and DAS data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

Table 3 summarizes SVOCs, pesticides/PCBs, dioxins, and HCX detected through analyses of START sediment samples (SD-01 through SD-32) that were collected adjacent to or downstream of the Centredale Manor property. Sediment samples collected upstream of the Centredale Manor property (SD-33 through SD-39) are discussed later in this report.

For each sample location, a compound is listed if it is detected at three times or greater than the appropriate reference sample concentration. Based on its relative upstream location, sediment sample SD-28 is the reference sample for samples SD-01 through SD-27. Based on their relative upstream locations, sediment samples SD-31 and SD-32 (duplicates) are the references for SD-29 and SD-30. If the compound is not detected in the appropriate reference sample, the reference sample quantitation limit (SQL) is used as the reference value. These compounds are listed if they occurred at a value equal to or greater than the reference SQL and are designated by their approximate relative concentration above these values. Dioxin values are presented as the 2,3,7,8-tetrachlorodibenzodioxin (2,3,7,8-TCDD) toxicity equivalence on a dry-weight basis. The estimated detection limit for 2,3,7,8-TCDD is used to calculate the total toxicity equivalence value for the reference sample [11].

Twelve SVOCs, 12 pesticides, one PCB (Aroclor-1254), dioxins, and HCX were detected at concentrations exceeding reference values in various sediment samples collected along Woonasquatucket River downstream of the Centredale Manor property (SD-01 through SD-27). In addition, five pesticides, one PCB (Aroclor-1254), dioxins, and HCX were detected at concentrations exceeding reference values in the drainage channel downstream sediment samples (SD-29 and SD-30) [4; 5].

Generally, dioxin concentrations were highest near the Centredale Manor property and attenuate to less than 1 ppb at downstream locations. The highest concentration of dioxins was detected in a sediment sample collected along the drainage channel (SD-30) adjacent to the Centredale Manor property, which flows into the Woonasquatucket River approximately 0.3 miles downstream of the property. Analytical results of the Woonasquatucket River sediment samples indicate that the highest dioxin concentration detected was 10.8 ppb in sample SD-23 collected at the Allendale Dam Area [7]. It should be noted that this is the first downstream dam from the Centredale Manor property. The dam acts as a barrier and slows the flow of water, providing the sediments and possibly contaminants time to settle out of the water column.

Various SVOCs and pesticides/PCBs were detected at several locations along the Woonasquatucket River and the drainage channel. However, the greatest number of SVOCs and the highest concentrations of SVOCs were detected in the sample collected farthest downstream along Woonasquatucket River (SD-01) [4; 5]. Sediment samples with elevated levels of PCBs were detected only in samples upstream of the Allendale Dam.

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-01 (APA78) (DAFZ79) AAL24-007	SVOCs			
	Acenaphthene	170 J ppb	56 J ppb	3.0 × Ref
	Phenanthrene	3,400 ppb	1,100 ppb	3.1 × Ref
	Fluoranthene	9,100 ppb	1,400 ppb	6.5 × Ref
	Pyrene	11,000 J ppb	1,100 ppb	10 × Ref
	Benzo(a)anthracene	4,500 ppb	560 ppb	8.0 × Ref
	Chrysene	2,600 J ppb	580 ppb	4.5 × Ref
	Bis(2-ethylhexyl)phthalate	3,700 J ppb	87 J ppb	42 × Ref
	Benzo(b)fluoranthene	4,700 ppb	830 J ppb	5.7 × Ref
	Benzo(a)pyrene	3,700 ppb	530 ppb	7.0 × Ref
	Indeno(1,2,3-cd)pyrene	3,500 ppb	340 J ppb	10 × Ref
	Dibenz(a,h)anthracene	680 ppb	140 J ppb	4.9 × Ref
	Benzo(g,h,i)perylene	2,700 ppb	280 J ppb	9.6 × Ref
	PESTICIDES/PCBs			
	Heptachlor Epoxide	2.7 J ppb	2.1 U ppb	1.3 × SQL
	4,4'-DDD	35 J ppb	4.1 U ppb	8.5 × SQL
	4,4'-DDT	22 J ppb	4.1 U ppb	5.4 × SQL
	DIOXINS			
	Dioxins†	0.12 ppb	0.002 UJ ppb	60 × SQL
	Hexachloroxanthene	49.4 J ppb	0.261 UJ ppb	190 × SQL
SD-02 (APA79) (DAFZ80) AAL24-008	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	840 ppb	87 J ppb	9.7 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	3.6 J ppb	0.38 J ppb	9.5 × Ref
	4,4'-DDD	6.1 J ppb	4.1 U ppb	1.5 × SQL
	alpha-Chlordane	3.4 J ppb	2.1 U ppb	1.6 × SQL
	DIOXINS			
	Dioxins†	0.088 J ppb	0.002 UJ ppb	44 × SQL
	Hexachloroxanthene	21.9 J ppb	0.261 UJ ppb	84 × SQL

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Continued)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-03 (APA80) (DAFZ81) AAL24-009	SVOCs			
	Acenaphthene	250 J ppb	56 J ppb	4.5 × Ref
	Bis(2-ethylhexyl)phthalate	440 ppb	87 J ppb	5.1 × Ref
	Benzo(b)fluoranthene	2,500 ppb	830 J ppb	3.0 × Ref
	Benzo(a)pyrene	1,600 ppb	530 ppb	3.0 × Ref
	DIOXINS			
	Dioxins†	0.034 J ppb	0.002 UJ ppb	17 × SQL
SD-04 (APA81) (DAFZ82) AAL24-010	SVOCs			
	Bis(2-ethylhexyl)phthalate	870 ppb	87 J ppb	10 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	3.7 J ppb	0.38 J ppb	9.7 × Ref
	4,4'-DDD	5.1 J ppb	4.1 U ppb	1.2 × SQL
	alpha-Chlordane	4.2 J ppb	2.1 U ppb	2.0 × SQL
	DIOXINS			
	Dioxins†	0.42 J ppb	0.002 UJ ppb	210 × SQL
	Hexachloroxanthene	6.8 J ppb	0.261 UJ ppb	26 × SQL
SD-05 (APA82) (DAFZ83) AAL24-011	**PESTICIDES/PCBs**			
	4,4'-DDE	4.9 ppb	0.38 J ppb	13 × Ref
	DIOXINS			
	Dioxins†	0.018 J ppb	0.002 UJ ppb	9.0 × SQL
SD-06 (APA83) (DAFZ84) AAL24-012	**DIOXINS**			
	Dioxins†	0.018 J ppb	0.002 UJ ppb	9.0 × SQL
SD-07 (APA84) (DAFZ85) AAL24-013	**DIOXINS**			
	Dioxins†	0.055 J ppb	0.002 UJ ppb	28 × SQL
SD-08 (APA85) (DAFZ86) AAL24-01	SVOCs			
	Bis(2-ethylhexyl)phthalate	390 J ppb	87 J ppb	4.5 × Ref
	DIOXINS			
	Dioxins†	0.21 J ppb	0.002 UJ ppb	105 × SQL

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Continued)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-09 (APA86) (DAFZ87) AAL24-015	**DIOXINS**			
	Dioxins†	0.030 J ppb	0.002 UJ ppb	15 × SQL
SD-10 (APA87 (DAFZ88 AAL24-016	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	700 ppb	87 J ppb	8.1 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	1.7 J ppb	0.38 J ppb	4.5 × Ref
	alpha-Chlordane	2.4 J ppb	2.1 U ppb	1.1 × SQL
	DIOXINS			
	Dioxins†	0.16 J ppb	0.002 UJ ppb	80 × SQL
SD-11 (APA88) (DAFZ89) AAL24-017	**PESTICIDES/PCBs**			
	4,4'-DDE	6.1 ppb	0.38 J ppb	16 × Ref
	alpha-Chlordane	14 J ppb	2.1 U ppb	6.7 × SQL
	gamma-Chlordane	16 J ppb	2.1 U ppb	7.6 × SQL
	DIOXINS			
	Dioxins†	0.27 J ppb	0.002 UJ ppb	135 × SQL
SD-12 (APA89) (DAFZ90) AAL24-018	**DIOXINS**			
	Dioxins†	0.020 J ppb	0.002 UJ ppb	10 × SQL
SD-13 (APA90) (DAFZ91) AAL24-019	**PESTICIDES/PCBs**			
	4,4'-DDE	3.5 J ppb	0.38 J ppb	9.2 × Ref
	alpha-Chlordane	5.7 ppb	2.1 U ppb	2.7 × SQL
	gamma-Chlordane	3.5 ppb	2.1 U ppb	1.7 × SQL
	DIOXINS			
	Dioxins†	0.12 J ppb	0.002 UJ ppb	60 × SQL
SD-14 (APA91) (DAFZ92) AAL24-020	**PESTICIDES/PCBs**			
	4,4'-DDE	3.6 J ppb	0.38 J ppb	9.5 × Ref
	4,4'-DDD	4.1 ppb	4.1 U ppb	1.0 × SQL

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Continued)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-14 (concluded)	alpha-Chlordane	25 J ppb	2.1 U ppb	12 × SQL
	gamma-Chlordane	21 ppb	2.1 U ppb	10 × SQL
	DIOXINS			
	Dioxins†	0.030 J ppb	0.002 UJ ppb	15 × SQL
SD-16 (APA93) (DAFZ94) AAL24-022	**PESTICIDES/PCBs**			
	4,4'-DDE	2.5 J ppb	0.38 J ppb	6.6 × Ref
	alpha-Chlordane	3.5 J ppb	2.1 U ppb	1.7 × SQL
	DIOXINS			
	Dioxins†	0.47 J ppb	0.002 UJ ppb	240 × SQL
	Hexachloroxanthene	15 J ppb	0.261 UJ ppb	57 × SQL
SD-17 (APA94) (DAFZ95) AAL24-023	**PESTICIDES/PCBs**			
	4,4'-DDE	6.8 J ppb	0.38 J ppb	18 × Ref
	alpha-Chlordane	12 J ppb	2.1 U ppb	5.7 × SQL
	gamma-Chlordane	7.9 J ppb	2.1 U ppb	3.8 × SQL
	DIOXINS			
	Dioxins†	0.62 J ppb	0.002 UJ ppb	310 × SQL
	Hexachloroxanthene	15 J ppb	0.261 UJ ppb	57 × SQL
SD-18 (APA95) DAFZ96) AAL24-024	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	470 ppb	87 J ppb	5.4 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	2.8 J ppb	0.38 J ppb	7.4 × Ref
	alpha-Chlordane	5.6 J ppb	2.1 U ppb	2.7 × SQL
	gamma-Chlordane	4.7 J ppb	2.1 U ppb	2.2 × SQL
	DIOXINS			
	Dioxins†	8.0 J ppb	0.002 UJ ppb	4,000 × SQL
	Hexachloroxanthene	167 J ppb	0.261 UJ ppb	640 × SQL

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Continued)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-19 (APA96) (DAFZ97) AAL24-025	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	920 ppb	87 J ppb	10 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	1.3 J ppb	0.38 J ppb	3.4 × Ref
	alpha-Chlordane	9.1 ppb	2.1 U ppb	4.3 × SQL
	gamma-Chlordane	4.0 J ppb	2.1 U ppb	1.9 × SQL
	DIOXINS			
	Dioxins†	0.018 J ppb	0.002 UJ ppb	9.0 × SQL
SD-20 (APA97) (DAFZ98) AAL24-026	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	590 J ppb	87 J ppb	6.8 × Ref
	Indeno(1,2,3-cd)pyrene	1,200 J ppb	340 J ppb	3.5 × Ref
	PESTICIDES/PCBs			
	delta-BHC	2.4 J ppb	2.1 U ppb	1.1 × SQL
	4,4'-DDE	4.2 J ppb	0.38 J ppb	11 × Ref
	Endrin Aldehyde	5.2 J ppb	0.77 J ppb	6.8 × Ref
	Aroclor-1254	200 J ppb	48 J ppb	4.2 × Ref
	DIOXINS			
	Dioxins†	3.6 J ppb	0.002 UJ ppb	1,800 × SQL
	Hexachloroxanthene	76 J ppb	0.261 UJ ppb	290 × SQL
SD-21 (APA98) (DAFZ99) AAL24-027	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	330 J ppb	87 J ppb	3.8 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	2.8 J ppb	0.38 J ppb	7.4 × Ref
	Endrin aldehyde	2.6 J ppb	0.77 J ppb	3.4 × Ref

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Continued)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-21 (concluded)	**DIOXINS**			
	Dioxins†	4.1 J ppb	0.002 UJ ppb	2,050 × SQL
	Hexachloroxanthene	99 J ppb	0.261 UJ ppb	380 × SQL
SD-22 (APA99) (DAF01A) AAL24-028	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	930 J ppb	87 J ppb	11 × Ref
	Indeno(1,2,3-cd)pyrene	1,800 ppb	340 J ppb	5.3 × Ref
	Dibenz(a,h)anthracene	440 J ppb	140 J ppb	3.1 × Ref
	Benzo(g,h,i)perylene	1,100 ppb	280 J ppb	3.9 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	9.5 J ppb	0.38 J ppb	25 × Ref
	Methoxychlor	16 J ppb	3.5 J ppb	4.6 × Ref
	alpha-Chlordane	9.1 ppb	2.1 U ppb	4.3 × SQL
	gamma-Chlordane	9.3 J ppb	2.1 U ppb	4.4 × SQL
	Aroclor-1254	440 ppb	48 J ppb	9.2 × Ref
	DIOXINS			
	Dioxins†	7.5 J ppb	0.002 J ppb	3,750 × SQL
	Hexachloroxanthene	163 J ppb	0.261 UJ ppb	624 × SQL
SD-23 (APB00) (DAF02A) AAL24-029	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	1,600 J ppb	87 J ppb	18 × Ref
	Indeno(1,2,3-cd)pyrene	1,100 J ppb	340 J ppb	3.2 × Ref
	Benzo(g,h,i)perylene	990 J ppb	280 J ppb	3.5 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	9.3 J ppb	0.38 J ppb	24 × Ref
	gamma-Chlordane	5.0 J ppb	2.1 U ppb	2.4 × SQL
	Aroclor-1254	320 J ppb	48 J ppb	6.7 × Ref

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Continued)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-23 (concluded)	**DIOXINS**			
	Dioxins†	10.1 J ppb	0.002 UJ ppb	5,050 × SQL
	Hexachloroxanthene	365 J ppb	0.261 UJ ppb	1,400 × SQL
SD-24 (APB01) (DAF03A) AAL24-030	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	650 J ppb	87 J ppb	7.5 × Ref
	Indeno(1,2,3-cd)pyrene	1,200 J ppb	340 J ppb	3.5 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	5.1 J ppb	0.38 J ppb	13 × Ref
	Methoxychlor	12 J ppb	3.5 J ppb	3.4 × Ref
	gamma-Chlordane	3.2 J ppb	2.1 U ppb	1.5 × SQL
	Aroclor-1254	260 J ppb	48 J ppb	5.4 × Ref
	DIOXINS			
	Dioxins†	5.8 J ppb	0.002 UJ ppb	2,900 × SQL
	Hexachloroxanthene	135 J ppb	0.261 UJ ppb	517 × SQL
SD-25 (APB02) (DAF04A) AAL24-031	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	510 J ppb	87 J ppb	5.9 × Ref
	PESTICIDES/PCBs			
	4,4'-DDE	3.7 J ppb	0.38 J ppb	9.7 × Ref
	gamma-Chlordane	2.4 J ppb	2.1 U ppb	1.1 × SQL
	Aroclor-1254	170 J ppb	48 J ppb	3.5 × Ref
	DIOXINS			
	Dioxins†	5.2 J ppb	0.002 UJ ppb	2,600 × SQL
	Hexachloroxanthene	89 J ppb	0.261 UJ ppb	340 × SQL

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Continued)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-26 (APB03) (DAF05A) AAL24-032	**DIOXINS**			
	Dioxins†	0.093 ppb	0.002 UJ ppb	47 × SQL
SD-27 (APB04) (DAF06A) AAL24-033	**PESTICIDES/PCBs**			
	Dieldrin	12 ppb	4.1 U ppb	2.9 × SQL
	4,4'-DDE	5.2 ppb	0.38 J ppb	14 × Ref
	Endrin aldehyde	2.6 J ppb	0.77 J ppb	3.4 × Ref
	DIOXINS			
	Dioxins†	1.3 J ppb	0.002 UJ ppb	650 × SQL
	Hexachloroxanthene	50 J ppb	0.261 UJ ppb	190 × SQL
SD-29 (APB06) (DAF08A) AAL24-035	**PESTICIDES/PCBs**			
	gamma-Chlordane	5.5 J ppb	1.4 J ppb	3.9 × Ref
	Aroclor-1254	65 J ppb	41 U ppb	1.6 × SQL
	DIOXINS			
	Dioxins†	0.057 J ppb	0.002 UJ ppb	28 × SQL
SD-30 (APB07) (DAF09A) AAL24-036	**PESTICIDES/PCBs**			
	beta-BHC	6.5 J ppb	1.7 U ppb	3.8 × CRQL
	Dieldrin	27 J,EB ppb	4.1 U ppb	6.6 × SQL
	4,4'-DDE	23 J ppb	4.1 U ppb	5.6 × SQL
	Endosulfan Sulfate	23 ppb	3.3 U ppb	7.0 × CRQL
	Aroclor-1254	1,400 ppb	41 U ppb	34 × Ref

Table 3

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-01 through SD-32
(Concluded)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-30 (concluded)	DIOXINS			
	Dioxins†	15.8 J ppb	0.002 UJ ppb	7,900 × SQL
	Hexachloroxanthene	94 J ppb	1.9 UJ ppb	49 × SQL

J = The associated numerical value is an estimated quantity.
U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.
EB = The compound was identified in an aqueous equipment blank (EB) that was used to assess field contamination associated with soil/sediment samples.
mg/kg = Milligrams per kilogram.
ppb = Parts per billion.
PCBs = Polychlorinated Biphenyls.
SVOCs = Semivolatile Organic Compounds.
Ref = Reference value.
SQL = Sample Quantitation Limit.
CRQL = Contract Required Quantitation Limit

* For SVOCs, the reference concentration or the reference SQL is presented. For dioxins, the estimated detection limit for 2,3,7,8-TCDD that is used to calculate the total toxicity equivalence value for the reference sample is presented.

† Values presented for dioxins are the 2,3,7,8-tetrachlorodibenzo dioxin toxicity equivalence on a dry-weight basis.

Note: Analytical results for numerous pesticides and PCBs in sediment samples were rejected due to deficiencies in quality control identified during the data validation process. Refer to Attachment B for complete analytical results.

[4; 5; 7]

Table 4 summarizes SVOCs, pesticides/PCBs, dioxins, and HCX detected through analyses of START sediment samples (SD-33 through SD-39) collected upstream of the Centredale Manor property. For each sample location, a compound is listed if it is detected at three times or greater than the reference sample concentration (SD-39). If the compound is not detected in the reference sample, the reference SQL is used as the reference value. These compounds are listed if they occurred at a value equal to or greater than the reference SQL and are designated by their approximate relative concentration above these values. Dioxin values are presented as the 2,3,7,8-TCDD toxicity equivalence on a dry-weight basis. The estimated detection limit for 2,3,7,8-TCDD is used to calculate the total toxicity equivalence value for the reference sample [11].

A total of 18 SVOCs, two pesticides, one PCB, and dioxins were detected at concentrations exceeding reference values in sediment samples collected along the Woonasquatucket River upstream of the Centredale Manor property. Seventeen of the SVOCs were detected at the highest concentrations in sample SD-37 (collected approximately 1.8 miles upstream of the Centredale Manor property), and 16 of the 18 SVOCs were detected at elevated levels only at sample SD-37. Elevated PCB levels were detected in one sample upstream of the Centredale Manor property (SD-33). Dioxin concentrations detected upstream of the Centredale Manor property ranged from 0.003 J ppb to 0.09 J ppb, significantly lower than the dioxin concentrations detected adjacent to and downstream of the Centredale Manor property.

Table 4

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-33 to SD-39

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-33 (APB10) (DAF12A) AAL24-039	**SVOCs**			
	Benzo(k)fluoranthene	1.000 J ppb	150 J ppb	6.7 × Ref
	PESTICIDES/PCBs			
	Aroclor-1254	7.800 J ppb	57 U ppb	140 × SQL
	DIOXINS			
	Dioxins†	0.094 J ppb	0.002 UJ ppb	47 × SQL
SD-34 (APB11) (DAF13A) AAL24-040	**SVOCs**			
	Benzo(k)fluoranthene	600 J ppb	150 J ppb	4.0 × Ref
	DIOXINS			
	Dioxins†	0.020 J ppb	0.002 UJ ppb	10 × SQL
SD-35 (APB12) (DAF14A) AAL24-041	**SVOCs**			
	Bis(2-ethylhexyl)phthalate	3.300 J ppb	160 J ppb	21 × Ref
	DIOXINS			
	Dioxins†	0.003 J ppb	0.002 UJ ppb	1.5 × SQL
SD-37 (APB17) (DAF16A) AAL24-043	**SVOCs**			
	Naphthalene	930 ppb	570 U ppb	1.6 × SQL
	Acenaphthene	1.600 ppb	570 U ppb	2.8 × SQL
	Dibenzofuran	1.300 ppb	570 U ppb	2.3 × SQL
	Fluorene	2.000 ppb	570 U ppb	3.5 × SQL
	Phenanthrene	17.000 ppb	280 J ppb	61 × Ref
	Anthracene	3.100 ppb	96 J ppb	32 × Ref

Table 4

Summary of Analytical Results
Sediment Sample Analysis for Woonasquatucket River Samples SD-33 to SD-39
(Concluded)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration*	Comments
SD-37 (concluded)	Carbazole	2,000 J ppb	570 UJ ppb	3.5 × SQL
	Fluoranthene	17,000 ppb	670 ppb	25 × Ref
	Pyrene	17,000 ppb	560 J ppb	30 × Ref
	Benzo(a)anthracene	8,600 ppb	340 J ppb	25 × Ref
	Chrysene	7,900 ppb	370 J ppb	21 × Ref
	Benzo(b)fluoranthene	8,400 ppb	450 J ppb	19 × Ref
	Benzo(k)fluoranthene	2,400 ppb	150 J ppb	16 × Ref
	Benzo(a)pyrene	6,200 ppb	430 J ppb	14 × Ref
	Indeno(1,2,3-cd)pyrene	2,700 ppb	200 J ppb	13 × Ref
	Dibenz(a,h)anthracene	880 ppb	69 J ppb	13 × Ref
	Benzo(g,h,i)perylene	2,600 ppb	250 J ppb	10 × Ref
	PESTICIDES/PCBs			
	4,4'-DDT	11 J ppb	5.7 U ppb	1.9 × SQL
	Endrin Ketone	20 J ppb	5.7 U ppb	3.5 × SQL

J = The associated numerical value is an estimated quantity.
U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.
ppb = Parts per billion.
PCBs = Polychlorinated Biphenyls.
SVOCs = Semivolatile Organic Compounds.
Ref = Reference value.
SQL = Sample Quantitation Limit.

* For SVOCs, the reference concentration or the reference SQL is presented. For dioxins, the estimated detection limit for 2,3,7,8-TCDD that is used to calculate the total toxicity equivalence value for the reference sample is presented.

† Values presented for dioxins are the 2,3,7,8-tetrachlorodibenzo dioxin toxicity equivalence on a dry-weight basis.

Note: Analytical results for numerous pesticides and PCBs in sediment samples were rejected. Refer to Attachment B for complete analytical results.

[5; 6; 7]

On 15 January 1999, START personnel, along with personnel from the EPA OEME, collected a total of three drinking water samples from the Pied Piper Nursery School and from the Yacht Club Bottling Works, Inc. Additionally, 17 soil samples were collected on the Centredale Manor and Brook Village properties, the Lee Romano Little League Field, and the Boys and Girls Club property [3; Figures 3A and 3B].

A total of 20 samples were submitted to the EPA Region VII laboratory to be analyzed for dioxins and HCX. Three of the 17 soil samples collected had dioxin levels exceeding the EPA Region I Residential Action Level for dioxin (1 ppb). All of the elevated levels were noted in samples collected from the Centredale Manor property [Figure 3A]. The exceedences ranged from 2.5 ppb to 5.5 ppb, with the highest concentration detected in soil sample SS-99-03 (5.5 ppb) [12]. Table 5 summarizes dioxins exceeding the EPA Region I Residential Action Level of 1 ppb.

On 27 January 1999, EPA ERT and WESTON REAC personnel collected a total of five soil samples from the Lee Romano Little League Field property which were analyzed for dioxins. Analytical levels indicate that there were no dioxin levels exceeding the EPA Region I Residential Action Level for dioxin (1 ppb) [12; Figure 3B].

START personnel, along with EPA Region I, EPA OEME, EPA Emergency Response Team (ERT), and WESTON Response Engineering and Analytical Contract (REAC) personnel, conducted soil sampling (Phase I) on and around the Centredale Manor and Brook Village properties on 16 through 18 February 1999. A geophysical survey was also conducted on the Centredale Manor and Brook Village properties to assist in determining if there were any buried objects (i.e., drums, tanks) which may be contributing to the on-site contamination [3]. Soil samples were submitted to a private laboratory to be analyzed for dioxins. The findings of this survey and validated data are not yet available.

Table 5

Soil Sample Results from 15 January 1999
Above Residential Direct Exposure Criteria

Sample Location	Compound	Sample Concentration	Direct Exposure Criteria* (Residential)
SS-99-03 (DAF33J)	**DIOXINS**		
	Dioxins†	5.5 ppb	1.0 ppb
SS-99-04 (DAF34J)	**DIOXINS**		
	Dioxins†	2.5 ppb	1.0 ppb
SS-99-05 (DAF35J) (Dup. of SS-99-04)	**DIOXINS**		
	Dioxins†	2.5 ppb	1.0 ppb

ppb = Parts per billion.

* For dioxins, the EPA Region I Residential Action Level is presented for comparison purposes.

† Values presented for dioxins are the 2,3,7,8-tetrachlorodibenzo dioxin toxicity equivalence on a dry-weight basis.

[12]

SUMMARY

The Centredale Manor Site, for the purpose of this Expanded Site Inspection (ESI), consists of the Centredale Manor property as well as portions of the Brook Village property and the Woonasquatucket River (upstream of, adjacent to, and downstream of the Centredale Manor property). The Centredale Manor property is located at 2074 Smith Street in North Providence, Rhode Island. The 4.74-acre property is bordered by apartments to the north, a drainage channel to the east, a wooded area to the south, and the Woonasquatucket River to the west. An eight-story apartment building housing 135 residents is currently located on the property.

A chemical manufacturing facility and a drum recycling facility reportedly operated at the property between 1943 and 1971. Prior to this time, the property was occupied by a textile mill; additional information regarding the types of textiles produced was not available. In the mid-1970s, the existing buildings at the property were demolished.

From 1977 to 1996, numerous investigations of the Centredale Manor property and/or the Woonasquatucket River were completed by various organizations. Specifically, in 1977, representatives of the State of Rhode Island responded to complaints of fumes at the property which resulted in the discovery of approximately 60 drums. In the early 1980s, an additional 400 drums were identified either on the property or along the Woonasquatucket River. The drums reportedly contained caustics, solvents, polychlorinated biphenyls (PCBs), and ink wastes. Subsequently, a Notice of Violation was issued to the property owners for violations of the State Hazardous Waste Management Act.

In 1986, an EPA Preliminary Assessment (PA) was completed, and in 1990 an EPA Screening Site Inspection (SSI) of the Centredale Manor property was completed. As part of the SSI, samples were collected which indicated the presence of six volatile organic compounds (VOCs), 29 semivolatile organic compounds (SVOCs), four pesticides, two PCB congeners, and six inorganic elements. In 1996, as part of an EPA Site Inspection Prioritization (SIP), sediment samples were collected from along the Woonasquatucket River and from wetlands along the drainage channel. Analytical results of the samples indicated the presence of two VOCs, thirteen SVOCs, and ten inorganic elements. None of these samples were analyzed for dioxin.

In June 1996, fish tissue samples were collected and analyzed for inorganic elements, PCBs and dioxin. Based on elevated dioxin levels detected in fish tissue samples, a fish consumption advisory was issued. In January 1997, EPA representatives collected water and sediment samples at seven dam locations along the river. The results indicated elevated concentrations of numerous SVOCs, chlorinated pesticides, PCBs, inorganic elements, and dioxin.

In September 1998, as part of this ESI, soil and sediment samples were collected from the Centredale Manor Site. Analytical results (of both sediment and soil samples) revealed numerous SVOCs as well as dioxin at concentrations exceeding reference values. Subsequently, in January 1999, additional samples were collected from the Centredale Manor and Brook Village properties, as well as the Lee Romano Little League Field and the Boys and Girls Club to better determine the extent of dioxin contamination. The investigations of the Centredale Manor Site by EPA is continuing at this present time.

CENTREDALE MANOR
REFERENCES

[1] Chow, J. (Roy F. Weston, Inc.). 1997. Final Site Inspection Prioritization Report for Centredale Manor, North Providence, Rhode Island. TDD No. 9409-57-CWX. 16 May.

[2] EPA (U.S. Environmental Protection Agency). 1998. Woonasquatucket River Sediment/Water Quality Analysis Project Report. 31 July.

[3] START (Superfund Technical Assessment and Response Team). 1998. START Field Logbook No. 00343-S for the Centredale Manor Expanded Site Inspection. TDD No. 98-06-0017. 15 July.

[4] Switalski, G. (START). 1999. Centredale Manor Site Organic Data Validation Package Case No. 26464, SDG No. APA72, CompuChem. TDD No. 98-06-0017. 1 February.

[5] Switalski, G. (START). 1999. Centredale Manor Site Organic Data Validation Package Case No. 26464, SDG No. APA92, CompuChem. TDD No. 98-06-0017. 8 February.

[6] Switalski, G. (START). 1999. Centredale Manor Site Organic Data Validation Package Case No. 26464, SDG No. APB12, CompuChem. TDD No. 98-06-0017. 14 January.

[7] Bartels, J. (Lockheed Environmental). 1999. Centredale Manor Site Dioxin/Furan Data Validation Package. WA No. 01-99-3-02, Task No. 2, TDF No. 037, Reference No. 98-AAL24/SDG No. AAL24001, U.S. Environmental Protection Agency Region VII Laboratory. TDD No. 98-06-0017. 11 February.

[8] Fairbrother, M. (START). 1999. Phone Conversation Record with Mr. George Solitro (Providence Water Department), RE: North Providence Water Supply. TDD No. 98-06-0017. 22 February.

[9] Garypie, C. (EPA). 1999. General Comments to the Draft Historical Summary Report for Centredale Manor, North Providence, Rhode Island. 25 February.

[10] RI DEM (Rhode Island Department of Environmental Management). 1996. Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Amended). August.

[11] Keefe, D. (START). 1999. Phone Conversation Record with Mr. Matthew Audet (EPA Site Assessment Manager for Rhode Island), RE: Centredale Manor Dioxin Results - Reference Sample. TDD No. 98-06-0017. 18 February.

[12] EPA (U.S. Environmental Protection Agency). 1999. Centredale Manor Superfund Site - EPA Sampling (Dioxin Results from 9 September 1998, 15 January 1999, and 27 January 1999). 3 March.

[13] EPA (U.S. Environmental Protection Agency). 1998. Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Region I United States Environmental Protection Agency. Printout dated 7 August.

ATTACHMENT A

CENTREDALE MANOR SITE

SOIL AND SEDIMENT SAMPLE RESULTS

SEMIVOLATILE ORGANIC COMPOUNDS AND PESTICIDES/POLYCHLORINATED BIPHENYLS

Samples collected by START on 9 September 1998

DATA SUMMARY KEY
ORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
U	=	The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
UJ	=	The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.
EB	=	The compound was identified in an aqueous equipment blank (EB) that was used to assess field contamination associated with soil/sediment samples.
TB	=	The compound was identified in an aqueous trip blank (TB) that was used to assess field contamination associated with soil/sediment samples.
BB	=	The compound was identified in an aqueous bottle blank (BB) that was used to assess field contamination associated with soil/sediment samples.

DATA SUMMARY KEY
ORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
U	=	The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
UJ	=	The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.
EB	=	The compound was identified in an aqueous equipment blank (EB) that was used to assess field contamination associated with soil/sediment samples.
TB	=	The compound was identified in an aqueous trip blank (TB) that was used to assess field contamination associated with soil/sediment samples.
BB	=	The compound was identified in an aqueous bottle blank (BB) that was used to assess field contamination associated with soil/sediment samples.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA72	APA73	APA74	APA75	APA76	APA77
SAMPLE LOCATION:		SS-01	SS-02	SS-03	SS-04	SS-05	SS-06
LABORATORY NUMBER:		909467	909470	909473	909474	909475	909476
COMPOUND	CRQL						
Phenol	330	430 U	2200 EB	51 J,EB	430 U	480 U	840 U
bis(2-Chloroethyl) ether	330	430 U	520 U	400 U	430 U	480 U	840 U
2-Chlorophenol	330	430 U	520 U	400 U	430 U	480 U	840 U
1,3-Dichlorobenzene	330	430 U	520 U	400 U	430 U	480 U	840 U
1,4-Dichlorobenzene	330	430 U	520 U	400 U	430 U	480 U	840 U
1,2-Dichlorobenzene	330	430 U	520 U	400 U	430 U	480 U	840 U
2-Methylphenol	330	430 U	520 U	400 U	430 U	480 U	840 U
2,2'-Oxybis(1-chloropropane)	330	430 U	520 U	400 U	430 U	480 U	840 U
4-Methylphenol	330	430 U	80 J	400 U	430 U	480 U	840 U
N-Nitroso-di-n-propylamine	330	430 U	520 U	400 U	430 U	480 U	840 U
Hexachloroethane	330	430 U	520 U	400 U	430 U	480 U	840 U
Nitrobenzene	330	430 U	520 U	400 U	430 U	480 U	840 U
Isophorone	330	430 U	790	400 U	430 U	480 U	840 U
2-Nitrophenol	330	430 U	520 U	400 U	430 U	480 U	840 U
2,4-Dimethylphenol	330	430 U	520 U	400 U	430 U	480 U	840 U
bis(2-Chloroethoxy)methane	330	430 U	520 U	400 U	430 U	480 U	840 U
2,4-Dichlorophenol	330	430 U	520 U	400 U	430 U	480 U	840 U
1,2,4-Trichlorobenzene	330	430 U	520 U	400 U	430 U	480 U	840 U
Naphthalene	330	430 U	130 J	400 U	110 J	480 U	840 U
4-Chloroaniline	330	430 U	520 U	400 U	430 U	480 U	840 U
Hexachlorobutadiene	330	430 U	520 U	400 U	430 U	480 U	840 U
4-Chloro-3-methylphenol	330	430 U	520 U	400 U	430 U	480 U	840 U
2-Methylnaphthalene	330	430 U	520 U	400 U	78 J	480 U	840 U
Hexachlorocyclopentadiene	330	430 U	520 U	400 U	430 U	480 UJ	840 U
2,4,6-Trichlorophenol	330	430 U	520 U	400 U	430 U	480 U	840 U
2,4,5-Trichlorophenol	830	1100 U	1300 U	1000 U	180 J	1200 U	2100 U
2-Chloronaphthalene	330	430 U	520 U	400 U	430 U	480 U	840 U
2-Nitroaniline	830	1100 U	1300 U	1000 U	1100 U	1200 U	2100 U
Dimethylphthalate	330	430 U	520 U	400 U	430 U	480 U	840 U
Acenaphthylene	330	430 U	520 U	400 U	380 J	58 J	840 U
2,6-Dinitrotoluene	330	430 U	520 U	400 U	430 U	480 U	840 U
3-Nitroaniline	830	1100 U	1300 U	1000 U	1100 U	1200 UJ	2100 U
Acenaphthene	330	430 U	520 U	400 U	210 J	480 U	840 U
2,4-Dinitrophenol	830	1100 U	1300 U	1000 U	1100 U	1200 UJ	2100 U
4-Nitrophenol	830	1100 U	1300 U	1000 U	1100 U	1200 U	2100 U
Dibenzofuran	330	430 U	520 U	400 U	150 J	480 U	840 U
2,4-Dinitrotoluene	330	430 U	520 U	400 U	430 U	480 U	840 U
Diethylphthalate	330	430 U	1800	400 U	430 U	480 U	840 U
4-Chlorophenyl-phenylether	330	430 U	520 U	400 U	430 U	480 U	840 U
Fluorene	330	430 U	520 U	400 U	280 J	51 J	840 U
4-Nitroaniline	830	1100 U	1300 U	1000 U	1100 U	1200 UJ	2100 U
4,6-Dinitro-2-methylphenol	830	1100 U	1300 U	1000 U	1100 U	1200 U	2100 U
N-Nitrosodiphenylamine(1)	330	430 U	520 U	400 U	430 U	480 U	840 U
4-Bromophenyl-phenylether	330	430 U	520 U	400 U	430 U	480 U	840 U
Hexachlorobenzene	330	430 U	520 U	400 U	430 U	480 U	840 U
Pentachlorophenol	830	1100 UJ	1300 UJ	1000 UJ	1100 UJ	1200 UJ	2100 U
Phenanthrene	330	580	560	400 U	*3900	580	590 J
Anthracene	330	100 J	520 U	400 U	520	120 J	94 J
Carbazole	330	68 J	520 U	400 U	430 J	81 J	150 J
Di-n-butylphthalate	330	430 U	*12000	400 U	430 U	480 U	840 U
Fluoranthene	330	1000	640	36 J	*4700	1100	980
Pyrene	330	720	560	400 U	*3500	750	880
Butylbenzylphthalate	330	430 U	520 U	400 U	110 J	54 J	840 U
3,3'-Dichlorobenzidine	330	430 U	520 U	400 U	430 U	480 U	840 U
Benzo(a)anthracene	330	420 J	280 J	400 U	2400	460 J	530 J
Chrysene	330	420 J	450 J	400 U	2200	470 J	710 J
Bis(2-ethylhexyl)phthalate	330	130 J	*4400	87 J	290 J	160 J	450 J
Di-n-octylphthalate	330	430 U	520 U	400 U	430 U	480 UJ	840 U
Benzo(b)fluoranthene	330	650	540	400 U	*3200	670	870
Benzo(k)fluoranthene	330	180 J	120 J	400 U	960	260 J	360 J
Benzo(a)pyrene	330	460	290 J	400 U	2600	500	690 J
Indeno(1,2,3-cd)pyrene	330	300 J	250 J	400 U	1500	350 J	460 J
Dibenz(a,h)anthracene	330	99 J	62 J	400 U	460	120 J	160 J
Benzo(g,h,i)perylene	330	260 J	160 J	400 U	1300	310 J	350 J
DILUTION FACTOR:		1.0	1.0/5.0	1.0	1.0/3.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/16/98	09/16/98	09/16/98	09/16/98	09/19/98	09/19/98
% MOISTURE:		23	36	18	24	32	81

* - RESULT REPORTED FROM DILUTED ANALYSIS. NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

02

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA78	APA79	APA80	APA81	APA82	APA83
SAMPLE LOCATION:		SD-01	SD-02	SD-03	SD-04	SD-05	SD-06
LABORATORY NUMBER:		909477	909478	909479	909481	909486	909491
COMPOUND	CRQL						
Phenol	330	500 U	480 U	420 U	600 U	420 U	410 U
bis(2-Chloroethyl) ether	330	500 U	480 U	420 U	600 U	420 U	410 U
2-Chlorophenol	330	500 U	480 U	420 U	600 U	420 U	410 U
1,3-Dichlorobenzene	330	500 U	480 U	420 U	600 U	420 U	410 U
1,4-Dichlorobenzene	330	500 U	480 U	420 U	600 U	420 U	410 U
1,2-Dichlorobenzene	330	500 U	480 U	420 U	600 U	420 U	410 U
2-Methylphenol	330	500 U	480 U	420 U	600 U	420 U	410 U
2,2'-Oxybis(1-chloropropane)	330	500 UJ	480 U	420 U	600 U	420 U	410 U
4-Methylphenol	330	500 U	480 U	420 U	600 U	420 U	410 U
N-Nitroso-di-n-propylamine	330	500 UJ	480 U	420 U	600 U	420 U	410 U
Hexachloroethane	330	500 U	480 U	420 U	600 U	420 U	410 U
Nitrobenzene	330	500 U	480 U	420 U	600 U	420 U	410 U
Isophorone	330	500 U	480 U	420 U	600 U	420 U	410 U
2-Nitrophenol	330	500 U	480 U	420 U	600 U	420 U	410 U
2,4-Dimethylphenol	330	500 U	480 U	420 U	600 U	420 U	410 U
bis(2-Chloroethoxy)methane	330	500 U	480 U	420 U	600 U	420 U	410 U
2,4-Dichlorophenol	330	500 U	480 U	420 U	600 U	420 U	410 U
1,2,4-Trichlorobenzene	330	500 U	480 U	420 U	600 U	420 U	410 U
Naphthalene	330	100 J	480 U	98 J	600 U	420 U	410 U
4-Chloroaniline	330	500 U	480 U	420 U	600 U	420 U	410 U
Hexachlorobutadiene	330	500 U	480 U	420 U	600 U	420 U	410 U
4-Chloro-3-methylphenol	330	500 U	480 U	420 U	600 U	420 U	410 U
2-Methylnaphthalene	330	55 J	480 U	57 J	600 U	420 U	410 U
Hexachlorocyclopentadiene	330	500 U	480 U	420 U	600 UJ	420 UJ	410 UJ
2,4,6-Trichlorophenol	330	500 U	480 U	420 U	600 U	420 U	410 U
2,4,5-Trichlorophenol	830	1200 U	1200 U	1000 U	1500 U	1000 U	1000 U
2-Chloronaphthalene	330	500 U	480 U	420 U	600 U	420 U	410 U
2-Nitroaniline	830	1200 U	1200 U	1000 U	1500 U	1000 U	1000 U
Dimethylphthalate	330	500 U	480 U	420 U	600 U	420 U	410 U
Acenaphthylene	330	330 J	480 U	100 J	600 U	420 U	410 U
2,6-Dinitrotoluene	330	500 U	480 U	420 U	600 U	420 U	410 U
3-Nitroaniline	830	1200 UJ	1200 U	1000 U	1500 UJ	1000 UJ	1000 UJ
Acenaphthene	330	170 J	140 J	250 J	68 J	420 U	410 U
2,4-Dinitrophenol	830	1200 UJ	1200 U	1000 U	1500 UJ	1000 UJ	1000 UJ
4-Nitrophenol	830	1200 UJ	1200 U	1000 U	1500 U	1000 U	1000 U
Dibenzofuran	330	190 J	480 U	190 J	600 U	420 U	410 U
2,4-Dinitrotoluene	330	500 U	480 U	420 U	600 U	420 U	410 U
Diethylphthalate	330	500 U	480 U	420 U	600 U	420 U	410 U
4-Chlorophenyl-phenylether	330	500 U	480 U	420 U	600 U	420 U	410 U
Fluorene	330	270 J	140 J	270 J	99 J	420 U	53 J
4-Nitroaniline	830	1200 U	1200 U	1000 U	1500 UJ	1000 UJ	1000 UJ
4,6-Dinitro-2-methylphenol	830	1200 U	1200 U	1000 U	1500 U	1000 U	1000 U
N-Nitrosodiphenylamine(1)	330	500 UJ	480 U	420 U	600 U	420 U	410 U
4-Bromophenyl-phenylether	330	500 U	480 U	420 U	600 U	420 U	410 U
Hexachlorobenzene	330	500 U	480 U	420 U	600 U	420 U	410 U
Pentachlorophenol	830	1200 U	1200 UJ	1000 UJ	1500 UJ	1000 UJ	1000 UJ
Phenanthrene	330	3400	2400	*3200	1200	290 J	160 J
Anthracene	330	680	290 J	540	240 J	79 J	410 U
Carbazole	330	110 J	310 J	450	170 J	420 UJ	410 UJ
Di-n-butylphthalate	330	500 UJ	86 J	45 J	600 U	420 U	410 U
Fluoranthene	330	*9100	3200	*4100	2600	500	260 J
Pyrene	330	*11000 J	2700	*3000	1700	310 J	200 J
Butylbenzylphthalate	330	500 UJ	160 J	420 U	250 J	420 U	410 U
3,3'-Dichlorobenzidine	330	500 U	480 U	420 U	600 U	420 U	410 U
Benzo(a)anthracene	330	*4500	1300	1500	910	180 J	85 J
Chrysene	330	2600 J	1300	1500	1200	190 J	120 J
Bis(2-ethylhexyl)phthalate	330	3700 J	840	440	870	110 J	21 J
Di-n-octylphthalate	330	500 UJ	480 U	420 U	600 UJ	420 UJ	410 UJ
Benzo(b)fluoranthene	330	*4700	2100	2500	1500	250 J	170 J
Benzo(k)fluoranthene	330	1800	640	760	570 J	110 J	64 J
Benzo(a)pyrene	330	*3700	1400	1600	1100	180 J	120 J
Indeno(1,2,3-cd)pyrene	330	3500	940	1000	730	120 J	87 J
Dibenz(a,h)anthracene	330	680	290 J	270 J	190 J	420 U	410 U
Benzo(g,h,i)perylene	330	2700	740	820	600	130 J	98 J
DILUTION FACTOR:		1.0/6.0	1.0	1.0/2.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/16/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/21/98	09/16/98	09/16/98	09/19/98	09/19/98	09/19/98
% MOISTURE:		34	31	21	45	21	19

*- RESULT REPORTED FROM DILUTED ANALYSIS. NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

03

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA84	APA85	APA86	APA87	APA88	APA89
SAMPLE LOCATION:		SD-07	SD-08	SD-09	SD-10	SD-11	SD-12
LABORATORY NUMBER:		909493	909496	909498	909501	909502	909504
COMPOUND	CRQL						
Phenol	330	460 U	520 U	430 U	660 U	530 U	410 U
bis(2-Chloroethyl) ether	330	460 U	520 U	430 U	660 U	530 U	410 U
2-Chlorophenol	330	460 U	520 U	430 U	660 U	530 U	410 U
1,3-Dichlorobenzene	330	460 U	520 U	430 U	660 U	530 U	410 U
1,4-Dichlorobenzene	330	460 U	520 U	430 U	660 U	530 U	410 U
1,2-Dichlorobenzene	330	460 U	520 U	430 U	660 U	530 U	410 U
2-Methylphenol	330	460 U	520 U	430 U	660 U	530 U	410 U
2,2'-Oxybis(1-chloropropane)	330	460 U	520 U	430 U	660 U	530 U	410 U
4-Methylphenol	330	460 U	520 U	430 U	660 U	530 U	410 U
N-Nitroso-di-n-propylamine	330	460 U	520 U	430 U	660 U	530 U	410 U
Hexachloroethane	330	460 U	520 U	430 U	660 U	530 U	410 U
Nitrobenzene	330	460 U	520 U	430 U	660 U	530 U	410 U
Isophorone	330	460 U	520 U	430 U	660 U	530 U	410 U
2-Nitrophenol	330	460 U	520 U	430 U	660 U	530 U	410 U
2,4-Dimethylphenol	330	460 U	520 U	430 U	660 U	530 U	410 U
bis(2-Chloroethoxy)methane	330	460 U	520 U	430 U	660 U	530 U	410 U
2,4-Dichlorophenol	330	460 U	520 U	430 U	660 U	530 U	410 U
1,2,4-Trichlorobenzene	330	460 U	520 U	430 U	660 U	530 U	410 U
Naphthalene	330	460 U	520 U	430 U	660 U	530 U	410 U
4-Chloroaniline	330	460 U	520 U	430 U	660 U	530 U	410 U
Hexachlorobutadiene	330	460 U	520 U	430 U	660 U	530 U	410 U
4-Chloro-3-methylphenol	330	460 U	520 U	430 U	660 U	530 U	410 U
2-Methylnaphthalene	330	460 U	520 U	430 U	660 U	530 U	410 U
Hexachlorocyclopentadiene	330	460 UJ	520 U	430 U	660 U	530 U	410 U
2,4,6-Trichlorophenol	330	460 U	520 U	430 U	660 U	530 U	410 U
2,4,5-Trichlorophenol	830	1200 U	1300 U	1100 U	1700 U	1300 U	1000 U
2-Chloronaphthalene	330	460 U	520 U	430 U	660 U	530 U	410 U
2-Nitroaniline	830	1200 U	1300 U	1100 U	1700 U	1300 U	1000 U
Dimethylphthalate	330	460 U	520 U	430 U	660 U	530 U	410 U
Acenaphthylene	330	460 U	86 J	430 U	660 U	530 U	410 U
2,6-Dinitrotoluene	330	460 U	520 U	430 U	660 U	530 U	410 U
3-Nitroaniline	830	1200 UJ	1300 U	1100 U	1700 U	1300 U	1000 U
Acenaphthene	330	460 U	84 J	430 U	660 U	530 U	410 U
2,4-Dinitrophenol	830	1200 UJ	1300 U	1100 U	1700 U	1300 U	1000 U
4-Nitrophenol	830	1200 U	1300 U	1100 U	1700 U	1300 U	1000 U
Dibenzofuran	330	460 U	64 J	430 U	660 U	530 U	410 U
2,4-Dinitrotoluene	330	460 U	520 U	430 U	660 U	530 U	410 U
Diethylphthalate	330	460 U	520 U	430 U	660 U	530 U	410 U
4-Chlorophenyl-phenylether	330	460 U	520 U	430 U	660 U	530 U	410 U
Fluorene	330	460 U	110 J	430 U	660 U	530 U	410 U
4-Nitroaniline	830	1200 UJ	1300 U	1100 U	1700 U	1300 U	1000 U
4,6-Dinitro-2-methylphenol	830	1200 U	1300 U	1100 U	1700 U	1300 U	1000 U
N-Nitrosodiphenylamine(1)	330	460 U	520 U	430 U	660 U	530 U	410 U
4-Bromophenyl-phenylether	330	460 U	520 U	430 U	660 U	530 U	410 U
Hexachlorobenzene	330	460 U	520 U	430 U	660 U	530 U	410 U
Pentachlorophenol	830	1200 UJ	1300 U	1100 U	1700 U	1300 U	1000 U
Phenanthrene	330	220 J	1900	71 J	490 J	140 J	410 U
Anthracene	330	54 J	230 J	430 U	75 J	530 U	410 U
Carbazole	330	460 UJ	380 J	430 U	80 J	530 U	410 U
Di-n-butylphthalate	330	51 J	520 U	430 U	660 U	530 U	410 U
Fluoranthene	330	460	2900	130 J	550 J	250 J	49 J
Pyrene	330	320 J	2000	100 J	360 J	190 J	410 U
Butylbenzylphthalate	330	460 U	520 U	430 U	660 U	530 U	410 U
3,3'-Dichlorobenzidine	330	460 U	520 U	430 U	660 U	530 U	410 U
Benzo(a)anthracene	330	190 J	1100	56 J	200 J	93 J	410 U
Chrysene	330	220 J	1400	74 J	230 J	120 J	410 U
Bis(2-ethylhexyl)phthalate	330	65 J	390 J	73 J	700	140 J	43 J
Di-n-octylphthalate	330	460 UJ	520 U	430 U	660 U	530 U	410 U
Benzo(b)fluoranthene	330	400 J	1700	92 J	300 J	170 J	410 U
Benzo(k)fluoranthene	330	130 J	650	44 J	100 J	66 J	410 U
Benzo(a)pyrene	330	280 J	1300	63 J	190 J	110 J	410 U
Indeno(1,2,3-cd)pyrene	330	220 J	850	45 J	110 J	74 J	410 U
Dibenz(a,h)anthracene	330	65 J	220 J	430 U	660 U	530 U	410 U
Benzo(g,h,i)perylene	330	170 J	520	45 J	77 J	64 J	410 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/19/98	09/18/98	09/18/98	09/18/98	09/18/98	09/18/98
% MOISTURE:		28	36	23	50	38	19

* - RESULT REPORTED FROM DILUTED ANALYSIS. NOTE RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

04

SITE: GENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA90	APA91
SAMPLE LOCATION:		SD-13	SD-14
LABORATORY NUMBER:		909505	909514
COMPOUND	CRQL		
Phenol	330	580 U	390 U
bis(2-Chloroethyl) ether	330	580 U	390 U
2-Chlorophenol	330	580 U	390 U
1,3-Dichlorobenzene	330	580 U	390 U
1,4-Dichlorobenzene	330	580 U	390 U
1,2-Dichlorobenzene	330	580 U	390 U
2-Methylphenol	330	580 U	390 U
2,2'-Oxybis(1-chloropropane)	330	580 U	390 U
4-Methylphenol	330	580 U	390 U
N-Nitroso-di-n-propylamine	330	580 U	390 U
Hexachloroethane	330	580 U	390 U
Nitrobenzene	330	580 U	390 U
Isophorone	330	580 U	390 U
2-Nitrophenol	330	580 U	390 U
2,4-Dimethylphenol	330	580 U	390 U
bis(2-Chloroethoxy)methane	330	580 U	390 U
2,4-Dichlorophenol	330	580 U	390 U
1,2,4-Trichlorobenzene	330	580 U	390 U
Naphthalene	330	580 U	390 U
4-Chloroaniline	330	580 U	390 U
Hexachlorobutadiene	330	580 U	390 U
4-Chloro-3-methylphenol	330	580 U	390 U
2-Methylnaphthalene	330	580 U	390 U
Hexachlorocyclopentadiene	330	580 U	390 U
2,4,6-Trichlorophenol	330	580 U	390 U
2,4,5-Trichlorophenol	830	1400 U	980 U
2-Chloronaphthalene	330	580 U	390 U
2-Nitroaniline	830	1400 U	980 U
Dimethylphthalate	330	580 U	390 U
Acenaphthylene	330	580 U	390 U
2,6-Dinitrotoluene	330	580 U	390 U
3-Nitroaniline	830	1400 U	980 U
Acenaphthene	330	580 U	150 J
2,4-Dinitrophenol	830	1400 U	980 U
4-Nitrophenol	830	1400 U	980 U
Dibenzofuran	330	580 U	66 J
2,4-Dinitrotoluene	330	580 U	390 U
Diethylphthalate	330	580 U	390 U
4-Chlorophenyl-phenylether	330	580 U	390 U
Fluorene	330	580 U	190 J
4-Nitroaniline	830	1400 U	980 U
4,6-Dinitro-2-methylphenol	830	1400 U	980 U
N-Nitrosodiphenylamine(1)	330	580 U	390 U
4-Bromophenyl-phenylether	330	580 U	390 U
Hexachlorobenzene	330	580 U	390 U
Pentachlorophenol	830	1400 U	980 U
Phenanthrene	330	310 J	2300
Anthracene	330	580 U	440
Carbazole	330	580 U	280 J
Di-n-butylphthalate	330	580 U	390 U
Fluoranthene	330	490 J	2600
Pyrene	330	350 J	1700
Butylbenzylphthalate	330	580 U	390 U
3,3'-Dichlorobenzidine	330	580 U	390 U
Benzo(a)anthracene	330	200 J	1000
Chrysene	330	240 J	990
Bis(2-ethylhexyl)phthalate	330	82 J	89 J
Di-n-octylphthalate	330	580 U	140 J
Benzo(b)fluoranthene	330	310 J	1200
Benzo(k)fluoranthene	330	110 J	440
Benzo(a)pyrene	330	200 J	940
Indeno(1,2,3-cd)pyrene	330	120 J	500
Dibenz(a,h)anthracene	330	580 U	140 J
Benzo(g,h,i)perylene	330	94 J	400
DILUTION FACTOR:		1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98
DATE ANALYZED:		09/18/98	09/19/98
% MOISTURE:		43	15

05

* - RESULT REPORTED FROM DILUTED ANALYSIS. NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA72	APA73	APA74	APA75	APA76	APA77
SAMPLE LOCATION:		SS-01	SS-02	SS-03	SS-04	SS-05	SS-06
LABORATORY NUMBER:		909467	909470	909473	909474	909475	909476
COMPOUND	CRQL						
alpha-BHC	1.7	2.2 U	* 26 UJ	2.1 U	2.2 UJ	2.5 U	4.3 UJ
beta-BHC	1.7	2.2 U	2.6 UJ	2.1 U	R	12 J	4.3 UJ
delta-BHC	1.7	2.2 U	2.6 UJ	2.1 U	2.2 UJ	R	4.3 UJ
gamma-BHC (Lindane)	1.7	2.2 U	2.6 UJ	2.1 U	2.2 UJ	2.6 U	4.3 UJ
Heptachlor	1.7	2.2 U	2.6 UJ	2.1 U	R	0.31 J	4.3 UJ
Aldrin	1.7	2.2 U	R	2.1 U	2.2 UJ	2.5 U	4.3 UJ
Heptachlor Epoxide	1.7	* 22 U	* 26 UJ	2.1 U	2.2 UJ	R	4.3 UJ
Endosulfan I	1.7	2.2 U	* 26 UJ	2.1 U	2.2 UJ	R	4.3 UJ
Dieldrin	3.3	4.3 U	* 140 J, EB	2.4 J, EB	R	R	R
4,4'-DDE	3.3	* 33 J	R	4.0 U	6.4 J	R	13 J
Endrin	3.3	4.3 U	5.2 UJ	4.0 U	4.3 UJ	4.8 U	8.4 UJ
Endosulfan II	3.3	4.3 U	5.2 UJ	4.0 U	4.3 UJ	R	8.4 UJ
4,4'-DDD	3.3	4.3 U	5.2 UJ	4.0 U	9.9 J	4.8 U	8.4 UJ
Endosulfan Sulfate	3.3	17 J	5.2 UJ	4.0 U	R	10 J	R
4,4'-DDT	3.3	4.3 U	5.2 UJ	4.0 U	4.3 UJ	4.8 U	8.4 UJ
Methoxychlor	17	* 220 U	26 UJ	21 U	R	R	43 UJ
Endrin Ketone	3.3	4.3 U	5.2 UJ	4.0 U	R	R	8.4 UJ
Endrin Aldehyde	3.3	4.3 U	5.2 UJ	4.0 U	4.3 UJ	4.8 U	8.4 UJ
alpha-Chlordane	1.7	2.4	3.0 J	2.1 U	2.2 J	1.0 J	3.1 J
gamma-Chlordane	1.7	2.2 U	2.6 UJ	2.1 U	2.2 UJ	2.5 U	4.3 UJ
Toxaphene	170	220 U	260 UJ	210 U	220 UJ	250 U	430 UJ
Aroclor-1016	33	43 U	52 UJ	40 U	43 UJ	48 U	84 UJ
Aroclor-1221	67	87 U	100 UJ	82 U	88 UJ	98 U	170 UJ
Aroclor-1232	33	43 U	52 UJ	40 U	43 UJ	48 U	84 UJ
Aroclor-1242	33	43 U	52 UJ	40 U	43 UJ	48 U	84 UJ
Aroclor-1248	33	43 U	52 UJ	40 U	43 UJ	48 U	84 UJ
Aroclor-1254	33	* 2300	* 9300 J	150	410 J	780	760 J
Aroclor-1260	33	43 U	52 UJ	40 U	43 UJ	48 U	84 UJ
DILUTION FACTOR:		1.0/10	1.0/10	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/21/98	09/20/98	09/21/98	09/21/98	09/21/98	09/21/98
% MOISTURE:		23	36	18	24	32	61

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA78	APA79	APA80	APA81	APA82	APA83
SAMPLE LOCATION:		SD-01	SD-02	SD-03	SD-04	SD-05	SD-06
LABORATORY NUMBER:		909477	909478	909479	909481	909486	909491
COMPOUND	CRQL						
alpha-BHC	1.7	2.6 UJ	2.5 UJ	2.2 UJ	3.1 U	2.1 U	2.1 U
beta-BHC	1.7	*260 UJ	5.0 UJ	2.2 UJ	5.3 U	2.1 U	2.1 U
delta-BHC	1.7	2.6 UJ	2.5 UJ	2.2 UJ	3.1 U	2.1 U	2.1 U
gamma-BHC (Lindane)	1.7	2.6 UJ	2.5 UJ	2.2 UJ	3.1 U	2.1 U	2.1 U
Heptachlor	1.7	2.6 UJ	0.38 J	2.2 UJ	3.1 U	2.1 U	2.1 U
Aldrin	1.7	2.6 UJ	2.5 UJ	2.2 UJ	3.1 U	2.1 U	2.1 U
Heptachlor Epoxide	1.7	2.7 J	2.5 UJ	0.20 J	3.1 U	2.1 U	2.1 U
Endosulfan I	1.7	2.6 UJ	2.5 UJ	2.2 UJ	3.1 U	2.1 U	2.1 U
Dieldrin	3.3	*500 UJ	R	4.2 UJ	6.0 U	4.2 U	4.1 U
4,4'-DDE	3.3	*500 UJ	3.6 J	4.2 UJ	3.7 J	4.9	11
Endrin	3.3	5.0 UJ	4.8 UJ	4.2 UJ	6.0 U	4.2 U	4.1 U
Endosulfan II	3.3	5.0 UJ	4.8 UJ	4.2 UJ	6.0 U	4.2 U	4.1 U
4,4'-DDD	3.3	35 J	6.1 J	4.2 UJ	5.1 J	4.2 U	4.1 U
Endosulfan Sulfate	3.3	*500 UJ	R	R	R	4.2 U	4.1 U
4,4'-DDT	3.3	22 J	R	R	R	2.3 J	7.2
Methoxychlor	17	*2600 UJ	R	R	R	21 U	21 U
Endrin Ketone	3.3	*500 UJ	R	R	R	R	4.1 U
Endrin Aldehyde	3.3	5.0 UJ	4.8 UJ	4.2 UJ	6.0 U	4.2 U	4.1 U
alpha-Chlordane	1.7	2.6 UJ	3.4 J	2.2 UJ	4.2 J	0.55 J	0.50 J
gamma-Chlordane	1.7	2.6 UJ	2.5 UJ	2.2 UJ	R	2.1 U	2.1 U
Toxaphene	170	260 UJ	250 UJ	220 UJ	310 U	210 U	210 U
Aroclor-1016	33	50 UJ	48 UJ	42 UJ	60 U	42 U	41 U
Aroclor-1221	67	100 UJ	97 UJ	85 UJ	120 U	84 U	83 U
Aroclor-1232	33	50 UJ	48 UJ	42 UJ	60 U	42 U	41 U
Aroclor-1242	33	50 UJ	48 UJ	42 UJ	60 U	42 U	41 U
Aroclor-1248	33	50 UJ	48 UJ	42 UJ	60 U	42 U	41 U
Aroclor-1254	33	50 UJ	48 UJ	42 UJ	60 U	42 U	41 U
Aroclor-1260	33	50 UJ	48 UJ	42 UJ	60 U	42 U	41 U
DILUTION FACTOR:		1.0/100	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/20/98	09/21/98	09/21/98	09/21/98	09/21/98	09/21/98
% MOISTURE:		34	31	21	45	21	19

07

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA84	APA85	APA86	APA87	APA88	APA89
SAMPLE LOCATION:		SD-07	SD-08	SD-09	SD-10	SD-11	SD-12
LABORATORY NUMBER:		909493	909496	909498	909501	909502	909504
COMPOUND	CRQL						
alpha-BHC	1.7	2.4 U	2.6 U	2.2 U	3.4 U	2.4 U	2.1 U
beta-BHC	1.7	2.4 U	2.6 U	2.5 U	3.4 U	6.6 U	2.1 U
delta-BHC	1.7	2.4 U	2.6 U	2.2 U	3.4 U	2.4 U	2.1 U
gamma-BHC (Lindane)	1.7	2.4 U	2.6 U	2.2 U	3.4 U	2.4 U	R
Heptachlor	1.7	2.4 U	2.6 U	0.43 J	0.43 J	2.4 U	0.62 J
Aldrin	1.7	2.4 U	2.6 U	0.51 J	3.4 U	2.4 U	0.58 J
Heptachlor Epoxide	1.7	2.4 U	2.6 U	2.2 U	3.4 U	2.4 U	2.1 U
Endosulfan I	1.7	2.4 U	2.6 U	2.2 U	3.4 U	2.4 U	2.1 U
Dieldrin	3.3	4.6 U	5.2 U	1.4 J, EB	6.6 U	4.7 U	1.4 J, EB
4,4'-DDE	3.3	0.43 J	0.81 J	0.54 J	1.7 J	6.6	4.1 U
Endrin	3.3	4.6 U	5.2 U	1.9 J	6.6 U	*27 U	1.4 J
Endosulfan II	3.3	4.6 U	5.2 U	4.3 U	6.6 U	4.7 U	4.1 U
4,4'-DDD	3.3	0.52 J	3.0 J	0.37 J	1.9 J	3.8 J	4.1 U
Endosulfan Sulfate	3.3	4.6 U	R	4.3 U	6.6 U	1.7 j	4.1 U
4,4'-DDT	3.3	4.6 U	R	1.8 J	6.6 U	*27 J	1.6 J
Methoxychlor	17	24 U	26 U	22 U	R	24 U	21 U
Endrin Ketone	3.3	R	R	4.3 U	R	*27 U	R
Endrin Aldehyde	3.3	0.15 J	5.2 U	4.3 U	6.6 U	4.7 U	4.1 U
alpha-Chlordane	1.7	2.4 U	2.6 U	2.2 U	2.4 J	14 J	0.21 J
gamma-Chlordane	1.7	2.4 U	2.6 U	2.2 U	R	16 J	2.1 U
Toxaphene	170	240 U	260 U	220 U	340 U	240 U	210 U
Aroclor-1016	33	46 U	52 U	43 U	66 U	47 U	41 U
Aroclor-1221	67	93 U	100 U	87 U	130 U	96 U	83 U
Aroclor-1232	33	46 U	52 U	43 U	66 U	47 U	41 U
Aroclor-1242	33	46 U	52 U	43 U	66 U	47 U	41 U
Aroclor-1248	33	46 U	52 U	43 U	66 U	47 U	41 U
Aroclor-1254	33	46 U	52 U	43 U	66 U	47 U	41 U
Aroclor-1260	33	46 U	52 U	43 U	66 U	47 U	41 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0/5.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/21/98	09/21/98	09/21/98	09/21/98	09/21/98	09/21/98
% MOISTURE:		28	36	23	50	30	19

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA72
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA90	APA91
SAMPLE LOCATION:		SD-13	SD-14
LABORATORY NUMBER:		909505	909514
COMPOUND	CRQL		
alpha-BHC	1.7	3.0 U	2.0 U
beta-BHC	1.7	3.0 U	2.0 U
delta-BHC	1.7	3.0 U	2.0 U
gamma-BHC (Lindane)	1.7	3.0 U	2.0 U
Heptachlor	1.7	3.0 U	2.0 U
Aldrin	1.7	3.0 U	2.0 U
Heptachlor Epoxide	1.7	3.0 U	*20 U
Endosulfan I	1.7	3.0 U	*20 U
Dieldrin	3.3	5.8 U	3.9 U
4,4'-DDE	3.3	3.5 J	3.6 J
Endrin	3.3	5.8 U	3.9 U
Endosulfan II	3.3	5.8 U	3.9 U
4,4'-DDD	3.3	5.8 U	4.1
Endosulfan Sulfate	3.3	5.8 U	*39 U
4,4'-DDT	3.3	2.3 J	1.7 J
Methoxychlor	17	30 U	20 U
Endrin Ketone	3.3	5.8 U	3.9 U
Endrin Aldehyde	3.3	5.8 U	3.9 U
alpha-Chlordane	1.7	5.7	25 J
gamma-Chlordane	1.7	3.5	21
Toxaphene	170	300 U	200 U
Aroclor-1016	33	58 U	39 U
Aroclor-1221	67	120 U	79 U
Aroclor-1232	33	58 U	39 U
Aroclor-1242	33	58 U	39 U
Aroclor-1248	33	58 U	39 U
Aroclor-1254	33	58 U	39 U
Aroclor-1260	33	58 U	39 U
DILUTION FACTOR:		1.0	1.0/10
DATE SAMPLED:		09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98
DATE ANALYZED:		09/21/98	09/21/98
% MOISTURE:		43	15

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

DATA SUMMARY KEY
ORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
U	=	The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit (SQL) or the adjusted SQL.
UJ	=	The compound was analyzed for, but not detected. The associated numerical value is the estimated SQL.
EB	=	The compound was identified in an aqueous equipment blank (EB) that was used to assess field contamination associated with soil/sediment samples.
TB	=	The compound was identified in an aqueous trip blank (TB) that was used to assess field contamination associated with soil/sediment samples.
BB	=	The compound was identified in an aqueous bottle blank (BB) that was used to assess field contamination associated with soil/sediment samples.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA92	APA93	APA94	APA95	APA96	APA97
SAMPLE LOCATION:		SD-15	SD-16	SD-17	SD-18	SD-19	SD-20
LABORATORY NUMBER:		909515	909520	909521	909522	909523	909524
COMPOUND	CRQL						
Phenol	330	400 U	940 U	1000 U	370 U	420 U	R
bis(2-Chloroethyl) ether	330	400 U	940 U	1000 U	370 U	420 U	R
2-Chlorophenol	330	400 U	940 U	1000 U	370 U	420 U	R
1,3-Dichlorobenzene	330	400 U	940 U	1000 U	370 U	420 U	R
1,4-Dichlorobenzene	330	400 U	940 U	1000 U	370 U	420 U	R
1,2-Dichlorobenzene	330	400 U	940 U	1000 U	370 U	420 U	R
2-Methylphenol	330	400 U	940 U	1000 U	370 U	420 U	R
2,2'-Oxybis(1-chloropropane)	330	400 U	940 U	1000 U	370 U	420 U	R
4-Methylphenol	330	400 UJ	940 UJ	1000 UJ	370 UJ	420 UJ	R
N-Nitroso-di-n-propylamine	330	400 U	940 U	1000 U	370 U	420 U	R
Hexachloroethane	330	400 U	940 U	1000 U	370 U	420 U	R
Nitrobenzene	330	400 U	940 U	1000 U	370 U	420 U	R
Isophorone	330	400 U	940 U	1000 U	370 U	420 U	R
2-Nitrophenol	330	400 U	940 U	1000 U	370 U	420 U	R
2,4-Dimethylphenol	330	400 U	940 U	1000 U	370 U	420 U	R
bis(2-Chloroethoxy)methane	330	400 U	940 U	1000 U	370 U	420 U	R
2,4-Dichlorophenol	330	400 U	940 U	1000 U	370 U	420 U	R
1,2,4-Trichlorobenzene	330	400 U	940 U	1000 U	370 U	420 U	R
Naphthalene	330	400 U	940 U	1000 U	370 U	420 U	R
4-Chloroaniline	330	400 U	940 U	1000 U	370 U	420 U	R
Hexachlorobutadiene	330	400 U	940 U	1000 U	370 U	420 U	R
4-Chloro-3-methylphenol	330	400 U	940 U	1000 U	370 U	420 U	R
2-Methylnaphthalene	330	400 U	940 U	1000 U	370 U	420 U	R
Hexachlorocyclopentadiene	330	400 U	940 U	1000 U	370 U	420 U	R
2,4,6-Trichlorophenol	330	400 U	940 U	1000 U	370 U	420 U	R
2,4,5-Trichlorophenol	830	1000 U	2400 U	2600 U	930 U	1100 U	R
2-Chloronaphthalene	330	400 U	940 U	1000 U	370 U	420 U	R
2-Nitroaniline	830	1000 U	2400 U	2600 U	930 U	1100 U	R
Dimethylphthalate	330	400 U	940 U	1000 U	370 U	420 U	R
Acenaphthylene	330	400 U	940 U	1000 U	370 U	420 U	R
2,6-Dinitrotoluene	330	400 U	940 U	1000 U	370 U	420 U	R
3-Nitroaniline	830	1000 U	2400 U	2600 U	930 U	1100 U	R
Acenaphthene	330	R	R	R	R	R	R
2,4-Dinitrophenol	830	1000 U	2400 U	2600 U	930 U	1100 U	R
4-Nitrophenol	830	1000 U	2400 U	2600 U	930 U	1100 U	R
Dibenzofuran	330	400 U	940 U	1000 U	370 U	420 U	R
2,4-Dinitrotoluene	330	400 U	940 U	1000 U	370 U	420 U	R
Diethylphthalate	330	400 U	940 U	1000 U	370 U	420 U	R
4-Chlorophenyl-phenylether	330	400 U	940 U	1000 U	370 U	420 U	R
Fluorene	330	400 U	940 U	1000 U	38 J	420 U	R
4-Nitroaniline	830	1000 UJ	2400 UJ	2600 UJ	930 UJ	1100 UJ	R
4,6-Dinitro-2-methylphenol	830	1000 U	2400 U	2600 U	930 U	1100 U	R
N-Nitrosodiphenylamine(1)	330	400 U	940 U	1000 U	370 U	420 U	R
4-Bromophenyl-phenylether	330	400 U	940 U	1000 U	370 U	420 U	R
Hexachlorobenzene	330	400 U	940 U	1000 U	370 U	420 U	R
Pentachlorophenol	830	1000 U	2400 U	2600 U	930 U	1100 U	R
Phenanthrene	330	400 U	210 J	280 J	850	630	850 J
Anthracene	330	400 U	940 U	1000 U	140 J	140 J	160 J
Carbazole	330	400 U	940 U	1000 U	80 J	92 J	120 J
Di-n-butylphthalate	330	400 U	940 U	1000 U	370 U	420 U	R
Fluoranthene	330	400 U	470 J	640 J	1200	1000	1800 J
Pyrene	330	400 U	380 J	460 J	890	700	1300 J
Butylbenzylphthalate	330	400 U	940 U	1000 U	45 J	130 J	180 J
3,3'-Dichlorobenzidine	330	400 U	940 U	1000 U	370 U	420 U	R
Benzo(a)anthracene	330	400 U	140 J	220 J	470	360 J	730 J
Chrysene	330	400 U	280 J	350 J	610	420 J	1000 J
Bis(2-ethylhexyl)phthalate	330	400 U	160 J	200 J	470	920	590 J
Di-n-octylphthalate	330	400 UJ	940 UJ	1000 UJ	370 UJ	420 UJ	R
Benzo(b)fluoranthene	330	R	300 J	740 J	1200 J	570 J	1500 J
Benzo(k)fluoranthene	330	400 U	260 J	500 J	810 J	310 J	950 J
Benzo(a)pyrene	330	400 U	210 J	300 J	540	380 J	1000 J
Indeno(1,2,3-cd)pyrene	330	400 U	300 J	370 J	620	390 J	1200 J
Dibenz(a,h)anthracene	330	400 U	940 U	1000 U	200 J	130 J	410 J
Benzo(g,h,i)perylene	330	400 U	180 J	260 J	390	270 J	830 J
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/18/98	09/18/98	09/18/98	09/18/98	09/18/98	09/18/98
% MOISTURE:		18	65	68	11	22	71

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA98	APA99	APB00	APB01	APB02	APB03
SAMPLE LOCATION:		SD-21	SD-22	SD-23	SD-24	SD-25	SD-26
LABORATORY NUMBER:		909525	909526	909527	909528	909529	909530
COMPOUND	CRQL						
Phenol	330	440 U	1100 U	R	R	R	410 U
bis(2-Chloroethyl) ether	330	440 U	1100 U	R	R	R	410 U
2-Chlorophenol	330	440 U	1100 U	R	R	R	410 U
1,3-Dichlorobenzene	330	440 U	1100 U	R	R	R	410 U
1,4-Dichlorobenzene	330	440 U	1100 U	R	R	R	410 U
1,2-Dichlorobenzene	330	440 U	1100 U	R	R	R	410 U
2-Methylphenol	330	440 U	1100 U	R	R	R	410 U
2,2'-Oxybis(1-chloropropane)	330	440 U	1100 U	R	R	R	410 U
4-Methylphenol	330	440 UJ	1100 UJ	R	R	R	410 U
N-Nitroso-di-n-propylamine	330	440 U	1100 U	R	R	R	410 U
Hexachloroethane	330	440 U	1100 U	R	R	R	410 U
Nitrobenzene	330	440 U	1100 U	R	R	R	410 U
Isophorone	330	440 U	1100 U	R	R	R	410 U
2-Nitrophenol	330	440 U	1100 U	R	R	R	410 U
2,4-Dimethylphenol	330	440 U	1100 U	R	R	R	410 U
bis(2-Chloroethoxy)methane	330	440 U	1100 U	R	R	R	410 U
2,4-Dichlorophenol	330	440 U	1100 U	R	R	R	410 U
1,2,4-Trichlorobenzene	330	440 U	1100 U	R	R	R	410 U
Naphthalene	330	440 U	1100 U	R	R	R	410 U
4-Chloroaniline	330	440 U	1100 U	R	R	R	410 U
Hexachlorobutadiene	330	440 U	1100 U	R	R	R	410 U
4-Chloro-3-methylphenol	330	440 U	1100 U	R	R	R	410 U
2-Methylnaphthalene	330	440 U	1100 U	R	R	R	410 U
Hexachlorocyclopentadiene	330	440 U	1100 U	R	R	R	410 U
2,4,6-Trichlorophenol	330	440 U	1100 J	R	R	R	410 U
2,4,5-Trichlorophenol	830	1100 U	2700 U	R	R	R	1000 U
2-Chloronaphthalene	330	440 U	1100 U	R	R	R	410 U
2-Nitroaniline	830	1100 U	2700 U	R	R	R	1000 U
Dimethylphthalate	330	440 U	1100 U	R	R	R	410 U
Acenaphthylene	330	440 U	1100 U	R	R	R	410 U
2,6-Dinitrotoluene	330	440 U	1100 U	R	R	R	410 U
3-Nitroaniline	830	1100 U	2700 U	R	R	R	1000 U
Acenaphthene	330	R	R	R	R	R	R
2,4-Dinitrophenol	830	1100 U	2700 U	R	R	R	1000 U
4-Nitrophenol	830	1100 U	2700 U	R	R	R	1000 U
Dibenzofuran	330	440 U	1100 U	R	R	R	410 U
2,4-Dinitrotoluene	330	440 U	1100 U	R	R	R	410 U
Diethylphthalate	330	440 U	1100 U	R	R	R	410 U
4-Chlorophenyl-phenylether	330	440 U	1100 U	R	R	R	410 U
Fluorene	330	440 U	1100 U	R	R	R	410 U
4-Nitroaniline	830	1100 UJ	2700 UJ	R	R	R	1000 U
4,6-Dinitro-2-methylphenol	830	1100 U	2700 U	R	R	R	1000 U
N-Nitrosodiphenylamine(1)	330	440 U	1100 U	R	R	R	410 U
4-Bromophenyl-phenylether	330	440 U	1100 U	R	R	R	410 U
Hexachlorobenzene	330	440 U	1100 U	R	R	R	410 U
Pentachlorophenol	830	1100 U	2700 U	R	R	R	1000 U
Phenanthrene	330	110 J	1200	1200 J	770 J	690 J	89 J
Anthracene	330	440 U	210 J	130 J	140 J	140 J	410 U
Carbazole	330	440 U	170 J	160 J	R	R	410 U
Di-n-butylphthalate	330	440 U	1100 U	R	R	R	410 U
Fluoranthene	330	260 J	2500	2400 J	1600 J	1300 J	140 J
Pyrene	330	230 J	2100	2200 J	1300 J	1100 J	140 J
Butylbenzylphthalate	330	440 U	170 J	360 J	R	R	410 U
3,3'-Dichlorobenzidine	330	440 U	1100 U	R	R	R	410 U
Benzo(a)anthracene	330	120 J	1100	1300 J	600 J	490 J	83 J
Chrysene	330	180 J	1700	1400 J	960 J	750 J	85 J
Bis(2-ethylhexyl)phthalate	330	330 J	930 J	1600 J	650 J	510 J	410 U
Di-n-octylphthalate	330	440 UJ	1100 UJ	R	R	R	87 J
Benzo(b)fluoranthene	330	230 J	2300 J	1800 J	2000 J	930 J	88 J
Benzo(k)fluoranthene	330	170 J	1300	1300 J	1400 J	780 J	86 J
Benzo(a)pyrene	330	160 J	1500	1300 J	870 J	670 J	85 J
Indeno(1,2,3-cd)pyrene	330	230 J	1800	1100 J	1200 J	950 J	62 J
Dibenz(a,h)anthracene	330	64 J	440 J	400 J	360 J	280 J	410 U
Benzo(g,h,i)perylene	330	160 J	1100	990 J	720 J	690 J	49 J
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/18/98	09/18/98	09/22/98	09/18/98	09/18/98	09/22/98
% MOISTURE:		26	69	73	72	70	19

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

12

SITE: CENTREDALE MANOR
CASE: 25464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APB04	APB05	APB06	APB07	APB08	APB09
SAMPLE LOCATION:		SD-27	SD-28	SD-29	SD-30	SD-31	SD-32
LABORATORY NUMBER:		909531	909532	909533	909534	909537	909538
COMPOUND	CRQL						
Phenol	330	390 U	410 U	430 U	670 UJ	780 U	410 U
bis(2-Chloroethyl) ether	330	390 U	410 U	430 U	670 U	780 U	410 U
2-Chlorophenol	330	390 U	410 U	430 U	670 U	780 U	410 U
1,3-Dichlorobenzene	330	390 U	410 U	430 U	670 U	780 U	410 U
1,4-Dichlorobenzene	330	390 U	410 U	430 U	670 UJ	780 U	410 U
1,2-Dichlorobenzene	330	390 U	410 U	430 U	670 U	780 U	410 U
2-Methylphenol	330	390 U	410 U	430 U	670 U	780 U	410 U
2,2'-Oxybis(1-chloropropane)	330	390 U	410 U	430 U	670 U	780 U	410 U
4-Methylphenol	330	390 U	410 U	430 U	670 UJ	780 U	410 U
N-Nitroso-di-n-propylamine	330	390 U	410 U	430 U	670 U	780 U	410 U
Hexachloroethane	330	390 U	410 U	430 U	670 U	780 U	410 U
Nitrobenzene	330	390 U	410 U	430 U	670 U	780 U	410 U
Isophorone	330	390 U	410 U	430 U	670 U	780 U	410 U
2-Nitrophenol	330	390 U	410 U	430 U	670 U	780 U	410 U
2,4-Dimethylphenol	330	390 U	410 U	430 U	670 U	780 U	410 U
bis(2-Chloroethoxy)methane	330	390 U	410 U	430 U	670 U	780 U	410 U
2,4-Dichlorophenol	330	390 U	410 U	430 U	670 U	780 U	410 U
1,2,4-Trichlorobenzene	330	390 U	410 U	430 U	670 U	780 U	410 U
Naphthalene	330	390 U	410 U	430 U	670 U	780 U	410 U
4-Chloroaniline	330	390 U	410 U	430 U	670 U	780 U	410 U
Hexachlorobutadiene	330	390 U	410 U	430 U	670 U	780 U	410 U
4-Chloro-3-methylphenol	330	390 U	410 U	430 U	670 U	780 U	410 U
2-Methylnaphthalene	330	390 U	410 U	430 U	670 U	780 U	410 U
Hexachlorocyclopentadiene	330	390 U	410 U	430 U	670 UJ	780 U	410 U
2,4,6-Trichlorophenol	330	390 U	410 U	430 U	670 U	780 U	410 U
2,4,5-Trichlorophenol	830	990 U	1000 U	1100 U	1700 U	2000 U	1000 U
2-Chloronaphthalene	330	390 U	410 U	430 U	670 U	780 U	410 U
2-Nitroaniline	830	990 U	1000 U	1100 U	1700 U	2000 U	1000 U
Dimethylphthalate	330	390 U	410 U	430 U	670 U	780 U	410 U
Acenaphthylene	330	390 U	410 U	97 J	670 U	780 U	410 U
2,6-Dinitrotoluene	330	390 U	410 U	430 U	670 U	780 U	410 U
3-Nitroaniline	830	990 U	1000 U	1100 U	1700 UJ	2000 U	1000 U
Acenaphthene	330	R	56 J	65 J	R	140 J	150 J
2,4-Dinitrophenol	830	990 U	1000 U	1100 U	1700 U	2000 U	1000 U
4-Nitrophenol	830	990 U	1000 U	1100 U	1700 U	2000 U	1000 U
Dibenzofuran	330	390 U	410 U	430 U	670 U	780 U	80 J
2,4-Dinitrotoluene	330	390 U	410 U	430 U	670 U	780 U	410 U
Diethylphthalate	330	390 U	410 U	430 U	670 U	780 U	410 U
4-Chlorophenyl-phenylether	330	390 U	410 U	430 U	670 U	780 U	410 U
Fluorene	330	390 U	110 J	110 J	670 U	160 J	140 J
4-Nitroaniline	830	990 U	1000 U	1100 U	1700 UJ	2000 U	1000 U
4,6-Dinitro-2-methylphenol	830	990 U	1000 U	1100 U	1700 U	2000 U	1000 U
N-Nitrosodiphenylamine(1)	330	390 U	410 U	430 U	670 U	780 U	410 U
4-Bromophenyl-phenylether	330	390 U	410 U	430 U	670 U	780 U	410 U
Hexachlorobenzene	330	390 U	410 U	430 U	670 U	780 U	410 U
Pentachlorophenol	830	990 U	1000 U	1100 U	1700 U	2000 U	1000 U
Phenanthrene	330	280 J	1100	1300	210 J	1900	1600
Anthracene	330	51 J	250 J	240 J	670 U	330 J	270 J
Carbazole	330	390 U	160 J	240 J	670 U	350 J	270 J
Di-n-butylphthalate	330	390 U	410 U	180 J	670 U	780 U	410 U
Fluoranthene	330	530	1400	2400	380 J	3000	2000
Pyrene	330	490	1100	2100	320 J	3000	2500
Butylbenzylphthalate	330	390 U	410 U	98 J	670 U	90 J	120 J
3,3'-Dichlorobenzidine	330	390 U	410 U	430 U	670 U	780 U	410 U
Benzo(a)anthracene	330	230 J	560	1100	160 J	1500	1100
Chrysene	330	280 J	580	1200	190 J	1700	1300
Bis(2-ethylhexyl)phthalate	330	90 J	87 J	360 J	100 J	2300	1900
Di-n-octylphthalate	330	390 U	410 U	60 J	670 UJ	160 J	86 J
Benzo(b)fluoranthene	330	290 J	830 J	1100 J	230 J	1700 J	1200 J
Benzo(k)fluoranthene	330	290 J	1000 J	1400	170 J	1800	1200
Benzo(a)pyrene	330	270 J	530	1100	180 J	1500	950
Indeno(1,2,3-cd)pyrene	330	180 J	340 J	730	150 J	980	700
Dibenz(a,h)anthracene	330	75 J	140 J	280 J	89 J	240 J	280 J
Benzo(g,h,i)perylene	330	150 J	280 J	540	150 J	780 J	570
DILUTION FACTOR:		1.0	1.0	1.0	1.0	2.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/23/98	09/23/98	09/23/98	09/19/98	09/23/98	09/23/98
% MOISTURE:		16	19	23	51	16	19

NOTE. RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APB10	APB11
SAMPLE LOCATION:		SD-33	SD-34
LABORATORY NUMBER:		909539	909540
COMPOUND	CRQL		
Phenol	330	460 U	590 UJ
bis(2-Chloroethyl) ether	330	460 U	590 U
2-Chlorophenol	330	460 U	590 U
1,3-Dichlorobenzene	330	460 U	590 U
1,4-Dichlorobenzene	330	460 U	590 UJ
1,2-Dichlorobenzene	330	460 U	590 U
2-Methylphenol	330	460 U	590 U
2,2'-Oxybis(1-chloropropane)	330	460 U	590 U
4-Methylphenol	330	460 U	590 UJ
N-Nitroso-di-n-propylamine	330	460 U	590 U
Hexachloroethane	330	460 U	590 U
Nitrobenzene	330	460 U	590 U
Isophorone	330	460 U	590 U
2-Nitrophenol	330	460 U	590 U
2,4-Dimethylphenol	330	460 U	590 U
bis(2-Chloroethoxy)methane	330	460 U	590 U
2,4-Dichlorophenol	330	460 U	590 U
1,2,4-Trichlorobenzene	330	460 U	590 U
Naphthalene	330	460 U	590 U
4-Chloroaniline	330	460 U	590 U
Hexachlorobutadiene	330	460 U	590 U
4-Chloro-3-methylphenol	330	460 U	590 U
2-Methylnaphthalene	330	460 U	590 U
Hexachlorocyclopentadiene	330	460 U	590 UJ
2,4,6-Trichlorophenol	330	460 U	590 U
2,4,5-Trichlorophenol	830	1100 U	1500 U
2-Chloronaphthalene	330	460 U	590 U
2-Nitroaniline	830	1100 U	1500 U
Dimethylphthalate	330	460 U	590 U
Acenaphthylene	330	460 U	590 U
2,6-Dinitrotoluene	330	460 U	590 U
3-Nitroaniline	830	1100 U	1500 UJ
Acenaphthene	330	65 J	R
2,4-Dinitrophenol	830	1100 U	1500 U
4-Nitrophenol	830	1100 U	1500 U
Dibenzofuran	330	460 U	590 U
2,4-Dinitrotoluene	330	460 U	590 U
Diethylphthalate	330	460 U	590 U
4-Chlorophenyl-phenylether	330	460 U	590 U
Fluorene	330	460 U	590 U
4-Nitroaniline	830	1100 U	1500 UJ
4,6-Dinitro-2-methylphenol	830	1100 U	1500 U
N-Nitrosodiphenylamine(1)	330	460 U	590 U
4-Bromophenyl-phenylether	330	460 U	590 U
Hexachlorobenzene	330	460 U	590 U
Pentachlorophenol	830	1100 U	1500 U
Phenanthrene	330	590	430 J
Anthracene	330	79 J	150 J
Carbazole	330	74 J	590 U
Di-n-butylphthalate	330	460 U	590 U
Fluoranthene	330	810	820
Pyrene	330	1000	600
Butylbenzylphthalate	330	460 U	590 U
3,3'-Dichlorobenzidine	330	460 U	590 U
Benzo(a)anthracene	330	340 J	380 J
Chrysene	330	470	390 J
Bis(2-ethylhexyl)phthalate	330	160 J	86 J
Di-n-octylphthalate	330	460 U	590 UJ
Benzo(b)fluoranthene	330	830 J	890 J
Benzo(k)fluoranthene	330	1000 J	600 J
Benzo(a)pyrene	330	440 J	430 J
Indeno(1,2,3-cd)pyrene	330	360 J	340 J
Dibenz(a,h)anthracene	330	140 J	180 J
Benzo(g,h,i)perylene	330	350 J	330 J
DILUTION FACTOR:		1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98
DATE ANALYZED:		09/22/98	09/19/98
% MOISTURE:		28	44

NOTE. RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

14

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA92	APA93	APA94	APA95	APA96	APA97
SAMPLE LOCATION:		SD-15	SD-16	SD-17	SD-18	SD-19	SD-20
LABORATORY NUMBER:		909515	909520	909521	909522	909523	909524
COMPOUND	CRQL						
alpha-BHC	1.7	2.1 U	4.8 U	5.3 U	1.9 U	2.2 U	R
beta-BHC	1.7	2.1 U	4.8 U	5.3 U	R	2.2 U	R
delta-BHC	1.7	2.1 U	4.8 U	5.3 U	1.9 U	2.2 U	2.4 J
gamma-BHC (Lindane)	1.7	2.1 U	4.8 U	5.3 U	1.9 UJ	2.2 U	R
Heptachlor	1.7	2.1 U	4.8 U	5.3 U	1.9 U	2.2 U	R
Aldrin	1.7	2.1 U	4.8 U	5.3 U	1.9 U	2.2 U	R
Heptachlor Epoxide	1.7	2.1 U	4.8 U	5.3 U	R	R	R
Endosulfan I	1.7	2.1 U	4.8 U	5.3 U	1.9 U	2.2 U	R
Dieldrin	3.3	4.0 U	9.4 U	10 U	3.7 U	2.2 U	R
4,4'-DDE	3.3	0.31 J	2.5 J	6.8 J	2.8 J	1.3 J	4.2 J
Endrin	3.3	4.0 U	9.4 U	10 U	3.7 U	4.2 U	R
Endosulfan II	3.3	4.0 U	9.4 U	10 U	3.7 U	4.2 U	R
4,4'-DDD	3.3	4.0 U	1.4 J	10 U	3.7 U	4.2 U	R
Endosulfan Sulfate	3.3	4.0 U	9.4 U	2.3 J	R	4.2 U	R
4,4'-DDT	3.3	4.0 U	9.4 U	10 U	3.7 U	4.2 U	R
Methoxychlor	17	21 U	48 U	53 U	5.3 J	2.7 J	9.9 J
Endrin Ketone	3.3	4.0 U	9.4 U	10 U	3.7 U	4.2 U	R
Endrin Aldehyde	3.3	4.0 U	9.4 U	10 U	3.7 U	4.2 U	5.2 J
alpha-Chlordane	1.7	2.1 U	3.5 J	12 J	5.6 J	9.1	R
gamma-Chlordane	1.7	2.1 U	R	7.9 J	4.7 J	4.0 J	R
Toxaphene	170	210 U	480 U	530 U	190 U	220 U	R
Aroclor-1016	33	40 U	94 U	100 U	37 U	42 U	R
Aroclor-1221	67	82 U	190 U	210 U	75 U	86 U	R
Aroclor-1232	33	40 U	94 U	100 U	37 U	42 U	R
Aroclor-1242	33	40 U	94 U	100 U	37 U	42 U	R
Aroclor-1248	33	40 U	94 U	100 U	37 U	42 U	R
Aroclor-1254	33	40 U	23 J	58 J	120	42 U	200 J
Aroclor-1260	33	40 U	94 U	100 U	37 U	42 U	R
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		09/30/98	09/30/98	09/30/98	09/30/98	09/30/98	10/01/98
% MOISTURE:		18	65	68	11	22	71

15

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APA98	APA99	APB00	APB01	APB02	APB03
SAMPLE LOCATION:		SD-21	SD-22	SD-23	SD-24	SD-25	SD-26
LABORATORY NUMBER:		909525	909526	909527	909528	909529	909530
COMPOUND	CRQL						
alpha-BHC	1.7	2.3 U	5.5 U	R	R	R	2.1 U
beta-BHC	1.7	2.3 U	R	R	R	R	R
delta-BHC	1.7	2.3 U	5.5 U	R	R	R	2.1 U
gamma-BHC (Lindane)	1.7	2.3 U	5.5 U	R	R	R	2.1 U
Heptachlor	1.7	2.3 U	5.5 U	R	R	R	2.1 U
Aldrin	1.7	2.3 U	5.5 U	R	R	R	2.1 U
Heptachlor Epoxide	1.7	2.3 U	R	R	R	R	2.1 U
Endosulfan I	1.7	2.3 U	5.5 U	R	R	R	2.1 U
Dieldrin	3.3	4.4 U	11 U	R	R	R	4.1 U
4,4'-DDE	3.3	2.8 J	9.5 J	9.3 J	5.1 J	3.7 J	4.1 U
Endrin	3.3	4.4 U	11 U	R	R	R	4.1 U
Endosulfan II	3.3	4.4 U	11 U	R	R	R	4.1 U
4,4'-DDD	3.3	2.4 J	11 U	R	R	R	4.1 U
Endosulfan Sulfate	3.3	2.2 J	R	R	R	R	4.1 U
4,4'-DDT	3.3	4.4 U	11 U	R	R	R	4.1 U
Methoxychlor	17	23 U	16 J	10 J	12 J	10 J	8.7 J
Endrin Ketone	3.3	4.4 U	11 U	R	R	R	4.1 U
Endrin Aldehyde	3.3	2.6 J	R	R	R	R	4.1 U
alpha-Chlordane	1.7	2.3 U	9.1	R	R	R	2.1 U
gamma-Chlordane	1.7	R	9.3 J	5.0 J	3.2 J	2.4 J	R
Toxaphene	170	230 U	550 U	R	R	R	210 U
Aroclor-1016	33	44 U	110 U	R	R	R	41 U
Aroclor-1221	67	90 U	220 U	R	R	R	83 U
Aroclor-1232	33	44 U	110 U	R	R	R	41 U
Aroclor-1242	33	44 U	110 U	R	R	R	41 U
Aroclor-1248	33	44 U	110 U	R	R	R	41 U
Aroclor-1254	33	140	440	320 J	260 J	170 J	33 J
Aroclor-1260	33	44 U	110 U	R	R	R	41 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		10/01/98	10/01/98	10/01/98	10/01/98	10/01/98	10/01/98
% MOISTURE:		26	69	73	72	70	19

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APB04	APB05	APB06	APB07	APB08	APB09
SAMPLE LOCATION:		SD-27	SD-28	SD-29	SD-30	SD-31	SD-32
LABORATORY NUMBER:		909531	909532	909533	909534	909537	909538
COMPOUND	CRQL						
alpha-BHC	1.7	2.0 U	2.1 U	2.2 UJ	3.5 U	2.0 U	2.1 U
beta-BHC	1.7	2.0 U	2.1 U	R	6.5 J	R	R
delta-BHC	1.7	2.0 U	2.1 U	2.2 UJ	3.5 U	2.0 U	0.12 J
gamma-BHC (Lindane)	1.7	2.0 U	2.1 U	2.2 UJ	3.5 U	2.0 U	2.1 U
Heptachlor	1.7	2.0 U	2.1 U	2.2 UJ	3.5 U	2.0 U	2.1 U
Aldrin	1.7	2.0 U	2.1 U	2.2 UJ	R	2.0 U	2.1 U
Heptachlor Epoxide	1.7	2.0 U	2.1 U	R	3.5 U	2.0 U	2.1 U
Endosulfan I	1.7	2.0 U	2.1 U	2.2 UJ	3.5 U	2.0 U	2.1 U
Dieldrin	3.3	12 EB	4.1 U	4.3 UJ	27 J, EB	3.9 U	4.1 U
4,4'-DDE	3.3	5.2	0.38 J	4.3 UJ	23 J	3.9 U	4.1 U
Endrin	3.3	3.9 U	4.1 U	4.3 UJ	6.7 U	3.9 U	4.1 U
Endosulfan II	3.3	3.9 U	4.1 U	4.3 UJ	6.7 U	3.9 U	4.1 U
4,4'-DDD	3.3	R	4.1 U	3.7 J	6.7 U	3.9 U	4.1 U
Endosulfan Sulfate	3.3	1.8 J	4.1 U	R	23	R	R
4,4'-DDT	3.3	3.9 U	4.1 U	4.3 UJ	6.7 U	3.9 U	4.1 U
Methoxychlor	17	20 U	3.5 J	10 J	2.3 J	5.8 J	7.3 J
Endrin Ketone	3.3	3.9 U	4.1 U	4.3 UJ	6.7 U	3.9 U	4.1 U
Endrin Aldehyde	3.3	2.6 J	0.77 J	4.3 UJ	R	3.9 U	4.1 U
alpha-Chlordane	1.7	1.2 J	2.1 U	5.4 J	2.6 J	R	3.8
gamma-Chlordane	1.7	R	2.1 U	5.5 J	R	R	1.4 J
Toxaphene	170	200 U	210 U	220 UJ	350 U	200 U	210 U
Aroclor-1016	33	39 U	41 U	43 UJ	67 U	39 U	41 U
Aroclor-1221	67	80 U	83 U	87 UJ	140 U	80 U	83 U
Aroclor-1232	33	39 U	41 U	43 UJ	67 U	39 U	41 U
Aroclor-1242	33	39 U	41 U	43 UJ	67 U	39 U	41 U
Aroclor-1248	33	39 U	41 U	43 UJ	67 U	39 U	41 U
Aroclor-1254	33	140	48 J	65 J	1400	39 U	41 U
Aroclor-1260	33	39 U	41 U	43 UJ	67 U	39 U	41 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98	09/14/98	09/14/98	09/14/98	09/14/98
DATE ANALYZED:		10/01/98	10/01/98	10/01/98	10/01/98	10/01/98	10/01/98
% MOISTURE:		16	19	23	51	16	19

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APA92
LABORATORY: COMPUCHEM

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APB10	APB11
SAMPLE LOCATION:		SD-33	SD-34
LABORATORY NUMBER:		909539	909540
COMPOUND	CRQL		
alpha-BHC	1.7	2.4 UJ	3.9 U
beta-BHC	1.7	2.4 UJ	R
delta-BHC	1.7	2.4 UJ	3.9 U
gamma-BHC (Lindane)	1.7	2.4 UJ	3.9 U
Heptachlor	1.7	2.4 UJ	3.9 U
Aldrin	1.7	2.4 UJ	1.9 J
Heptachlor Epoxide	1.7	2.4 UJ	3.9 U
Endosulfan I	1.7	*47 UJ	3.9 U
Dieldrin	3.3	4.6 UJ	7.5 U
4,4'-DDE	3.3	R	1.2 J
Endrin	3.3	4.6 UJ	7.5 U
Endosulfan II	3.3	4.6 UJ	7.5 U
4,4'-DDD	3.3	4.6 UJ	1.4 J
Endosulfan Sulfate	3.3	4.6 UJ	4.3 J
4,4'-DDT	3.3	4.6 UJ	7.5 U
Methoxychlor	17	*240 UJ	39 U
Endrin Ketone	3.3	4.6 UJ	7.5 U
Endrin Aldehyde	3.3	4.6 UJ	7.5 U
alpha-Chlordane	1.7	2.4 UJ	3.9 U
gamma-Chlordane	1.7	2.4 UJ	3.9 U
Toxaphene	170	240 UJ	390 U
Aroclor-1016	33	46 UJ	75 U
Aroclor-1221	67	93 UJ	150 U
Aroclor-1232	33	46 UJ	75 U
Aroclor-1242	33	46 UJ	75 U
Aroclor-1248	33	46 UJ	75 U
Aroclor-1254	33	*7800 J	75 U
Aroclor-1260	33	46 UJ	75 U
DILUTION FACTOR:		1.0/20	1.0
DATE SAMPLED:		09/09/98	09/09/98
DATE EXTRACTED:		09/14/98	09/14/98
DATE ANALYZED:		10/07/98	10/07/98
% MOISTURE:		28	56

8

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

DATA SUMMARY KEY
ORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
U	=	The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
UJ	=	The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.
EB	=	The compound was identified in an aqueous equipment blank (EB) that was used to assess field contamination associated with soil/sediment samples.
TB	=	The compound was identified in an aqueous trip blank (TB) that was used to assess field contamination associated with soil/sediment samples.
BB	=	The compound was identified in an aqueous bottle blank (BB) that was used to assess field contamination associated with soil/sediment samples.

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APB12
LABORATORY: COMPUCHEM

TABLE 1
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APB12	APB13	APB17	APB18	APB19
SAMPLE LOCATION:		SD-35	SD-36	SD-37	SD-38	SD-39
LABORATORY NUMBER:		909541	909546	909547	909548	909549
COMPOUND	CRQL					
Phenol	330	940 U	420 U	480 U	970 U	570 U
bis(2-Chloroethyl) ether	330	940 U	420 U	480 U	970 U	570 U
2-Chlorophenol	330	940 U	420 U	480 U	970 U	570 U
1,3-Dichlorobenzene	330	940 U	420 U	480 U	970 U	570 U
1,4-Dichlorobenzene	330	940 U	420 U	480 U	970 U	570 U
1,2-Dichlorobenzene	330	940 U	420 U	480 U	970 U	570 U
2-Methylphenol	330	940 U	420 U	480 U	970 U	570 U
2,2'-Oxybis(1-chloropropane)	330	940 U	420 U	480 U	970 U	570 U
4-Methylphenol	330	940 U	420 U	480 U	970 U	570 U
N-Nitroso-di-n-propylamine	330	940 U	420 U	480 U	970 U	570 U
Hexachloroethane	330	940 U	420 U	480 U	970 U	570 U
Nitrobenzene	330	940 U	420 U	480 U	970 U	570 U
Isophorone	330	940 U	420 U	480 U	970 U	570 U
2-Nitrophenol	330	940 U	420 U	480 U	970 U	570 U
2,4-Dimethylphenol	330	940 U	420 U	480 U	970 U	570 U
bis(2-Chloroethoxy)methane	330	940 U	420 U	480 U	970 U	570 U
2,4-Dichlorophenol	330	940 U	420 U	480 U	970 U	570 U
1,2,4-Trichlorobenzene	330	940 U	420 U	480 U	970 U	570 U
Naphthalene	330	940 U	420 U	930	970 U	570 U
4-Chloroaniline	330	940 U	420 U	480 U	970 U	570 U
Hexachlorobutadiene	330	940 U	420 U	480 U	970 U	570 U
4-Chloro-3-methylphenol	330	940 U	420 U	480 U	970 U	570 U
2-Methylnaphthalene	330	940 U	420 U	440 J	970 U	570 U
Hexachlorocyclopentadiene	330	940 UJ	420 UJ	480 UJ	970 UJ	570 UJ
2,4,6-Trichlorophenol	330	940 U	420 U	480 U	970 U	570 U
2,4,5-Trichlorophenol	830	2400 U	1000 U	1200 U	2400 U	1400 U
2-Chloronaphthalene	330	940 U	420 U	480 U	970 U	570 U
2-Nitroaniline	830	2400 U	1000 U	1200 U	2400 U	1400 U
Dimethylphthalate	330	940 U	420 U	480 U	970 U	570 U
Acenaphthylene	330	940 U	420 U	190 J	970 U	570 U
2,6-Dinitrotoluene	330	940 U	420 U	480 U	970 U	570 U
3-Nitroaniline	830	2400 UJ	1000 UJ	1200 UJ	2400 UJ	1400 UJ
Acenaphthene	330	940 UJ	420 U	1600	970 U	570 U
2,4-Dinitrophenol	830	2400 UJ	1000 UJ	1200 UJ	2400 UJ	1400 UJ
4-Nitrophenol	830	2400 U	1000 U	1200 U	2400 U	1400 U
Dibenzofuran	330	940 U	420 U	1300	970 U	570 U
2,4-Dinitrotoluene	330	940 U	420 U	480 U	970 U	570 U
Diethylphthalate	330	940 U	420 U	480 U	970 U	570 U
4-Chlorophenyl-phenylether	330	940 U	420 U	480 U	970 U	570 U
Fluorene	330	940 U	420 U	2000	970 U	570 U
4-Nitroaniline	830	2400 UJ	1000 UJ	1200 UJ	2400 UJ	1400 UJ
4,6-Dinitro-2-methylphenol	830	2400 U	1000 U	1200 U	2400 U	1400 U
N-Nitrosodiphenylamine(1)	330	940 U	420 U	480 U	970 U	570 U
4-Bromophenyl-phenylether	330	940 U	420 U	480 U	970 U	570 U
Hexachlorobenzene	330	940 U	420 U	480 U	970 U	570 U
Pentachlorophenol	830	2400 UJ	1000 UJ	1200 UJ	2400 UJ	1400 UJ
Phenanthrene	330	280 J	270 J	*17000	210 J	280 J
Anthracene	330	940 U	67 J	3100	970 U	96 J
Carbazole	330	940 UJ	420 UJ	2000 J	970 UJ	570 UJ
Di-n-butylphthalate	330	940 U	420 U	480 U	970 U	570 U
Fluoranthene	330	480 J	530	*17000	630 J	670
Pyrene	330	360 J	380 J	*17000	480 J	560 J
Butylbenzylphthalate	330	940 UJ	420 UJ	480 UJ	970 UJ	570 UJ
3,3'-Dichlorobenzidine	330	940 U	420 U	480 U	970 U	570 U
Benzo(a)anthracene	330	180 J	220 J	*8600	310 J	340 J
Chrysene	330	190 J	270 J	*7900	370 J	370 J
Bis(2-ethylhexyl)phthalate	330	3300 J	74 J	480 UJ	110 J	160 J
Di-n-octylphthalate	330	940 UJ	420 UJ	480 UJ	970 UJ	570 UJ
Benzo(b)fluoranthene	330	310 J	340 J	*8400	530 J	450 J
Benzo(k)fluoranthene	330	100 J	110 J	2400	200 J	150 J
Benzo(a)pyrene	330	180 J	260 J	*6200	390 J	430 J
Indeno(1,2,3-cd)pyrene	330	110 J	130 J	2700	220 J	200 J
Dibenz(a,h)anthracene	330	940 U	46 J	880	970 U	69 J
Benzo(g,h,i)perylene	330	110 J	150 J	2600	250 J	250 J
DILUTION FACTOR:		1.0	1.0	1.0/9.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/15/98	09/15/98	09/15/98	09/15/98	09/15/98
DATE ANALYZED:		09/21/98	09/21/98	09/21/98	09/21/98	09/21/98
% MOISTURE:		85	21	32	66	42

20

* - RESULT REPORTED FROM DILUTED ANALYSIS. NOTE. RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APB12
LABORATORY: COMPUCHEM

TABLE 2
SEMIVOLATILE WATER ANALYSIS
ug/L

SAMPLE NUMBER:	APB20
SAMPLE LOCATION:	RB-01
LABORATORY NUMBER:	909550

COMPOUND	CRQL	
Phenol	10	1 J
bis(2-Chloroethyl) ether	10	10 U
2-Chlorophenol	10	10 U
1,3-Dichlorobenzene	10	10 U
1,4-Dichlorobenzene	10	10 U
1,2-Dichlorobenzene	10	10 U
2-Methylphenol	10	10 U
2,2'-Oxybis(1-chloropropane)	10	10 U
4-Methylphenol	10	10 U
N-Nitroso-di-n-propylamine	10	10 U
Hexachloroethane	10	10 U
Nitrobenzene	10	10 U
Isophorone	10	10 U
2-Nitrophenol	10	10 U
2,4-Dimethylphenol	10	10 U
bis(2-Chloroethoxy)methane	10	10 U
2,4-Dichlorophenol	10	10 U
1,2,4-Trichlorobenzene	10	10 U
Naphthalene	10	10 U
4-Chloroaniline	10	10 U
Hexachlorobutadiene	10	10 U
4-Chloro-3-methylphenol	10	10 U
2-Methylnaphthalene	10	10 U
Hexachlorocyclopentadiene	10	10 U
2,4,6-Trichlorophenol	10	10 U
2,4,5-Trichlorophenol	25	25 U
2-Chloronaphthalene	10	10 U
2-Nitroaniline	25	25 U
Dimethylphthalate	10	10 U
Acenaphthylene	10	10 U
2,6-Dinitrotoluene	10	10 U
3-Nitroaniline	25	25 U
Acenaphthene	10	10 U
2,4-Dinitrophenol	25	25 UJ
4-Nitrophenol	25	25 U
Dibenzofuran	10	10 U
2,4-Dinitrotoluene	10	10 U
Diethylphthalate	10	10 U
4-Chlorophenyl-phenylether	10	10 U
Fluorene	10	10 U
4-Nitroaniline	25	25 U
4,6-Dinitro-2-methylphenol	25	25 U
N-Nitrosodiphenylamine(1)	10	10 U
4-Bromophenyl-phenylether	10	10 U
Hexachlorobenzene	10	10 U
Pentachlorophenol	25	25 U
Phenanthrene	10	10 U
Anthracene	10	10 U
Carbazole	10	10 UJ
Di-n-butylphthalate	10	10 U
Fluoranthene	10	10 U
Pyrene	10	10 U
Butylbenzylphthalate	10	10 U
3,3'-Dichlorobenzidine	10	10 U
Benzo(a)anthracene	10	10 U
Chrysene	10	10 U
Bis(2-ethylhexyl)phthalate	10	10 U
Di-n-octylphthalate	10	10 U
Benzo(b)fluoranthene	10	10 U
Benzo(k)fluoranthene	10	10 U
Benzo(a)pyrene	10	10 U
Indeno(1,2,3-cd)pyrene	10	10 U
Dibenz(a,h)anthracene	10	10 U
Benzo(g,h,i)perylene	10	10 U

DILUTION FACTOR:	0.99
DATE SAMPLED:	09/09/98
DATE EXTRACTED:	09/14/98
DATE ANALYZED:	09/16/98

21

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APB12
LABORATORY: COMPUCHEM

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		APB12	APB13	APB17	APB18	APB19
SAMPLE LOCATION:		SD-35	SD-36	SD-37	SD-38	SD-39
LABORATORY NUMBER:		909541	909546	909547	909548	909549
COMPOUND	CRQL					
alpha-BHC	1.7	4.8 U	2.2 U	2.5 UJ	5.0 U	2.9 U
beta-BHC	1.7	4.8 U	2.2 U	2.5 UJ	5.0 U	2.9 U
delta-BHC	1.7	4.8 U	2.2 U	2.5 UJ	5.0 U	2.9 U
gamma-BHC (Lindane)	1.7	4.8 U	2.2 U	2.5 UJ	5.0 U	2.9 U
Heptachlor	1.7	4.8 U	2.2 U	2.5 UJ	5.0 U	2.9 U
Aldrin	1.7	4.8 U	2.2 U	2.5 UJ	5.0 U	2.9 U
Heptachlor Epoxide	1.7	4.8 U	2.2 U	2.2 J	5.0 U	2.9 U
Endosulfan I	1.7	4.8 U	2.2 U	2.5 UJ	5.0 U	0.25 J
Dieldrin	3.3	9.4 U	4.2 U	6.8 UJ	9.7 U	5.7 U
4,4'-DDE	3.3	1.3 J	4.2 U	4.8 UJ	2.5 J	3.1 J
Endrin	3.3	9.4 U	4.2 U	4.8 UJ	9.7 U	5.7 U
Endosulfan II	3.3	9.4 U	4.2 U	4.8 UJ	9.7 U	5.7 U
4,4'-DDD	3.3	1.6 J	0.89 J	4.8 UJ	1.7 J	1.7 J
Endosulfan Sulfate	3.3	9.4 U	4.2 U	4.8 UJ	9.7 U	5.7 U
4,4'-DDT	3.3	9.4 U	4.2 U	11 J	9.7 U	5.7 U
Methoxychlor	17	48 U	22 U	25 UJ	50 U	29 U
Endrin Ketone	3.3	9.4 U	1.9 J	20 J	2.3 J	5.7 U
Endrin Aldehyde	3.3	9.4 U	4.2 U	4.8 UJ	9.7 U	5.7 U
alpha-Chlordane	1.7	4.8 U	2.2 U	2.5 UJ	1.4 J	0.45 J
gamma-Chlordane	1.7	4.8 U	R	2.5 UJ	R	2.4 J
Toxaphene	170	480 U	220 U	250 UJ	500 U	290 U
Aroclor-1016	33	94 U	42 U	48 UJ	97 U	57 U
Aroclor-1221	67	190 U	85 U	98 UJ	200 U	120 U
Aroclor-1232	33	94 U	42 U	48 UJ	97 U	57 U
Aroclor-1242	33	94 U	42 U	48 UJ	97 U	57 U
Aroclor-1248	33	94 U	42 U	48 UJ	97 U	57 U
Aroclor-1254	33	94 U	42 U	48 UJ	97 U	57 U
Aroclor-1260	33	94 U	42 U	48 UJ	97 U	57 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		09/09/98	09/09/98	09/09/98	09/09/98	09/09/98
DATE EXTRACTED:		09/15/98	09/15/98	09/15/98	09/15/98	09/15/98
DATE ANALYZED:		09/29/98	09/29/98	09/29/98	09/29/98	09/29/98
% MOISTURE:		65	21	32	66	42

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

S\98060017\APB12PS.WK4

SITE: CENTREDALE MANOR
CASE: 26464 SDG: APB12
LABORATORY: COMPUCHEM

TABLE 4
PESTICIDE/POLYCHLORINATED BIPHENYL AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		APB20
SAMPLE LOCATION:		RB-01
LABORATORY NUMBER:		909550
COMPOUND	CRQL	
alpha-BHC	0.050	0.054 U
beta-BHC	0.050	0.054 U
delta-BHC	0.050	0.054 U
gamma-BHC (Lindane)	0.050	0.054 U
Heptachlor	0.050	0.054 U
Aldrin	0.050	0.054 U
Heptachlor Epoxide	0.050	0.054 U
Endosulfan I	0.050	0.054 U
Dieldrin	0.10	0.0078 J
4,4'-DDE	0.10	0.11 U
Endrin	0.10	0.11 U
Endosulfan II	0.10	0.11 U
4,4'-DDD	0.10	0.11 U
Endosulfan Sulfate	0.10	0.11 U
4,4'-DDT	0.10	0.11 U
Methoxychlor	0.50	0.54 U
Endrin Ketone	0.10	0.11 U
Endrin Aldehyde	0.10	0.11 U
alpha-Chlordane	0.050	0.054 U
gamma-Chlordane	0.050	0.054 U
Toxaphene	5.0	5.4 U
Aroclor-1016	1.0	1.1 U
Aroclor-1221	2.0	2.2 U
Aroclor-1232	1.0	1.1 U
Aroclor-1242	1.0	1.1 U
Aroclor-1248	1.0	1.1 U
Aroclor-1254	1.0	1.1 U
Aroclor-1260	1.0	1.1 U
DILUTION FACTOR:		1.07
DATE SAMPLED:		09/09/98
DATE EXTRACTED:		09/15/98
DATE ANALYZED:		09/18/98

S:\98060017\APB12PA.WK4

ATTACHMENT B

CENTREDALE MANOR SITE

SOIL AND SEDIMENT SAMPLE RESULTS

DIOXINS/HEXACHLOROXANTHENE

Samples collected by START on 9 September 1998

Table I
Recommendation Summary Table for Dioxins/Furans

J^1	-	Unacceptable PES results: J detects.
J^2	-	Verification calibration Ion Ratio outside acceptable range: J detects ; UJ non-detects.
J^3	-	Calibration verification % outside the acceptable range: J detects; UJ non-detects.
J^4	-	Blank contamination: The positive results for affected samples listed in the table were reported as estimated detection limits (EDLs) and were estimated (UJ).
J^5	-	MS/MSD % recovery and/or RPD outside criteria: J detects; UJ non-detects.
J^6	-	Duplicate RPD >50%: J detects; UJ non-detects.
J^7	-	Internal standard % recovery and/or ion ratios outside criteria: J detects; UJ non-detects.
J^8	-	Recovery standard area counts outside criteria: J detects; UJ non-detects.
J^9	-	Recovery standard ion ratios outside criteria: J detects; UJ non-detects .
J^{10}	-	% Solids <30% (but > 10%): J detects
R^1	-	Unacceptable PES Results: R non-detects
R^2	-	% Solids < 30%: R non-detects
R^3	-	Unacceptable homogeneity: R detects; R non-detects .

EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DXO (list all DXOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error: Analytical Error	Measurement Error: Sampling Error	Sampling Variability	Potential Usability Issues
To determine the nature and extent of soil and sediment dioxin/furan contamination along/near the Woonasquatucket River To determine potential sources of dioxin/furan contamination These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb	Yes, Sampling Method appropriate for all samples. Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: J[2,3,4,6,7,8], R[1]	Refer to qualification in R/S Key on Table I: J[1,5], R[1]	**	For all samples, the reported TEQs were derived almost solely from 2378-TCDD concentrations. Most of the 2378-TCDD sampling and analysis quality control met acceptance criteria and the 2378-TCDD sample data can be used for the site objectives (with the exception of samples AAL24001 and AAL24044 as discussed below) Sample AAL24001 was rejected in its entirety due to severe problems with homogeneity/representativeness The initial 10 gram sample extraction yielded a dry weight 2378-TCDD concentration (and TEQ) significantly greater than 1 ppb, whereas the 1 gram re-extraction yielded a dry weight 2378-TCDD concentration (and TEQ) less than 1 ppb This location should be resampled if it is critical to achievement of the site objectives. Sample homogeneity/representativeness was also negatively impacted in the four sediment samples that had low % solids AAL24029 (22 7%), AAL24030 (25 1%), AAL24031 (26.9%), and AAL24044 (29.7%) Data usability was impacted as follows: The non-detects for 2378-TCDD, 12378-PeCDD, and 123789-HxCDF in Sample AAL24044 were rejected and that location should be resampled if it is critical to achievement of the site objectives. The positive detects for 2378-TCDD in Samples AAL24029-AAL24031, which were all greater than 1ppb, were estimated (J) For the non-2378-TCDD congeners in Sample AAL24029-AAL24031, the positive detects were estimated (J) and the non-detects were rejected. Sample homogeneity/representativeness problems were also indicated by the poor precision for the non-2378-TCDD congeners in the four sediment field duplicate pairs. It was noted that one field duplicate pair (AAL24026/AAL 24027) had wide variability in percent solids content (30.7% and 75 2%) respectively). Another pair (AAL24030/AAL24031) had less than 30% solids as noted above Those field duplicate pairs also contained the majority of non-2378-TCDD RPDs that did not meet acceptance criteria Although non-2378-TCDD data were estimated based upon poor precision, no sample values (positive detects or non-detects) were rejected. Four single blind performance evaluation samples were analyzed with this case. 2378-TCDD scored acceptable in all four samples. Nine non-2378-TCDD congeners were scored Action Low (and two were scored Action High) out of the 64 total non-2378-congeners analyzed (16 non-2378-TCDD congeners in each of the four PE samples) Since the samples from this Case were not all extracted and/or analyzed with the PE samples, the ESAT data validator used a conservative approach and applied actions for non-2378-TCDD congeners with low scores to all samples from this Case. For those non-2378-congeners, the positive detects were estimated (the reported concentration may be biased low) and the non-detects were rejected.

* The evaluation of "sampling error" cannot be completely assessed in the data validation

** Sampling variability is not assessed in data validation.

Validator: _____

Date: 2-11-99

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO : 98-AAL24 SDG NO.: AAL24001

SAMPLE NUMBER:	AAL24001#		AAL24002#		AAL24003#		AAL24004#		AAL24005#		AAL24006#	
STATION LOCATION:	SS-01		SS-02		SS-03		SS 04		SS-05		SS 06	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC :	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	R		4672^ J		105 1		6272^ J		3333^ J		2939 J	
1,2,3,7,8-PeCDD	R		UJ	43 52	UJ	2 12	10 63 J		UJ	3.00	12 17 J	
1,2,3,4,7,8-HxCDD	R		UJ	49 86	U	1 56	4 82 J		U	2.27	24 64 J	
1,2,3,6,7,8-HxCDD	R		R		R		19 74 J			7.86*	62 84 J	
1,2,3,7,8,9-HxCDD	R		27.79^ J		UJ	1 53	16 61 J		115.46^		65 74 J	
1,2,3,4,6,7,8 HpCDD	R		615 35 J		UJ	23 03	451 00 J		144 69		1427 J	
OCDD	R		3300^ J		UJ	126 17	3373 J		UJ	735.71	6099 J	
2,3,7,8-TCDF	R		75.48 J		3 80 J			25.11*	29 25 J		39 30 J	
1,2,3,7,8-PeCDF	R		51.62 J		R			6 03*	17.89^ J		3 80 J	
2,3,4,7,8-PeCDF	R		60.59 J		0.43 J			9.68*	U	6.77	15 97 J	
1,2,3,4,7,8 HxCDF	R		71 60^ J		R		29 45 J		26.74 J		38 09 J	
1,2,3,6,7,8-HxCDF	R		68.81 J		R		25 21 J		10.01 J		17.85 J	
1,2,3,7,8,9 HxCDF	R		R		R		R		R		R	
2,3,4,6,7,8-HxCDF	R		24 34^ J		R		14 31 J		7 54 J		R	
1,2,3,4,6,7,8-HpCDF	R		373.56 J			2 16*	327 74 J		140.35 J		168 06 J	
1,2,3,4,7,8,9 HpCDF	R			10 14*	U	0 92	12 28 J		8.21 J		5 98 J	
OCDF	R		424 88 J		R		314 75 J		UJ	124.06	UJ	125 08
Hexachloroxanthene	R		263000^ J		9921		168172^ J		63241		48278 J	
TOXICITY EQUIVALENCY:	R		4745 39J		105 72J		6307.58J		3356 61J		3000 22J	
% SOLIDS:	94 5		79 4		87 1		88 6		75 9		34 8	
DILUTION FACTOR:	1.0		1 0		1 0		1 0		1.0		1 0	
DATE SAMPLED:	09/09/98		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98	
DATE OF RECEIPT:	09/11/98		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98	
SAMPLE EXTRACTION DATE:	10/02/98		10/02/98		10/02/98		10/02/98		10/02/98		10/02/98	
ANALYSIS DATE:	10/20/98		10/20/98		10/21/98		10/21/98		10/21/98		10/21/98	
GC/MS I D :	AAL24001		AAL24002		AAL24003		AAL24004		AAL24005		AAL24006	

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO : 98-AAL24 SDG NO.: AAL24001

SAMPLE NUMBER:	AAL24007#		AAL24008#		AAL24009#		AAL24010#		AAL24011#		AAL24012#	
STATION LOCATION:	SD-01		SD-02		SD-03		SD-04		SD-05		SD-06	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	119.77 J		88.61 J		31.9 J		404.87 J		18.12 J		16.52	
1,2,3,7,8-PeCDD	UJ	7.49	UJ	1.78		0.52*		3.16*	UJ	2.14	U	0.73
1,2,3,4,7,8-HxCDD		3.14*	UJ	1.09	UJ	0.28	5.99 J		UJ	0.82	U	0.54
1,2,3,6,7,8-HxCDD	7.59 J			3.18*		2.25*	16.35 J		R			2.47*
1,2,3,7,8,9-HxCDD	7.55 J			4.40*		2.30*		15.78*	UJ	0.80		1.51*
1,2,3,4,6,7,8-HpCDD		215.42*	UJ	87.40	UJ	43.07	340.57 J		UJ	15.84	UJ	45.12
OCDD	UJ	1304	UJ	418.06	UJ	263.21	UJ	1897.26	UJ	131.13	UJ	255.92
2,3,7,8-TCDF	9.32 J		4.09 J			3.94*	20.18 J		1.33 J			4.98*
1,2,3,7,8-PeCDF		4.63*	R			0.83*	1.86 J		R		R	
2,3,4,7,8-PeCDF		3.71*	UJ	0.57		1.16*		2.36*	U	0.95	U	0.79
1,2,3,4,7,8-HxCDF	R		R		2.77 J			5.13*	1.26 J		4.72 J	
1,2,3,6,7,8-HxCDF	5.25 J		R		1.51 J			3.32*	R		2.02 J	
1,2,3,7,8,9-HxCDF	R		R		R		R		R		R	
2,3,4,6,7,8-HxCDF		5.12*	R			1.18*		2.44*	R			1.04*
1,2,3,4,6,7,8-HpCDF	78.59 J		UJ	3.28		21.62*	28.39 J		UJ	0.88		17.57*
1,2,3,4,7,8,9-HpCDF	UJ	6.25	UJ	2.54		1.26*	UJ	1.48	UJ	*1.16	2.00	
OCDF	UJ	129.07	R		UJ	27.87	UJ	53.52	UJ	14.71	UJ	22.68
Hexachloroxanthene	49351 J		21868 J		UJ	414.58	6842 J		UJ	11.82	UJ	356.77
TOXICITY EQUIVALENCY		128.59J		87.98J		34.41J		418.33J		18.38J		18.39J
% SOLIDS:		77.0		87.8		91.9		72.2		88.8		96.7
DILUTION FACTOR:		1.0		1.0		1.0		1.0		1.0		1.0
DATE SAMPLED:		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98
DATE OF RECEIPT:		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98
SAMPLE EXTRACTION DATE:		10/02/98		10/02/98		10/14/98		10/14/98		10/06/98		10/06/98
ANALYSIS DATE:		11/12/98		10/21/98		10/28/98		10/28/98		10/22/98		10/22/98
GC/MS I D :		AAL24007		AAL24008		AAL24009		AAL24010		AAL24011		AAL24012

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO.: 98-AAL24 SDG NO.: AAL24001

SAMPLE NUMBER:	AAL24013#		AAL24014#		AAL24015#		AAL24016#		AAL24017#		AAL24018#	
STATION LOCATION:	SD-07		SD-08		SD 09		SD-10		SD-11		SD-12	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC :	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	48.47 J		194.88 J		28 63 J		160 94 J		264.41 J		19 16 J	
1,2,3,7,8-PeCDD	UJ	0 81	1.99 J		UJ	0 53		0.89*		0 84*	UJ	0 65
1,2,3,4,7,8-HxCDD	UJ	0.39		3 24*	UJ	0 58	1.48 J			1.62*	UJ	0 50
1,2,3,6,7,8-HxCDD	R		9 66 J			0 93*	3 12 J		4 00 J		R	
1,2,3,7,8,9-HxCDD		0 90*	10 66 J		1.70 J			3 60*	4 33 J			1.40*
1,2,3,4,6,7,8-HpCDD	UJ	11 03	190.18 J		UJ	19 54	UJ	77.21	UJ	89.34	UJ	9 86
OCDD	UJ	76 69	UJ	1778	UJ	118 69	UJ	360 67	UJ	559.17	UJ	69 19
2,3,7,8-TCDF	51.64 J		19 13 J		UJ	0 43		7.85*		7 00*		0 70*
1,2,3,7,8-PeCDF		1 66*	1.91 J			0 62*	R			0 32*		0 80*
2,3,4,7,8-PeCDF		1.45*		2 55*		0 92*	UJ	2.33		1 38*		0 71*
1,2,3,4,7,8-HxCDF		2.21*	5 08 J		R		R		5.76 J		1 40 J	
1,2,3,6,7,8-HxCDF		1.88*	4.09 J			1 26*	R		3 60 J			0.64*
1,2,3,7,8,9-HxCDF	R		R		R		R		R		R	
2,3,4,6,7,8-HxCDF		0 98*	2 52 J			1 10*	R		3.30 J		R	
1,2,3,4,6,7,8-HpCDF	UJ	1.25		51 23*	UJ	0 40		14 62*	142.38 J			4 60*
1,2,3,4,7,8,9-HpCDF	UJ	2 37	UJ	0 82	UJ	0 48		2 33*	1.02 J		UJ	0 89
OCDF	R		UJ	71.34	UJ	8 79	UJ	28 81	UJ	58 40	UJ	7 82
Hexachloroxanthene	UJ	721.48	UJ	3390	UJ	1502	UJ	5036	UJ	4369	UJ	377 83
TOXICITY EQUIVALENCY:		55 04J		205 10J		29 62J		163.16J		269.93J		20 02J
% SOLIDS:		89 4		82 9		95 2		56 0		82 4		92 9
DILUTION FACTOR:		1.0		1 0		1 0		1 0		1 0		1 0
DATE SAMPLED:		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98
DATE OF RECEIPT:		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98
SAMPLE EXTRACTION DATE:		10/06/98		10/06/98		10/06/98		10/06/98		10/06/98		10/06/98
ANALYSIS DATE:		10/22/98		10/30/98		10/26/98		10/2698		10/26/98		10/26/98
GC/MS I D :		AAL24013		AAL24014		AAL24015		AAL24016		AAL24017		AAL24018

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO.: 98-AAL24 SDG NO.: AAL24001

SAMPLE NUMBER:	AAL24019#		AAL24020#		AAL24021#		AAL24022#		AAL24023#		AAL24024#	
STATION LOCATION:	SD-13		SD-14		SD-15		SD-16		SD-17		SD-18	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC.	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	112 27 J		28 86 J		UJ	0 70	469 12 J		611.06 J		7887 02 J	
1,2,3,7,8-PeCDD	UJ	1.14	UJ	0 56	UJ	0 66		1.26*		1.94*		7.22*
1,2,3,4,7,8-HxCDD	1.28 J		UJ	0 28	UJ	0 58	UJ	1 65	UJ	1 35		7 66*
1,2,3,6,7,8-HxCDD	6.18 J			1 97*	R			7.27*	8 72 J		42 16 J	
1,2,3,7,8,9-HxCDD	5.34 J			1 68*		0 48*		16 48*	9.14 J		42 19 J	
1,2,3,4,6,7,8-HpCDD	UJ	98 51	UJ	24 68	UJ	0 92	UJ	158 67	UJ	220 25	709 87 J	
OCDD	UJ	878.28	UJ	162.86	UJ	25 06	UJ	942.23	UJ	1575.88	4568 52 J	
2,3,7,8 TCDF	6 06 J		UJ	0 48	UJ	0 57	UJ	0 88	5.74 J		24 96 J	
1,2,3,7,8-PeCDF		2.24*		0 22*	R			1.28*		1 61*		7 45*
2,3,4,7,8-PeCDF	2.35 J			0 64*	UJ	0 37		2 08*	2.82 J			12 58*
1,2,3,4,7,8-HxCDF	7.50 J		R		R			3.19*	12.19 J			33 56*
1,2,3,6,7,8-HxCDF	2.71 J		1.39 J		R			1 29*	4 47 J		23.64 J	
1,2,3,7,8,9-HxCDF	R		R		R		R		R		R	
2,3,4,6,7,8-HxCDF		2.38*	0.98 J		R		R		2.86 J		12.11 J	
1,2,3,4,6,7,8-HpCDF		38.92*		8 95*	UJ	0 57		21 80*	UJ	3.13		353 98*
1,2,3,4,7,8,9-HpCDF		1 76*	UJ	0 53	UJ	0 81	UJ	1.19	UJ	3 39	UJ	5 25
OCDF	UJ	64.19	UJ	11 31	R		UJ	33.08	UJ	88.48	UJ	311 23
Hexachloroxenthene	UJ	2472	UJ	603.03	UJ	2022	15011 J		15478 J		166500 J	
TOXICITY EQUIVALENCY:		117.11J		29 88J		0 05J		473 90J		617 83J		8031 13J
% SOLIDS:		72.4		99 0		81.1		46 3		34.5		40 0
DILUTION FACTOR:		1.0		1 0		1 0		1 0		1 0		1 0
DATE SAMPLED:		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98
DATE OF RECEIPT:		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98
SAMPLE EXTRACTION DATE:		10/06/98		10/06/98		10/14/98		10/14/98		10/14/98		10/14/98
ANALYSIS DATE:		10/26/98		10/26/98		11/17/98		10/27/98		10/27/98		11/17/98
GC/MS I.D.:		AAL24019		AAL24020		AAL24021		AAL24022		AAL24023		AAL24024

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO.: 98-AAL24 SDG NO.: AAL24001

SAMPLE NUMBER:	AAL24025#		AAL24026#		AAL24027#		AAL24028#		AAL24029#		AAL24030#	
STATION LOCATION:	SD-19		SD-20		SD-21		SD-22		SD-23		SD-24	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	18.11 J		3534.20^ J		4098.98 J		7468.07 J		10050.80 J		5788.14 J	
1,2,3,7,8-PeCDD	UJ	1.93		13.46*	3.15 J		12.90 J			19.12*		9.57*
1,2,3,4,7,8-HxCDD	UJ	1.09		23.52*	3.61 J		23.32 J			35.64*	22.52 J	
1,2,3,6,7,8-HxCDD	4.15 J		71.42 J		9.21 J		70.57 J		68.81 J		79.44 J	
1,2,3,7,8,9-HxCDD	UJ	1.07	66.99 J		10.87 J		84.43 J			76.08*	73.80 J	
1,2,3,4,6,7,8-HpCDD	UJ	67.73	1423.96 J		175.58 J		1787.11 J		1607.00 J		1408.63 J	
OCDD	UJ	414.75	8641.61 J		UJ	939.76	11541.64 J		9155.60 J		8302.98 J	
2,3,7,8-TCDF	UJ	0.65	45.28^ J		14.89 J			42.65*	47.11 J		35.59 J	
1,2,3,7,8-PeCDF	R			9.42*		1.86*		9.17*	7.91 J		5.61 J	
2,3,4,7,8-PeCDF	UJ	0.79		11.50*	UJ	1.04	18.05 J			19.49*		10.77*
1,2,3,4,7,8-HxCDF	R			44.70*	11.68 J		R		52.36 J		36.68 J	
1,2,3,6,7,8-HxCDF	R			34.34*	8.78 J		32.50 J		36.01 J		26.48 J	
1,2,3,7,8,9-HxCDF	R		R		R		R		R		R	
2,3,4,6,7,8-HxCDF		0.98*		21.29*		3.89*	22.05 J		17.96 J		13.96 J	
1,2,3,4,6,7,8-HpCDF	UJ	1.53	644.30^ J		82.00 J		UJ	8.13	R		R	
1,2,3,4,7,8,9-HpCDF	UJ	1.62		20.56*	4.35 J		29.61 J			30.95*		8.66*
OCDF	UJ	34.12	UJ	581.98	UJ	56.41	1158.08 J		R		R	
Hexachloroxanthene	UJ	705.16	75570 J		99202 J		183333 J		384758 J		135060 J	
TOXICITY EQUIVALENCY:		18.62J		3607.43J		4109.56J		7542.41J		10129.43J		5849.91J
% SOLIDS:		81.4		30.7		75.2		30.0		22.7		25.1
DILUTION FACTOR:		1.0		1.0		1.0		1.0		1.0		1.0
DATE SAMPLED:		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98
DATE OF RECEIPT:		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98
SAMPLE EXTRACTION DATE:		10/14/98		10/14/98		10/14/98		10/14/98		10/16/98		10/16/98
ANALYSIS DATE:		10/28/98		10/28/98		10/28/98		10/28/98		11/17/98		10/29/98
GC/MS I.D.:		AAL24025		AAL24026		AAL24027		AAL24028		AAL24029		AAL24030

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO.: 98-AAL24 SDG NO.: AAL24001

SAMPLE NUMBER	AAL24031#		AAL24032#		AAL24033#		AAL24034#		AAL24035#		AAL24036#	
STATION LOCATION	SD-25		SD-26		SD-27		SD-28		SD-29		SD-30	
MATRIX	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC.	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	5178.90 J		92.24 J		1332.96 J		UJ	2.13	54.60 J		15738.10^ J	
1,2,3,7,8-PeCDD	R		UJ	1.58	0.41 J		UJ	0.94	UJ	1.93	20.04^ J	
1,2,3,4,7,8-HxCDD		13.54*	UJ	1.30	UJ	0.48		0.50*		1.42*	16.87 J	
1,2,3,6,7,8-HxCDD		41.3*	R		2.01 J			2.72*	5.48 J		38.68 J	
1,2,3,7,8,9-HxCDD		45.91*	UJ	1.30	UJ	0.47		1.67*		7.46*	51.47 J	
1,2,3,4,6,7,8-HpCDD	757.71 J		UJ	10.54	UJ	23.65	UJ	25.32	UJ	117.46	909.85 J	
OCDD	8473.10 J		UJ	48.80	UJ	103.82	UJ	122.21	UJ	746.93	4653.86 J	
2,3,7,8-TCDF		11.75*		1.35*	2.60 J			0.80*	1.38 J		587.64 J	
1,2,3,7,8-PeCDF	R		R		0.58 J		R		R		151.03 J	
2,3,4,7,8-PeCDF		4.20*	UJ	2.10	0.70 J			0.60*		1.10*	UJ	18.64
1,2,3,4,7,8-HxCDF	12.67 J		R		2.24 J			0.60*	R		41.35 J	
1,2,3,6,7,8-HxCDF		9.20*		1.38*	1.48 J			0.33*	R		20.06 J	
1,2,3,7,8,9-HxCDF	R		R		R		R		R		R	
2,3,4,6,7,8-HxCDF	5.34 J		R		1.08 J			0.66*	1.29 J			8.04*
1,2,3,4,6,7,8-HpCDF	R			9.79*		16.42*		16.40*		34.41*	73.79 J	
1,2,3,4,7,8,9-HpCDF	R		UJ	3.24	UJ	1.03	UJ	1.07	UJ	2.41	6.85 J	
OCDF	R		UJ	8.33	UJ	7.65	UJ	7.07	UJ	41.05	UJ	88.31
Hexachloroxanthene	88476 J		UJ	2636.70	50523 J		UJ	281.32	UJ	582.52	93773 J	
TOXICITY EQUIVALENCY:		5209.02J		92.61		1335.05J		1.19J		57.20J		1584.64J
% SOLIDS:		26.9		82.3		86.1		86.1		72.1		54.6
DILUTION FACTOR:		1.0		1.0		1.0		1.0		1.0		1.0
DATE SAMPLED		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98
DATE OF RECEIPT		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98
SAMPLE EXTRACTION DATE:		10/16/98		10/16/98		10/16/98		10/16/98		10/16/98		10/23/98
ANALYSIS DATE		10/29/98		10/29/98		10/29/98		10/29/98		10/30/98		11/02/98
GC/MS I.D.		AAL24031		AAL24032		AAL24033		AAL24034		AAL24035		AAL24036

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO.: 98-AAL24 SDG NO.: AAL24001

SAMPLE NUMBER:	AAL24037#		AAL24038#		AAL24039#		AAL24040#		AAL24041#		AAL24042#	
STATION LOCATION:	SD-31		SD-32		SD-33		SD-34		SD-35		SD-36	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC.	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	1.84	UJ	1.58	19.07 J		UJ	9.68	UJ	2.41	UJ	1.00
1,2,3,7,8-PeCDD	UJ	0.65	UJ	0.86	UJ	8.19	UJ	3.54	UJ	3.06	UJ	1.21
1,2,3,4,7,8-HxCDD		1.68*	1.38 J		UJ	5.40	5.83 J		2.26 J		UJ	1.24
1,2,3,6,7,8-HxCDD	4.34 J		3.92 J		50.56 J		36.17 J			6.09*	R	
1,2,3,7,8,9-HxCDD	4.75 J		3.45 J		24.08 J		26.80 J		3.92 J		UJ	1.18
1,2,3,4,6,7,8-HpCDD	UJ	74.85	UJ	76.84	351.33 J		UJ	238.32	UJ	82.56	UJ	25.15
OCDD	UJ	390.99	UJ	427.67	UJ	740.46	UJ	1151.08	UJ	482.22	UJ	133.50
2,3,7,8-TCDF		0.81*	UJ	0.68	78.53 J		10.34 J			3.40*		0.88*
1,2,3,7,8-PeCDF		0.26*	R		9.61 J			6.44*		1.39*	0.82 J	
2,3,4,7,8-PeCDF		0.63*	UJ	0.42	52.40 J			7.19*	2.10 J			0.94*
1,2,3,4,7,8-HxCDF	R		0.74 J		148.93 J		33.22 J		R			1.72*
1,2,3,6,7,8-HxCDF		0.71*	R		60.38 J		14.25 J			3.68*	R	
1,2,3,7,8,9-HxCDF	R		R		R			4.66*	R		R	
2,3,4,6,7,8-HxCDF	R		R		26.07 J		9.25 J			2.93*		1.16*
1,2,3,4,6,7,8-HpCDF		7.12*	5.47 J		547.45 J			186.31*	UJ	1.50	9.70 J	
1,2,3,4,7,8,9-HpCDF	UJ	1.00	U	2.17		47.60*		8.99*	UJ	1.35	UJ	0.68
OCDF	UJ	6.02	UJ	10.02	398.16 J		UJ	42.23	UJ	16.76	UJ	15.77
Hexachloroxanthene	UJ	1352.01	UJ	1941.52	UJ	2693.37	UJ	2708.86	UJ	2100.94	UJ	521.68
TOXICITY EQUIVALENCY:		1.63J		1.00J		94.47J		19.94J		3.35J		0.98J
% SOLIDS:		82.1		85.5		72.4		39.5		42.6		80.7
DILUTION FACTOR:		1.0		1.0		1.0		1.0		1.0		1.0
DATE SAMPLED:		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98		09/09/98
DATE OF RECEIPT:		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98		09/11/98
SAMPLE EXTRACTION DATE:		10/23/98		10/23/98		11/23/98		10/23/98		10/14/98		10/23/98
ANALYSIS DATE:		11/02/98		11/02/98		11/24/98		11/03/98		11/03/98		11/03/98
GC/MS I.D.:		AAL24037		AAL24038		AAL24039		AAL24040		AAL24041		AAL24042

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits.
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO.: 98-AAL24 SDG NO: AAL24001

SAMPLE NUMBER	AAL24043#		AAL24044#		AAL24045#	
STATION LOCATION	SD-37		SD-38		SD-39	
MATRIX	SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	4.12	R		UJ	2.16
1,2,3,7,8-PeCDD	UJ	9.39	R		UJ	1.69
1,2,3,4,7,8-HxCDD	UJ	16.36		4.80*	UJ	1.59
1,2,3,6,7,8-HxCDD	R			10.21*	2.23 J	
1,2,3,7,8,9-HxCDD	UJ	16.36		549.73*	78.36 J	
1,2,3,4,6,7,8-HpCDD	UJ	66.12	UJ	199.05	UJ	45.32
OCDD	UJ	561.75	UJ	1128.49	UJ	269.67
2,3,7,8-TCDF	UJ	3.15	6.92 J		3.60 J	
1,2,3,7,8-PeCDF	R		3.43 J		R	
2,3,4,7,8-PeCDF	UJ	3.02		3.51*	2.02 J	
1,2,3,4,7,8-HxCDF	R		10.75 J		R	
1,2,3,6,7,8-HxCDF	R		7.49 J		R	
1,2,3,7,8,9-HxCDF	R		R		R	
2,3,4,6,7,8-HxCDF	R			5.67*	2.14 J	
1,2,3,4,6,7,8-HpCDF		31.88*	57.47 J		48.54 J	
1,2,3,4,7,8,9-HpCDF	UJ	6.21		5.10*	3.20 J	
OCDF	UJ	36.58	UJ	81.66	UJ	16.13
Hexachloroxenthene	UJ	3100.00	UJ	1383.64	UJ	504.32
TOXICITY EQUIVALENCY		0.32J		82.11J		10.18J
% SOLIDS		69.4		29.7		57.9
DILUTION FACTOR		1.0		1.0		1.0
DATE SAMPLED		09/09/98		09/09/98		09/09/98
DATE OF RECEIPT		09/11/98		09/11/98		09/11/98
SAMPLE EXTRACTION DATE		11/03/98		11/03/98		11/03/98
ANALYSIS DATE		11/12/98		11/04/98		11/04/98
GC/MS I.D.		AAL24043		AAL24044		AAL24045

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
^ = Results reported from reextraction and reanalysis

ATTACHMENT C

CENTREDALE MANOR SITE

SOIL AND SEDIMENT SAMPLE RESULTS

TOTAL ORGANIC CARBON

Samples collected by START on 9 September 1998

01

SITE: CENTREDALE MANOR
CASE: 0178F SDG: DAFZ73
LABORATORY: SEVERN TRENT LABORATORIES

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

DRAFT DATA - NOT VALIDATED

SAMPLE NUMBER:		DAFZ73	DAFZ74	DAFZ75	DAFZ76	DAFZ77	DAFZ78	DAFZ79
SAMPLE LOCATION:		SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SD-01
LABORATORY NUMBER:		1948001	1948002	1948003	1948004	1948005	1948006	1948007
PERCENT SOLIDS:		77.6	68.2	78.3	77.5	65.3	33.0	51.6
INORGANIC ELEMENTS	INSTRUMENT DETECTION LIMITS (mg/kg)							
TOC	100	17400	20000	9520	35200	43200	122000	68400

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

02

SITE: CENTREDALE MANOR
CASE: 0178F SDG: DAFZ73
LABORATORY: SEVERN TRENT LABORATORIES

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

DRAFT DATA - NOT VALIDATED

SAMPLE NUMBER:		DAFZ87	DAFZ88	DAFZ89	DAFZ90	DAFZ91	DAFZ92
SAMPLE LOCATION:		SD-09	SD-10	SD-11	SD-12	SD-13	SD-14
LABORATORY NUMBER:		1948015	1948016	1948017	1948018	1948019	1948020
PERCENT SOLIDS:		80.9	39.7	53.5	77.7	49.3	77.5
INORGANIC ELEMENTS	INSTRUMENT DETECTION LIMITS (mg/kg)						
TOC	100	18100	128000	30100	2540	58100	8620

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

04

SITE: CENTREDALE MANOR
CASE: 0178F SDG: DAFZ93
LABORATORY: Severn Trent Laboratories

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

DRAFT DATA - NOT VALIDATED

SAMPLE NUMBER:		DAFZ93	DAFZ94	DAFZ95	DAFZ96	DAFZ97	DAFZ98	DAFZ99
SAMPLE LOCATION:		SD-15	SD-16	SD-17	SD-18	SD-19	SD-20	SD-21
LABORATORY NUMBER:		1948101	1948102	1948103	1948104	1948105	1948106	1948107
PERCENT SOLIDS:		86.4	35.4	33.4	41.3	79.0	25.8	57.3
INORGANIC ELEMENTS	INSTRUMENT DETECTION LIMITS (mg/kg)							
TOC	100	1010	86400	73400	91700	3860	141000	23600

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

05

SITE: CENTREDALE MANOR
CASE: 0178F SDG: DAFZ93
LABORATORY: Severn Trent Laboratories

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

DRAFT DATA - NOT VALIDATED

SAMPLE NUMBER:		DAF01A	DAF02A	DAF03A	DAF04A	DAF05A	DAF06A	DAF07A
SAMPLE LOCATION:		SD-22	SD-23	SD-24	SD-25	SD-26	SD-27	SD-28
LABORATORY NUMBER:		1948108	1948109	1948110	1948111	1948112	1948113	1948114
PERCENT SOLIDS:		31.5	22.2	24.3	22.6	80.9	85.4	81.5
INORGANIC ELEMENTS	INSTRUMENT DETECTION LIMITS (mg/kg)							
TOC	100	92900	202000	136000	180000	2120	5130	1120

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

90

SITE: CENTREDALE MANOR
CASE: 0178F SDG: DAFZ93
LABORATORY: Severn Trent Laboratories

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

DRAFT DATA - NOT VALIDATED

SAMPLE NUMBER:		DAF08A	DAF09A	DAF10A	DAF11A	DAF12A	DAF13A
SAMPLE LOCATION:		SD-29	SD-30	SD-31	SD-32	SD-33	SD-34
LABORATORY NUMBER:		1948115	1948116	1948117	1948118	1948119	1948120
PERCENT SOLIDS:		74.1	47.8	79.4	82.0	70.8	44.6
INORGANIC ELEMENTS	INSTRUMENT DETECTION LIMITS (mg/kg)						
TOC	100	6270	78000	10300	6220	30400	78800

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

07

SITE: CENTREDALE MANOR
CASE: 0178F SDG: DAFZ93
LABORATORY: SEVERN TRENT LABORATORIES

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

DRAFT DATA - NOT VALIDATED

SAMPLE NUMBER:		DAF14A	DAF15A	DAF16A	DAF17A	DAF18A
SAMPLE LOCATION:		SD-35	SD-36	SD-37	SD-38	SD-39
LABORATORY NUMBER:		1948201	1948202	1948203	1948204	1948205
PERCENT SOLIDS:		37.6	79.7	71.2	30.6	53.6
INORGANIC ELEMENTS	INSTRUMENT DETECTION LIMITS (mg/kg)					
TOC	100	90100	5270	25300	92400	38100

NOTE: . RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CENTREDALE MANOR
CASE: 0178F SDG: DAF14A
LABORATORY: SEVERN TRENT LABORATORIES

TABLE 2
INORGANIC WATER ANALYSIS
µg/L

DRAFT DATA - NOT VALIDATED

SAMPLE NUMBER:	DAF19A
SAMPLE LOCATION:	RB-01
LABORATORY NUMBER:	1948206

INORGANIC ELEMENTS	INSTRUMENT DETECTION LIMITS (ug/L)	
TOC	1.00	1.00 U

U - VALUE IS NON-DETECTED.

09

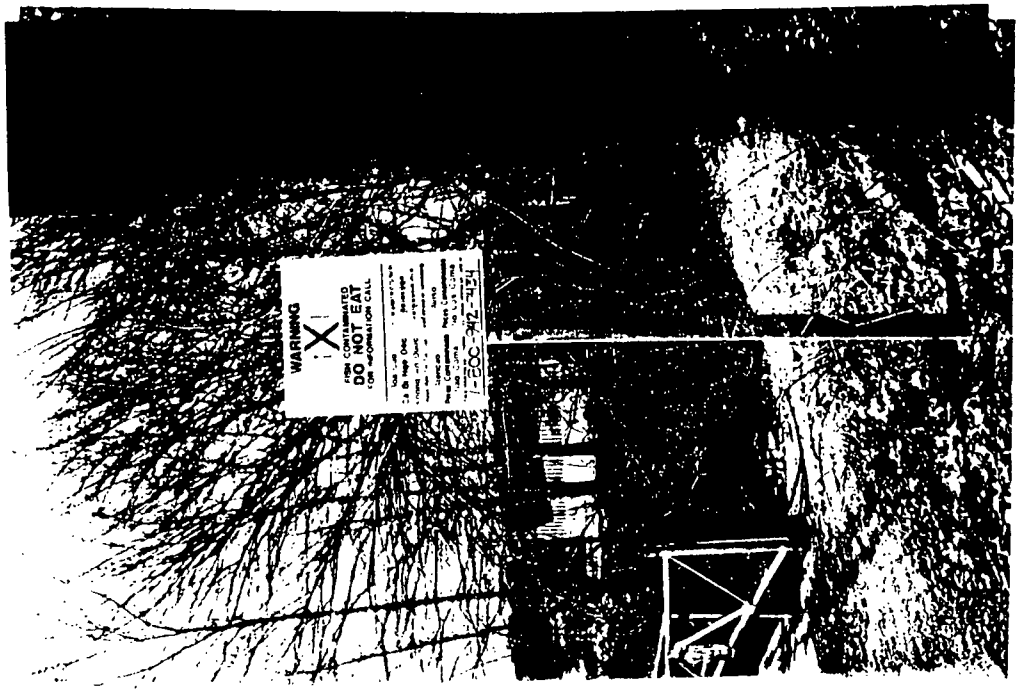
Reference 63

Project Note

On 31 March 1999, (Superfund Technical Assessment and Response Team (START) members R. Wynnyk, B. Bowen, and D. McGrath posted warning signs along the Woonasquatucket River which stated: "WARNING...FISH CONTAMINATED...DO NOT EAT" (See attached copy of photographs and descriptions). The text printed on the signs were in nine different languages, including English.

5/18/99

Renata Wynnyk
Environmental Scientist, START
Centredale Manor Removal Leader

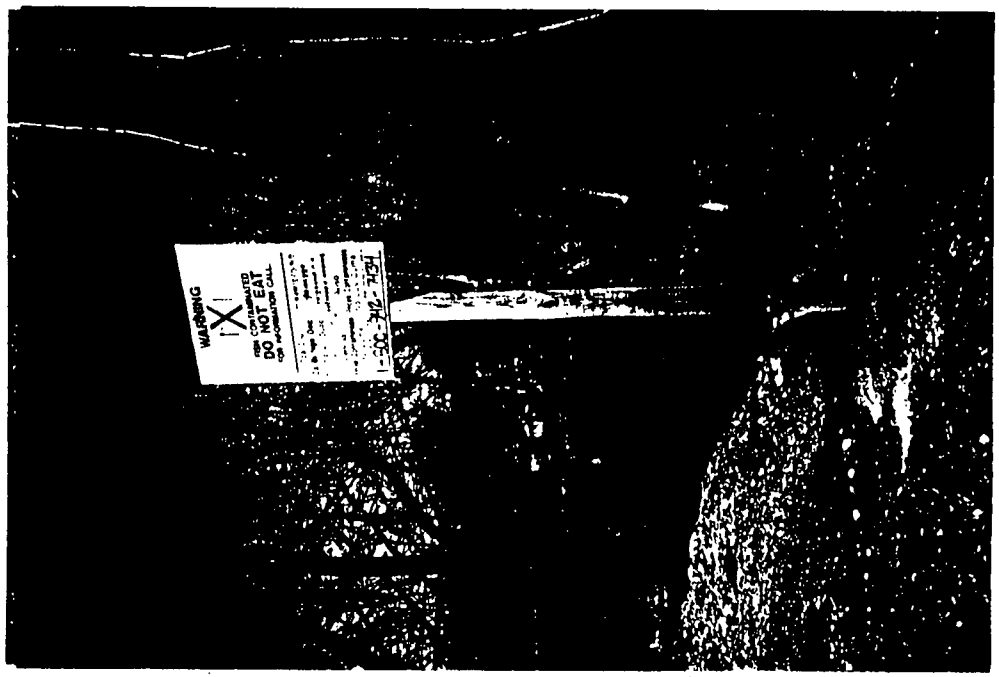


12A

3/31/99 BC100132

WYNN III, BOWEN, MCGRATH 12:20

VIEW OF WARNING SIGN INSTALLED ON EASTERN SIDE OF ALAMANDE BRM FOOT BRIDGE



13A

3/31/99 BC100132

WYNN III, BOWEN, MCGRATH 12:25

VIEW OF WARNING SIGN INSTALLED ON WESTERN SIDE OF FOOT-BRIDGE; ALAMANDA BRM IS IN BACKGROUND

Deborah A Szaro
US EPA Approval Signature

2/16/99
Date

February 16, 1999
B-99-2-Y-7

Ms. Christine Clark
Regional Sample Control Custodian
Office of Environmental Measurement and Evaluation
U.S. EPA Region I
60 Westview Street
Lexington, Massachusetts 02421

Re: WA No. 01-99-3-02, Task No. 2, TDF No. 036
Reference No. 99-AAL25 / SDG No. AAL25020
U.S. EPA Region VII Laboratory, Kansas City, KS
Woonasquatucket River/Centredale Manor Site, N. Providence, RI

Dioxin/Furan: 3/Aqueous/AAL25020, AAL25021, AAL24022
(Aqueous Field Duplicate Pair AAL25020/AAL25021)

Dear Ms. Clark:

A Tier III data validation was performed on the Dioxin/Furan analytical data for three drinking water samples collected by Roy F. Weston, Inc. for the U.S. EPA at the Woonasquatucket River/Centredale Manor Site in N. Providence, RI. The samples were analyzed according to EPA Method 1613B, September 1997. The samples were validated using first the criteria in EPA Method 1613B, October 1994, defaulting second to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria and finally to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98). Unless otherwise stated all criteria used were Method 1613B criteria. The data were evaluated based on the following parameters:

	•	Overall Evaluation of Data and Potential Usability Issues
	•	Data Completeness (CSF Audit - Tier I)
*	•	Preservation and Technical Holding Times
NR	•	PE Samples/Accuracy Check
*	•	Window Defining Mix
	•	Initial and Continuing Calibrations
*	•	Chromatographic Resolution
*	•	Instrument Sensitivity Check
	•	Blanks
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Laboratory and Field Duplicates
	•	Internal/Clean-up/Recovery Standards
	•	Sample Analysis and Identification
*	•	Sample Quantitation
*	•	Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
*	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity

*	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity
*	•	Required Sample Reruns and Second Column Confirmation
*	•	Dilutions
	•	System Performance

* - All criteria were met for this parameter.
NR - Not required.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes Site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To determine the nature and extent of dioxin/furan contamination near the Woonasquatucket River
- To determine potential health effects

The majority of the 2378-TCDD and non-2378-TCDD sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

For the final sample results reported in the Data Summary Table, all 2378-TCDD TEQs were zero and there were no positive detects of 2378-TCDD above the federal drinking water maximum contaminant level (MCL) of 30 pg/L.

Data Completeness (CSF Audit - Tier I)

Region VII has different reporting requirements than Region I. The laboratory reported EMPC values as regular concentrations on the Form Is. The ESAT data validator flagged EMPC values with a "*" on the Form Is.

Initial and Continuing Calibrations

The following table summarizes the calibration verification (VER) compounds with concentrations which failed to meet the control limit criteria for high resolution analyses.

Standard	Analyte	VER Conc. (ng/mL)	VER Limits (ng/mL)	Action		Affected Samples
				Positive Detects*	NDs*	
CS3012599 1/25/99	^{13}C -1234678-HpCDF	136.22	78-129	J	UJ	AAL25020
CS3012799 1/27/99	12378-PeCDD	38.32	39-65	J	UJ	AAL25021L, AAL25022L
	^{13}C-12378-PeCDD	40.77	62-160	J	UJ	
	^{13}C-12378-PeCDF	65.22	76-130	J	UJ	
	^{13}C-23478-PeCDF	58.62	77-130	J	UJ	

* For those compounds associated with an internal standard referenced.
L Re-extraction and re-analysis results for these samples are reported on the Data Summary Table. The "L" in this table denotes the relevant laboratory sample data file name.

Blanks

The table below summarizes the compounds that were detected in the aqueous laboratory method blanks, the action levels, and the samples affected:

Compound	Type of Blank	Blank Concentration pg/L	Action Level pg/L	Samples Affected
2378-TCDD	Method Blank	6.0*	30.0	AAL25020, AAL25021L
1234678-HpCDD	Method Blank	7.0	35.0	None
OCDD	Method Blank	23.0	230	AAL25020, AAL25021L, AAL25022L
12378-PeCDF	Method Blank	1.0*	5.0	None
123678-HxCDF	Method Blank	1.0*	5.0	None
OCDF	Method Blank	6.0*	60.0	None

* This value was reported as an EMPC value on the Form Is.
L Re-extraction and re-analysis results for these samples are reported on the Data Summary Table. The "L" in this table denotes the relevant laboratory sample data file name.

The following contamination was found in the method blanks: 2378-TCDD, 1234678-HpCDD, OCDD, 12378-PeCDF, 123678-HxCDF, and OCDF. Blank actions are based on EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98) criteria. Blank action levels are calculated as ten times the highest concentration of the contaminant determined in any blank for common contaminants (OCDD/OCDF) and five times the action level for all other analytes. The positive sample results that are less than the

action level are reported as non-detects and estimated (UJ) on the Data Summary Table. The positive sample results that are greater than the action level are not qualified on the Data Summary Table.

Internal/Clean-up/Recovery Standards

- Recovery Standards

The following table summarizes the recovery standards with area counts which failed to meet the acceptance criterion of 50-200% of the area counts of the associated daily calibration standard as specified in the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996, Internal Standard Section:

Recovery Standard	RS Area	Area Limits	Action		Affected Samples
			Positive Detects*	NDs*	
^{13}C-1234-TCDD	1.3×10^{8}	2.0×10^{8} - 7.8×10^{8}	J	UJ	AAL25020
^{13}C-123789-HxCDD	3.9×10^{7}	8.6×10^{7} - 3.4×10^{8}	J	UJ	
^{13}C-1234-TCDD	3.3×10^{8}	5.7×10^{7} - 2.3×10^{8}	J	UJ	AAL25022L

* For those compounds associated with the recovery standard referenced.

L Re-extraction and re-analysis results for these samples are reported on the Data Summary Table. The "L" in this table denotes the relevant laboratory sample data file name.

Sample Analysis and Identification

The laboratory originally extracted the three drinking water samples on 1/22/99 and analyzed them on 1/25/99. Sample AAL25021 had 1250 pg/L of OCDD and sample AAL25022 had 13 pg/L of 2378-TCDD, which were above the Method 1613B Minimum Levels of 100 pg/L and 10 pg/L, respectively. The 2378-TCDD sample concentration was well below the drinking water MCL of 30 pg/L. The method blank that was extracted and analyzed with those samples had 23 pg/L of OCDD and 2 pg/L of 2378-TCDD.

The laboratory re-extracted and re-analyzed the blank, sample AAL25021 (in duplicate), and sample AAL25022 to verify that the original sample concentrations arose from laboratory cross-contamination. Upon re-extraction and re-analysis, there were no detects for OCDD or 2378-TCDD above the Method 1613B Minimum Levels. The re-extraction and re-analysis results for those samples are reported on the Data Summary Table.

System Performance

No major trends in system performance were identified.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Janine Bartels
Principal Scientist

Louis Macri
ESAT Team Manager

Attachments: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Data Summary Tables
Data Validation Worksheets
Field Sampling Notes

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Reference No. 99-AAL25/SDG No. AAL25020

Sample Nos.	AAL25020	AAL25021	AAL25022
Compound			
2378-TCDD	J[2,3]	J[2]	J[3]
12378-PeCDD	J[3]	J[1]	J[1,3]
123478-HxCDD	J[3]	A	A
123678-HxCDD	J[3]	A	A
123789-HxCDD	J[3]	A	A
1234678-HpCDD	J[3]	A	A
OCDD	J[2,3]	J[2]	J[2]
2378-TCDF	J[3]	A	J[3]
12378-PeCDF	J[3]	J[1]	J[1,3]
23478-PeCDF	J[3]	J[1]	J[1,3]
123478-HxCDF	J[3]	A	A
123678-HxCDF	J[3]	A	A
123789-HxCDF	J[3]	A	A
234678-HxCDF	J[3]	A	A
1234678-HpCDF	J[1,3]	A	A
1234789-HpCDF	J[3]	A	A
OCDF	J[3]	A	A
HCX	J[3]	A	A

Recommendation Summary Table for Dioxins/Furans

J[1] - Calibration verification % recovery outside the acceptable range: J detects; UJ non-detects.

J[2] - Blank contamination: The positive results for affected samples listed in the table were reported as estimated detection limits (EDLs) and were estimated (UJ).

J[3] - Recovery standard low area counts: J detects; UJ non-detects.

EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error		
To determine the nature and extent of dioxin/furan contamination near the Woonasquatucket River. To determine potential health effects.	Yes, Sampling Method appropriate for all samples. Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: J[1,2,3]	Refer to qualification in R/S Key on Table I: NA	**	The majority of the 2378-TCDD and non-2378-TCDD sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

* The evaluation of "sampling error" cannot be completely assessed in the data validation.

** Sampling variability is not assessed in data validation.

Validator: _____

Date: 2-16-99

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - NORTH PROVIDENCE, RI
REFERENCE NO.: 99-AAL25 SDG NO.: AAL25020

SAMPLE NUMBER:	AAL25020		AAL25021		AAL25022	
STATION LOCATION:	DW-01/DAF58J		DW-02/DAF59J		DW-03/DAF60J	
MATRIX:	AQUEOUS		AQUEOUS		AQUEOUS	
	pg/L	DL/EMPC*	pg/L	DL/EMPC*	pg/L	DL/EMPC*
2,3,7,8-TCDD	UJ	3.0	UJ	1.0	UJ	1.0
1,2,3,7,8-PeCDD	UJ	5.0	UJ	3.0	UJ	2.0
1,2,3,4,7,8-HxCDD	UJ	5.0	U	3.0	U	1.0
1,2,3,6,7,8-HxCDD	UJ	5.0	U	2.0	U	1.0
1,2,3,7,8,9-HxCDD	UJ	5.0	U	2.0	U	1.0
1,2,3,4,6,7,8-HpCDD	UJ	10.0	U	4.0	U	4.0
OCDD	UJ	19.0	UJ	14.0	UJ	9.0
2,3,7,8-TCDF	UJ	3.0	U	1.0	UJ	1.0
1,2,3,7,8-PeCDF	UJ	2.0	UJ	1.0	UJ	1.0
2,3,4,7,8-PeCDF	UJ	3.0	UJ	2.0	UJ	1.0
1,2,3,4,7,8-HxCDF	UJ	3.0	U	2.0	U	1.0
1,2,3,6,7,8-HxCDF	UJ	3.0	U	2.0	U	1.0
1,2,3,7,8,9-HxCDF	UJ	4.0	U	3.0	U	2.0
2,3,4,6,7,8-HxCDF	UJ	3.0	U	2.0	U	1.0
1,2,3,4,6,7,8-HpCDF	UJ	5.0	U	3.0	U	3.0
1,2,3,4,7,8,9-HpCDF	UJ	6.0	U	3.0	U	4.0
OCDF	UJ	6.0	U	5.0	U	3.0
Hexachloroxanthene	UJ	20000	U	20000	U	20000
TOXICITY EQUIVALENCY:		0.0 UJ		0.0 UJ		0.0 UJ
DILUTION FACTOR:		1.0		1.0		1.0
DATE SAMPLED:		01/15/99		01/15/99		01/15/99
DATE OF RECEIPT:		01/19/99		01/18/99		01/19/99
SAMPLE EXTRACTION DATE:		01/22/99		01/26/99		01/26/99
ANALYSIS DATE:		01/25/99		01/27/99		01/27/99
GC/MS I.D.:		AAL25020		AAL25021		AAL25022

* = These values are EMPCs (Estimated Maximum Possible Concentration); Values without an "" are the Detection Limits.

WESTON

Reference 65

Sean Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Dr. Bob Marshall, Director of Health
Company RI Department of Health
Address 3 Capitol Hill
Providence, RI
Phone (401) 222-2231

Date 5/25/99
Time 1650 AM/PM

☒ Originator Placed Call
☐ Originator Received Call
W.O. No. 20098041001704550

Subject Woonasquatucket River Information

Notes:

Is the Woonasquatucket still open for catch and release fishing? - Yes.

Dr. Marshall did not think there was any information regarding fish production for human consumption available prior to the 1996 fish consumption advisory.

Regarding ~~fish~~ information of fish production (annual) in pounds) for human consumption from the Providence River and Narragansett Bay Dr. Marshall stated to try the following people:

Dr. Ernie Julian (401) 222-2750
Food Protection
Dr. Bob Vanderslice (401) 222-4948 X2103
RI DOH

☒ File Centredale Manor RRS
☐ Tickle File ___/___/___
☐ Follow-Up By: ___
☐ Copy/Route To: ___

Follow-Up-Action: ___

Originator's Initials Sean Kennedy

WESTON

Reference 66

Sean Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Carol Marlowe, Hydrologic Information Assistant
Company U.S.G.S. Headquarters
Address Reston, VA 20192
Phone 1-800-426-9000

Date 5/26/99
Time 1030 (AM) PM

☒ Originator Placed Call
☐ Originator Received Call

W.O. No. 20098041/0017045S0

Subject USGS Estimating Factor for New England

Notes: Left message asking USGS if 1.8 cfs/mi² factor still used ~~PSK~~

Ms. Marlowe stated that she called the USGS Water Resources Division of the Massachusetts District Office and asked if the 1.8 cfs/mi² estimating factor is currently used for New England, in which a representative from the MA district office replied that it is.

☒ File Centredale Manor HRS
☐ Tickle File ___/___/___
☐ Follow-Up By: ___
☐ Copy/Route To: ___

Follow-Up-Action: ___

Originator's Initials SK

WESTON

Reference 67

Sean Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Ann Vaccaro, Manager
Company Centredale Manor
Address 2074 Smith St.
N. Providence, RI
Phone (401) 232-3770

Date 5/25/99
Time 1100 AM/PM

☒ Originator Placed Call
☐ Originator Received Call
W.O. No. 20098041001704550

Subject Confirmation of bi-annual leak test of on-site UST (fuel)

Notes:

Ms. Vaccaro stated that she has paperwork from a leak test which was performed in November 1996* on the UST. The UST passed the tests at that time. She also stated that it has been tested since November 1996, however, she has had trouble locating the paperwork. Ms. Vaccaro is faxing the results of the November 1996 test to me.

An ~~ask~~ up to date leak test is to be performed in June 1999.

*See attached

☒ File Centredale Manor HRS
☐ Tickle File ___/___/___
☐ Follow-Up By: ___
☐ Copy/Route To: ___

Follow-Up-Action: ___

Originator's Initials Sean Kennedy

1

RFW 110-4-83

1423-1823 4/16/93

CENTREDALE MANOR
2074 SMITH STREET
NO. PROVIDENCE RI 02911

PHONE: 401-232-3770
FAX: 401-231-2523

FAX COVER SHEET

DATE: 5-27-99

TO: S. KENNEDY

FROM: A. M. VACCARO

NO. OF PAGES INCLUDING COVER SHEET 4

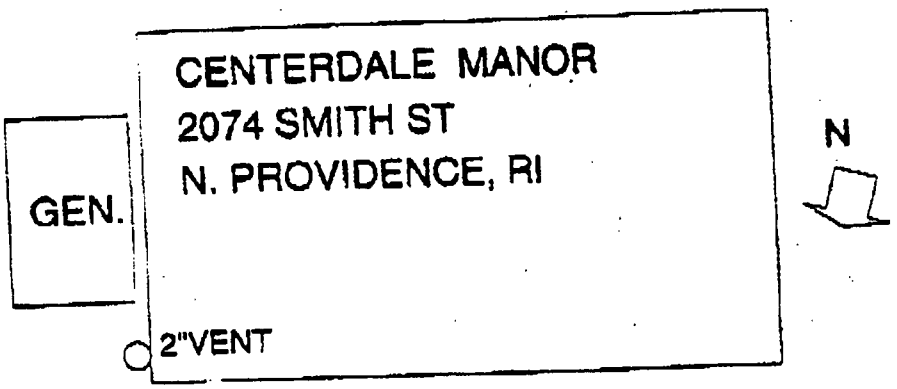
COMMENTS:

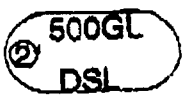
SITE DIAGRAM

NDE ENVIRONMENTAL CORPORATION
8906 WALL STREET, SUITE 306
AUSTIN, TEXAS 78754
(512) 719-4633
FAX (512) 719-4986

TEST DATE: November 11, 1996
CLIENT: AALANCO SERVICE CORPORATION

WORK ORDER NUMBER: 723711
SITE: CENTERDALE MANOR





DRIVEWAY

INDIVIDUAL TANK/LINE/LEAK DETECTOR TEST REPORT
NDE ENVIRONMENTAL CORPORATION

TEST DATE: November 11, 1996 WORK ORDER NUMBER: 723711
CLIENT: AALANCO SERVICE CORPORATION SITE: CENTERDALE MANOR

TANK INFORMATION

Tank ID:	1	Bottom to top fill in inches:	80.0
Product:	DIESEL	Bottom to grade fill in inches:	79.0
Capacity in gallons:	500	Fill pipe length in inches:	32.0
Diameter in inches:	48.00	Fill pipe diameter in inches:	2.0
Length in inches:	56	Stage I vapor recovery:	NONE
Material:	STEEL	Stage II vapor recovery:	NONE
Manifolded Tank:	NO		
Vent:	NO		
V/R:	NO		

COMMENTS:

TANK TEST RESULTS

Test method:	Sure Test
Psi at tank bottom:	1.50
Fluid level in inches:	36.00
UFT/OFT:	UFT
Fluid volume in gallons:	389
Water level in inches:	0.00
Test time:	08:55-10:57
Number of thermisters:	4
Specific gravity:	0.838
Water table depth in inches:	
Determined by (method):	NO WELL
Leak rate in gph:	-0.012
RESULT:	PASS

COMMENTS:

LEAK DETECTOR RESULTS

	New/passed detector	Failed/replaced detector
Test method:		
Make:		
Model:		
S/N:		
Open time in sec:		
Holding psi:		
Resiliency cc:		
Test leak rate ml/min:		
Metering psi:		
Calib. leak in gph:		
RESULT:		

COMMENTS:

ULLAGE TEST RESULTS

Test method:	UTS-4T System
Test time:	11:10-11:40
Ullage volume:	111
Ullage pressure:	3.00
RESULT:	PASS

DATA FOR UTS-4T ONLY:

Time of test 1:	11:10-11:20
Temperature:	50.00
Flow rate (cfh):	0.200-
Time of test 2:	11:20-11:30
Temperature:	50.00
Flow rate (cfh):	0.200-
Time of test 3:	11:30-11:40
Temperature:	50.00
Flow rate (cfh):	0.200-

COMMENTS:

LINE TEST RESULTS

	A	B	C	D
Material:	COPPER	COPPER		
Diameter (in):	0.5	0.5		
Length (ft):	25.0	25.0		
Test psi:				
Bleedback cc:				
Test time (min):				
Test 1: start time:				
finish psi:				
vol change cc:				
Test 2: start time:				
finish psi:				
vol change cc:				
Test 3: start time:				
finish psi:				
vol change cc:				
Final gph:				
RESULT:				

Test type:
Pump type: NONE Pump make: NONE

COMMENTS:

CERTIFICATE OF UNDERGROUND STORAGE TANK SYSTEM TESTING

NDE ENVIRONMENTAL CORPORATION
8906 WALL STREET, SUITE 306
AUSTIN, TEXAS 78754
(512) 719-4633
FAX (512) 719-4986

TEST RESULT SITE SUMMARY REPORT

TEST TYPE: Sure Test

TEST DATE: November 11, 1996

WORK ORDER NUMBER: 723711

CLIENT: AALANCO SERVICE CORPORATION
80-B TURNPIKE ROAD
WESTBOROUGH, MA 01581
1-800-215-6698
ATTN: STEVE McCARTHY

SITE: CENTERDALE MANOR
2074 SMITH STREET
NORTH PROVIDENCE, RI 02911

The following tests were conducted at the site above in accordance with all applicable portions of Federal, NFP A and local regulations.

Tank Tests

TANK NUMBER	PRODUCT	TANK CAPACITY (Gallons)	TANK DIAMETER (Inches)	TANK RESULT	VOLUME CHANGE (gph)	OUTAGE RESULT
1	DIESEL	,500	48.00	PASS	-0.012	PASS

Line and Leak Detector Tests

TANK NUMBER	PRODUCT	VOLUME CHANGE (gph) A	B	C	D	LINE RESULT (P=Pass F=Fail) A	B	C	D	LEAK DETECTOR PRESENT	LEAK DETECTOR RESULT
1	DIESEL										

NDE appreciates the opportunity to serve you, and looks forward to working with you in the future. Please call any time, day or night, when you need us.

NDE Customer Service Representative:
RUSSELL PRESTON

Test conducted by:
SHAWN CONRAD

Reviewed:

Technician Certification Number:

CENTREDALE MANOR
2074 SMITH STREET
NO. PROVIDENCE RI 02911

PHONE: 401-232-3770
FAX: 401-231-2523

FAX COVER SHEET

DATE: 6-21-99

TO: MR KENNEDY

FROM: ANN VACCARO

NO. OF PAGES INCLUDING COVER SHEET 5

COMMENTS:

CERTIFICATE OF UNDERGROUND STORAGE TANK SYSTEM TESTING

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757
(512) 451-6334
FAX (512) 459-1459

TEST RESULT SITE SUMMARY REPORT

TEST TYPE: Sure Test PURPOSE: REQUEST

TEST DATE: 06/02/99 CUSTOMER PO: A 2265 WORK ORDER NUMBER: 7122909

CLIENT: AALANCO SERVICE CORPORATION
80-B TURNPIKE ROAD
WESTBOROUGH, MA 01581

STEVE McCARTHY
(508) 366-1449

SITE: CENTERDALE MANOR
2074 SMITH STREET
NORTH PROVIDENCE, RI 02911

ANNE
(401) 232-3770

The following test(s) were conducted at the site above in accordance with all applicable portions of Federal, NFPA and local regulations

Tank Tests

TANK NUMBER	PRODUCT	TANK CAPACITY (gallons)	TANK DIAMETER (inches)	TANK RESULTS	VOLUME CHANGE (GPH)	ULLAGE RESULT
1	DIESEL	1,000	48.00	PASS	0.016	PASS

Line and Leak Detector Tests

TANK NUMBER	PRODUCT	VOLUME CHANGE (gph) A	B	C	D	LINE RESULT (Pass, Fail, Invalid) A	B	C	D	LEAK DETECTOR PRESENT #1	#2	LEAK DETECTOR RESULT #1	#2
1	DIESEL												

Tanknology appreciates the opportunity to serve you, and looks forward to working with you in the future. Please call any time, day or night, when you need us.

Tanknology representative:

TOM PRESNAL

Test conducted by:

SHAWN P. CONRAD

Shawn P Conrad

Reviewed:

Technician Certification Number: 5019

Printed 06/09/1999 17:34 KOHLMEYER

INDIVIDUAL TANK INFORMATION AND TEST RESULTS

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757 (512) 451-6334

TEST DATE: 06/02/99
CLIENT: AALANCO SERVICE

WORK ORDER NUMBER: 7122909
SITE: CENTERDALE MANOR

TANK INFORMATION

Tank ID:	1	Tank manifolded:	NO	Bottom to top fill in inches:	80.0
Product:	DIESEL	Vent manifolded:	NO	Bottom to grade in inches:	79.0
Capacity in gallons:	1,000	Vapor recovery manifolded:	NO	Fill pipe length in inches:	32.0
Diameter in inches:	48.00	Overfill protection:	NO	Fill pipe diameter in inches:	2.0
Length in inches:	66	Overspill protection:	NO	Stage I vapor recovery:	NONE
Material:	STEEL	Installed:		Stage II vapor recovery:	NONE
		CP installed on:	/ /		

COMMENTS

TANK TEST RESULTS / Test Method: Sure Test

PSI at tank bottom:	1.00
Fluid level in inches:	31.00
UFT/OFT:	UFT
Fluid volume in gallons:	645
Tank water level in inches:	0.00
Test time:	10:35-13:30
Number of thermisters:	4
Specific gravity:	0.850
Water table depth in inches:	999.00
Determined by (method):	NO WELL
Leak rate in gph:	0.016
Result:	PASS

COMMENTS

LEAK DETECTOR TEST RESULTS / Test Method:

	New/passed L.D. #1	Failed/replaced L.D. #1	New/passed L.D. #2	Failed/replaced L.D. #2
Make:				
Model:				
S/N:				
Open time in sec:				
Holding psi:	NOT		NOT	
Resiliency cc:	TESTED		TESTED	
Test leak rate ml/m:				
Metering psi:				
Calib. leak in gph:				
Results:				

COMMENTS

ULLAGE TEST RESULTS / Test Method: 02

Test time:	13:40-13:42
Ullage volume:	355
Ullage pressure:	
Results:	PASS

DATA FOR UTS-4T ONLY:

Time of test 1:	
Temperature:	
Flow rate (cfh):	
Time of test 2:	
Temperature:	
Flow rate (cfh):	
Time of test 3:	
Temperature:	
Flow rate (cfh):	

COMMENTS
The acoustic ullage passed.

LINE TEST RESULTS

Material:	COPPER	COPPER		
Diameter (in):	0.5	0.5		
Length (ft):	25.0	25.0		
Test psi:				
Bleedback cc:				
Test time (min):				
Start time:	NOT	NOT	NOT	NOT
End time:	TESTED	TESTED	TESTED	TESTED
Final gph:				
Result:				
Pump type:	NONE			
Pump make:	NONE			

Impact Valves Operational:

COMMENTS

Printed 06/09/1999 17:34 KOHLMEYER

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757
(512) 451-6334
FAX (512) 459-1459

TEST DATE: 06/02/99

WORK ORDER NUMBER: 7122909

CLIENT: AALANCO SERVICE CORPORATION

SITE: CENTERDALE MANOR

COMMENTS

The tank passed.

PARTS REPLACED

QUANTITY	DESCRIPTION

HELIUM PINPOINT TEST RESULTS (IF APPLICABLE)

ITEMS TESTED

HELIUM PINPOINT LEAK TEST RESULTS

SITE DIAGRAM

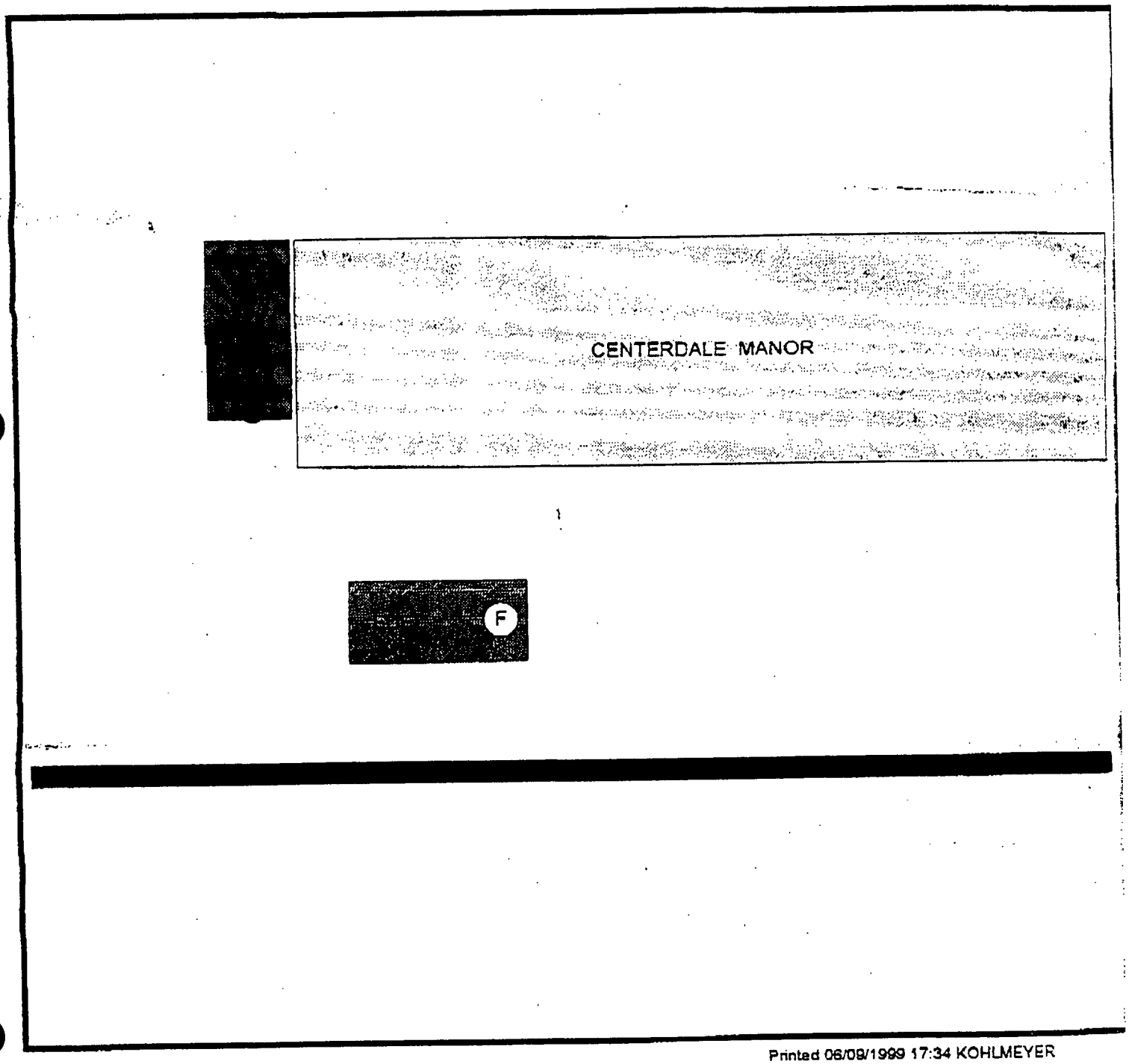
Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757
(512) 451-6334
FAX (512) 459-1459

TEST DATE: 06/02/99

WORK ORDER NUMBER: 7122909

CLIENT: AALANCO SERVICE CORPORATION

SITE: CENTERDALE MANOR



Printed 06/09/1999 17:34 KOHLMEYER

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL24016

Matrix (aqueous/solid/leachate): SOIL Sample Wt/Vol: 10 g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/06/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 26-OCT-98 Time: 12:16 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24016

Injection Volume (uL): 1 Blank Data Filename: AAL24902M

Dilution Factor: Cal. Ver. Data Filename: CS3102698

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 56.0 * EMPC

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	90.129	0.585	0.72	1.002
1,2,3,7,8-PeCDD	0.499 *	*	(2.35)	1.001
1,2,3,4,7,8-HxCDD	0.828	*	1.13	1.001
1,2,3,6,7,8-HxCDD	1.750	0.431	1.16	1.001
1,2,3,7,8,9-HxCDD	2.019 *	*	(0.93)	1.000
1,2,3,4,6,7,8-HpCDD	43.241	0.985	0.93	1.000
OCDD	202.089	*	0.94	1.000
2,3,7,8-TCDF	4.394 * Lmt	0.590	(0.56)	1.002
1,2,3,7,8-PeCDF	*	*	*	*
2,3,4,7,8-PeCDF	*	1.303	*	*
1,2,3,4,7,8-HxCDF	*	*	*	*
1,2,3,6,7,8-HxCDF	*	0.663	*	*
1,2,3,7,8,9-HxCDF	*	0.358	*	*
2,3,4,6,7,8-HxCDF	*	*	*	*
1,2,3,4,6,7,8-HpCDF	8.185 *	0.730	(1.48)	1.000
1,2,3,4,7,8,9-HpCDF	1.305 *	0.706	(2.55)	1.001
OCDF	16.132	*	1.00	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCX 2.824 ng/kg

01

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: US EPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL24017

Matrix (aqueous/solid/leachate): SOIL Sample Wt/Vol: 10 g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/06/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 26-OCT-98 Time: 13:26 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24017

Injection Volume (uL): 1 Blank Data Filename: AAL24902M

Dilution Factor: Cal. Ver. Data Filename: CS3102698

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 82.4 # EMPC

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	217.876	0.362	0.77	1.001
1,2,3,7,8-PeCDD	0.693 #	*	2.15	1.000
1,2,3,4,7,8-HxCDD	1.334 #	*	1.46	1.001
1,2,3,6,7,8-HxCDD	3.298	0.327	1.25	1.000
1,2,3,7,8,9-HxCDD	3.569	*	1.17	1.000
1,2,3,4,6,7,8-HpCDD	73.615	0.595	1.09	1.000
OCDD	460.760	*	0.87	1.000
2,3,7,8-TCDF	5.765 # 12 out	*	0.90	1.001
1,2,3,7,8-PeCDF	0.262 #	*	0.30	1.001
2,3,4,7,8-PeCDF	1.135 #	*	1.25	1.001
1,2,3,4,7,8-HxCDF	4.749	*	1.38	1.000
1,2,3,6,7,8-HxCDF	2.968	0.402	1.38	1.001
1,2,3,7,8,9-HxCDF	*	0.413	*	*
2,3,4,6,7,8-HxCDF	2.720 #	*	1.58	1.001
1,2,3,4,6,7,8-HpCDF	117.322	0.344	1.02	1.000
1,2,3,4,7,8,9-HpCDF	0.842	*	1.04	1.000
OCDF	48.118	*	0.88	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCX = 3.60 ng/kg

02

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL24028

Matrix (aqueous/solid/leachate): SOIL Sample Wt/Vol: 10.5 g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/14/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 28-OCT-98 Time: 14:27 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24028

Injection Volume (uL): 1 Blank Data Filename: AAL24903M

Dilution Factor: Cal. Ver. Data Filename: CS3102898

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 30

EMPC

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	2240.420	0.308	0.30	1.001
1,2,3,7,8-PeCDD	3.870	1.340	1.47	1.001
1,2,3,4,7,8-HxCDD	6.995	0.628	1.13	1.001
1,2,3,6,7,8-HxCDD	21.171	0.556	1.42	1.000
1,2,3,7,8,9-HxCDD	25.329	0.598	1.21	1.000
1,2,3,4,6,7,8-HpCDD	536.134	2.768	1.04	1.001
OCDD	3462.492	5.302	0.94	1.000
2,3,7,8-TCDF	12.766 TIR out	0.467	0.92	1.002
1,2,3,7,8-PeCDF	2.751	0.398	2.27	1.001
2,3,4,7,8-PeCDF	5.414	0.311	1.51	1.001
1,2,3,4,7,8-HxCDF	*	0.528	*	*
1,2,3,6,7,8-HxCDF	9.750	0.478	1.21	1.000
1,2,3,7,8,9-HxCDF	*	0.245	*	*
2,3,4,6,7,8-HxCDF	6.615	0.208	1.31	1.000
1,2,3,4,6,7,8-HpCDF	*	2.439	*	*
1,2,3,4,7,8,9-HpCDF	8.882	2.454	1.14	1.000
OCDF	347.424	15.292	0.97	1.003

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCX = 49.047 ng/kg

03

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL24032

Matrix (aqueous/solid/leachate): Sample Wt/Vol: g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/15/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 29-OCT-98 Time: 14:38 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24032

Injection Volume (uL): 1 Blank Data Filename:

Dilution Factor: Cal. Ver. Data Filename: CS3102998

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 82.3

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	75.915	*	0.81	1.001
1,2,3,7,8-PeCDD	*	*	-	-
1,2,3,4,7,8-HxCDD	*	*	-	-
1,2,3,6,7,8-HxCDD	*	1.074	*	*
1,2,3,7,8,9-HxCDD	*	*	*	-
1,2,3,4,6,7,8-HpCDD	8.677	1.885	1.17	1.001
OCDD	40.165	*	0.76	1.001
2,3,7,8-TCDF	1.109	*	0.55	1.001
1,2,3,7,8-PeCDF	*	*	-	-
2,3,4,7,8-PeCDF	*	*	-	-
1,2,3,4,7,8-HxCDF	*	*	-	-
1,2,3,6,7,8-HxCDF	1.134	0.900	0.81	0.996
1,2,3,7,8,9-HxCDF	*	*	-	-
2,3,4,6,7,8-HxCDF	*	*	-	-
1,2,3,4,6,7,8-HpCDF	8.061	2.116	1.65	1.000
1,2,3,4,7,8,9-HpCDF	*	2.664	*	*
OCDF	6.858	*	0.57	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCX = ~~0.859 ug/L~~ 2.17 ug/L

04

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL~~24032~~ 33

Matrix (aqueous/solid/leachate): Sample Wt/Vol: g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/15/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 29-OCT-98 Time: 15:45 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24033

Injection Volume (uL): 1 Blank Data Filename:

Dilution Factor: Cal. Ver. Data Filename: CS3102998

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 86.1

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	1147.682	0.407	0.80	1.002
1,2,3,7,8-PeCDD	0.350	0.968	3.98	1.003
1,2,3,4,7,8-HxCDD	*	0.410	*	*
1,2,3,6,7,8-HxCDD	1.728	0.392	0.81	1.001
1,2,3,7,8,9-HxCDD	*	0.405	*	*
1,2,3,4,6,7,8-HpCDD	20.361	0.647	1.17	1.000
OCDD	89.394	1.051	0.93	1.001
2,3,7,8-TCDF	2.243	0.268	1.20	1.002
1,2,3,7,8-PeCDF	0.498	0.774	0.94	1.001
2,3,4,7,8-PeCDF	0.603	0.600	1.08	1.000
1,2,3,4,7,8-HxCDF	1.926	0.477	1.19	1.000
1,2,3,6,7,8-HxCDF	1.271	0.424	1.22	1.000
1,2,3,7,8,9-HxCDF	*	0.293	*	*
2,3,4,6,7,8-HxCDF	0.909	0.205	0.44	1.000
1,2,3,4,6,7,8-HpCDF	14.142 - Rout	0.778	1.43	1.000
1,2,3,4,7,8,9-HpCDF	*	0.886	*	*
OCDF	6.588	0.622	0.82	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCX = 43.5 ng/kg

05

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID:

Matrix (aqueous/solid/leachate): Sample Wt/Vol: g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/15/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 30-OCT-98 Time: 11:12» GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24035

Injection Volume (uL): 1 Blank Data Filename:

Dilution Factor: Cal. Ver. Data Filename: CS3103098

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 72.1 * 5 M.P.C

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	39.367	0.520	0.73	1.001
1,2,3,7,8-PeCDD	*	1.392	*	*
1,2,3,4,7,8-HxCDD	1.021	0.782	0.60	1.000
1,2,3,6,7,8-HxCDD	3.955	0.782	1.26	1.000
1,2,3,7,8,9-HxCDD	5.379	0.790	2.03	1.000
1,2,3,4,6,7,8-HpCDD	84.686	1.117	1.05	1.000
OCDD	538.535	3.305	0.98	1.000
2,3,7,8-TCDF	0.978	0.226	0.67	1.002
1,2,3,7,8-PeCDF	*	1.161	*	*
2,3,4,7,8-PeCDF	0.790	0.577	0.82	1.001
1,2,3,4,7,8-HxCDF	*	2.343	*	*
1,2,3,6,7,8-HxCDF	*	2.163	*	*
1,2,3,7,8,9-HxCDF	*	0.762	*	*
2,3,4,6,7,8-HxCDF	0.929	0.532	1.14	1.000
1,2,3,4,6,7,8-HpCDF	24.810	2.137	1.92	1.000
1,2,3,4,7,8,9-HpCDF	*	1.735	*	*
OCDF	29.599	4.168	0.96	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCX = 0.420 ug/kg

06

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID:

Matrix (aqueous/solid/leachate): Sample Wt/Vol: g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/21/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 2-NOV-98 Time: 14:04» GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24036

Injection Volume (uL): 1 Blank Data Filename:

Dilution Factor: Cal. Ver. Data Filename: CS3110298

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 54.6

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	5653.989	4.763	0.78	1.001
1,2,3,7,8-PeCDD	*	4.795	*	*
1,2,3,4,7,8-HxCDD	9.212	1.159	1.35	1.000
1,2,3,6,7,8-HxCDD	21.121	1.113	1.35	1.001
1,2,3,7,8,9-HxCDD	28.104	1.146	1.29	1.000
1,2,3,4,6,7,8-HpCDD	496.835	3.236	1.10	1.000
OCDD	2541.007	2.840	0.90	1.000
2,3,7,8-TCDF	320.849	3.482	0.79	1.001
1,2,3,7,8-PeCDF	82.462	9.661	1.54	1.003
2,3,4,7,8-PeCDF	*	10.180	*	*
1,2,3,4,7,8-HxCDF	22.578	2.593	1.25	1.000
1,2,3,6,7,8-HxCDF	10.952	2.446	1.17	1.000
1,2,3,7,8,9-HxCDF	*	2.293	*	*
2,3,4,6,7,8-HxCDF	4.392	1.935	1.48	1.000
1,2,3,4,6,7,8-HpCDF	40.289	0.951	1.13	1.000
1,2,3,4,7,8,9-HpCDF	3.741	1.006	1.06	1.000
OCDF	48.219	0.616	0.89	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

Hcx 51.2 ng/kg

07

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL24037

Matrix (aqueous/solid/leachate): Sample Wt/Vol: g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/21/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 2-NOV-98 Time: 15:07 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24037

Injection Volume (uL): 1 Blank Data Filename:

Dilution Factor: Cal. Ver. Data Filename: CS3110298

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 82.1 % EMPC

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	1.513	0.329	1.23	1.001
1,2,3,7,8-PeCDD	*	0.530	*	*
1,2,3,4,7,8-HxCDD	1.377	0.579	1.22	1.000
1,2,3,6,7,8-HxCDD	3.563	0.512	1.22	1.000
1,2,3,7,8,9-HxCDD	3.903	0.548	1.14	1.000
1,2,3,4,6,7,8-HpCDD	61.454	0.572	0.92	1.000
OCDD	321.000	1.329	0.78	1.001
2,3,7,8-TCDF	0.662	0.429	0.56	1.002
1,2,3,7,8-PeCDF	0.211	0.266	1.31	1.001
2,3,4,7,8-PeCDF	0.516	0.224	1.94	1.001
1,2,3,4,7,8-HxCDF	*	0.613	*	*
1,2,3,6,7,8-HxCDF	0.586	0.485	0.66	1.000
1,2,3,7,8,9-HxCDF	*	0.227	*	*
2,3,4,6,7,8-HxCDF	*	0.344	*	*
1,2,3,4,6,7,8-HpCDF	5.850	2.171	0.78	1.000
1,2,3,4,7,8,9-HpCDF	*	0.817	*	*
OCDF	4.941	1.037	0.65	1.003

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCX 1.11 ug/kg

08

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL24038

Matrix (aqueous/solid/leachate): SOIL Sample Wt/Vol: 10.1 g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/23/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 2-NOV-98 Time: 16:10 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24038

Injection Volume (uL): 1 Blank Data Filename: AAL24904M

Dilution Factor: Cal. Ver. Data Filename: CS3110298

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 85.5

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	1.338	1.206	0.73	1.001
1,2,3,7,8-PeCDD	*	0.734	*	*
1,2,3,4,7,8-HxCDD	1.178	0.351	1.16	1.000
1,2,3,6,7,8-HxCDD	3.355	0.349	1.09	1.001
1,2,3,7,8,9-HxCDD	2.949	0.354	1.25	1.001
1,2,3,4,6,7,8-HpCDD	65.697	1.520	0.94	1.000
OCDD	365.660	1.086	0.85	1.000
2,3,7,8-TCDF	*	0.584	*	*
1,2,3,7,8-PeCDF	*	0.311	*	*
2,3,4,7,8-PeCDF	*	0.361	*	*
1,2,3,4,7,8-HxCDF	0.635	0.582	1.16	1.000
1,2,3,6,7,8-HxCDF	*	0.550	*	*
1,2,3,7,8,9-HxCDF	*	0.864	*	*
2,3,4,6,7,8-HxCDF	*	0.644	*	*
1,2,3,4,6,7,8-HpCDF	4.678	1.494	0.90	1.000
1,2,3,4,7,8,9-HpCDF	*	1.852	*	*
OCDF	8.571	0.809	0.70	1.003

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

HCx 1.66 ng/kg

69

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID: AAL24039

Matrix (aqueous/solid/leachate): SOIL Sample Wt/Vol: 1.33 g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 11/23/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 24-NOV-98 Time: 12:38» GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24039R

Injection Volume (uL): 1 Blank Data Filename: AAL24907M

Dilution Factor: Cal. Ver. Data Filename: CS3112498

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 72.4

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	13.804	1.971	1.01	1.001
1,2,3,7,8-PeCDD	*	5.929	*	*
1,2,3,4,7,8-HxCDD	*	*	*	*
1,2,3,6,7,8-HxCDD	36.605	*	1.31	1.001
1,2,3,7,8,9-HxCDD	17.432	3.913	1.32	1.001
1,2,3,4,6,7,8-HpCDD	254.362	7.613	1.03	1.000
OCDD	536.097	13.653	0.88	1.000
2,3,7,8-TCDF	56.857	11.161	0.75	1.002
1,2,3,7,8-PeCDF	6.958	5.634	1.52	1.001
2,3,4,7,8-PeCDF	37.952	5.911	1.69	1.001
1,2,3,4,7,8-HxCDF	107.826	4.051	1.30	1.000
1,2,3,6,7,8-HxCDF	43.714	3.830	1.38	1.000
1,2,3,7,8,9-HxCDF	*	4.087	*	*
2,3,4,6,7,8-HxCDF	18.874	3.195	1.21	1.000
1,2,3,4,6,7,8-HpCDF	396.353	7.141	1.09	1.000
1,2,3,4,7,8,9-HpCDF	34.463	8.598	0.76	1.000
OCDF	288.267	11.413	0.90	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

10

FORM 1B EPA SAMPLE NO.

PCDD/PCDF CONFIRMATION ANALYSIS DATA SHEET

Lab Name: USEPA REGION VII Episode No.:

Contract No.: SAS No.: Lab Sample ID:

Matrix (aqueous/solid/leachate): Sample Wt/Vol: g or mL:

Sample Receipt Date: Initial Calibration Date: 01/08/98

Ext. Date: 10/21/98 Shift: Instrument ID: ZAB-E4F

Analysis Date: 3-NOV-98 Time: 13:17 GC Column ID: db5

Extract Volume (uL): 20 Sample Data Filename: AAL24040

Injection Volume (uL): 1 Blank Data Filename:

Dilution Factor: Cal. Ver. Data Filename: CS3110398

Concentration Units (pg/L or ng/Kg dry weight): % Solids: 29.5

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO (1)	RRT (1)
2,3,7,8-TCDD	3.824 #	1.145	1.95	0.995
1,2,3,7,8-PeCDD	*	1.398	*	*
1,2,3,4,7,8-HxCDD	2.302	1.296	1.23	1.000
1,2,3,6,7,8-HxCDD	14.287	1.184	1.39	1.001
1,2,3,7,8,9-HxCDD	10.585	1.251	1.34	1.000
1,2,3,4,6,7,8-HpCDD	94.136	2.514	0.93	1.000
OCDD	451.675	1.440	0.81	1.000
2,3,7,8-TCDF	4.083	1.088	0.79	1.002
1,2,3,7,8-PeCDF	2.544 #	0.969	1.13	1.001
2,3,4,7,8-PeCDF	2.839 #	0.700	1.06	1.001
1,2,3,4,7,8-HxCDF	13.121	1.900	1.06	1.001
1,2,3,6,7,8-HxCDF	5.629	1.667	1.08	1.000
1,2,3,7,8,9-HxCDF	1.921 #	1.259	1.54	1.004
2,3,4,6,7,8-HxCDF	3.655	0.942	1.15	1.000
1,2,3,4,6,7,8-HpCDF	73.593 #	2.351	1.24	1.000
1,2,3,4,7,8,9-HpCDF	3.552 #	1.939	0.86	1.000
OCDF	16.681	2.463	0.81	1.004

(1) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 3A, respectively, Method 1613

6/90

EMPC

HCX = 1.07 ng/kg

11

WESTON

Reference 70

S. Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Tim Lynch, Biologist
Company RI Division of Fish/Wildlife - Marine Division
Address Wickford, RI
Phone (401) 294-4524

Date 5/28/99
Time 0840 (AM)/PM

☒ Originator Placed Call
☐ Originator Received Call
W.O. No. 20098.041.001.704530

Subject Providence River/Narragansett Bay Fish Consumption Info

Notes:

When asked if there is any information regarding how many pounds of fish, if any, are caught annually for human food consumption from either the Providence River ~~and~~ or Narragansett Bay, or both Mr. Lynch stated that the Providence River does not have a set system which regulates finfish catches. Mr. Lynch added that the Providence River has been closed for shellfish harvesting for a number of years, but believes there are fishermen who catch finfish (blue fish, etc.) legally in the river and wind up selling them commercially. Mr. Lynch agreed that there are 10 pounds per year of finfish are taken from the Providence River for the purpose of human food production.

☒ File Centredale Manor HRS
☐ Tickle File ___/___/___
☐ Follow-Up By: ___
☐ Copy/Route To: ___

Follow-Up-Action: ___

Originator's Initials Sean Kennedy

WESTON

Reference 71

Sean Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Walter Anoushian State Coordinator
Company National Marine Fisheries Service
Address Point Judith
Narragansett, RI
Phone (401) 782-3200

Date 6/1/99
Time 1230 AM (PM)

☒ Originator Placed Call
☒ Originator Received Call
W.O. No. 20098041001704550

Subject Narragansett Bay Fish Consumption Information

Notes:

Mr. Anoushian stated that the way the tracking system is set up, there is no way Narragansett Bay can be broken down regarding fish consumption. He added that it is safe to say that there are greater than 0 pounds per year of fish caught from Narragansett Bay that is used for human consumption.

☒ File Centredale Manor HRS
☐ Tickle File ____/____/____
☐ Follow-Up By: ____
☐ Copy/Route To: ____

Follow-Up-Action: ____

Originator's Initials Sean Kennedy

RFW 110-4-83

1423-1823 4/16/93

Reference 72

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF AIR AND HAZARDOUS MATERIALS

Complaint Investigation Report

mplaint No. 83-23 Date Complaint Received May 2, 1983 Time: 9 a.m.

me and Address of Complainant:

Annonymous

Tele. No.:

Name and Address of Alleged Source:

Centerdale Manor

Centerdale, North Providence

Tele. No:

ature of Complaint: Exposed Barrels at end of Parking Lot

ate of Investigation of Complaint: May 2, 1983 Time: 11 a.m.

indings:

Examination of the area shows the remains of many crushed and empty drums. There was no odor or any other visable signs to substantiate the complaints of buried chemicals at the site.

John P. Leo, Engineer
Division of Air and Hazardous Materials

JPL/km

Centredale Manor
Hazard Ranking System/National Priorities Listing Package
TDD No.: 99-05-0104

Project Note: Past Inventories of Drums Located on the Centredale Manor Site
North Providence, Rhode Island

Performed by: Sean P. Kennedy

Date: 14 June 1999

In order to determine the number of drums which were once located on the Centredale Manor site (the site), documents generated by Rhode Island's Department of Health (RI DOH) and Department of Environmental Management (RI DEM) were referenced by START to determine an estimated amount of drums which had been inventoried during past investigations*.

An inspection report generated by RI DOH on 27 October 1977 stated that there were 20 to 50 drums noted in a "bog area" of the site. Another inspection report generated by RI DOH on 1 November 1977 stated that there were 50 to 60 drums deposited over a "wide swampy area" of the site (presumably the same area as the previously stated "bog" area).

An inter-office memorandum generated by RI DEM on 10 December 1980 states that during a 1 December 1980 inspection, approximately 100 to 150 barrels were scattered along the bank of the Woonasquatucket River. The memorandum also states that the site borders the Woonasquatucket River on one side and a "marsh area" on the other, in which some of the drums were piled right on the bank of the Woonasquatucket River. This would indicate that RI DEM was describing a separate drum disposal area than the area(s) RI DOH had described in 1977.

In a 17 March 1981 RI DEM Field Investigation Report, it is stated that approximately 600 drums (of which the contents of 161 drums were checked) were found scattered all over the site. The remaining drums could not be checked because they were either crushed or buried. It is assumed that this number includes areas along the bank of the Woonasquatucket River and the "bog" or "marsh" area.

A RI DEM inter-office memorandum (no date included) was generated sometime after a drum sampling event on 27 February 1982. The memorandum states that about 300 to 400 55-gallon drums were removed by a Goldberg, Zoino, and Associates (GZA) subcontractor beginning on 22 February 1982 and was completed about four days later. A Field Summary report was completed by GZA on 22 February 1982 which stated that the drums located along the bank of the Woonasquatucket River and the scattered drums along the south end and eastern portions of the site were removed by their subcontractor. A Field Summary report completed GZA on 26 February 1982 stated that drums had been encountered during excavation activities earlier in the week; however, the number of excavated drums was not included in the report.

*See Reference Numbers 52, 53, 55, 58, 59, 72, 73 in the Reference Section of the Centredale Manor Hazard Ranking System/National Priorities Listing Package for documents referenced for this project note.

In a 2 May 1983 RI DEM Complaint Investigation Report, it was stated that the remains of many crushed and empty drums exist at the end of the Centredale Manor parking lot; however, the number of crushed or empty drums was not included in the report.

START Conclusions

While a maximum of 60 drums were noted to be located along the "bog" or "marsh" area of the site, a maximum of 150 drums were noted to be located along the bank of the Woonasquatucket River, and approximately 600 drums were noted to be scattered all over the site, approximately 300 - 400 drums were reportedly removed from the site. For the purpose of this evaluation, START acknowledges that, at the very least, 300 drums have been documented to have been removed from the site. Therefore, with the information stated above, it is estimated that 300 drums were disposed of at the site.

Centredale Manor
Hazard Ranking System/National Priorities Listing Package
TDD No.: 99-05-0104

Project Note: Explanations of Sample Quantitation Limit Calculations
for 2,3,7,8-TCDD Detected in Samples Collected
for the Centredale Manor Site
North Providence, Rhode Island

Performed by: Sean P. Kennedy

Date: 15 June 1999

The sample quantitation limits (SQLs) for the dioxin congener 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) were calculated as follows:

For TCDD:

Divide the detection limit of the sample by the percent solids of the sample. Divide that number by 1,000 to convert to parts per billion (ppb) for the SQL of TCDD for that sample. The detection limits and percent solids for samples utilized in the Centredale Manor HRS Package can be found in Reference Number 68 of the Centredale Manor HRS Package.

Centredale Manor
Hazard Ranking System/National Priorities Listing Package
TDD No.: 99-05-0104

Project Note: Explanations of Sample Quantitation Limit Calculations
for 2,3,7,8-TCDD Detected in Samples Collected
for the Centredale Manor Site
North Providence, Rhode Island

Performed by: Sean P. Kennedy

Date: 15 June 1999

The sample quantitation limits (SQLs) for the dioxin congener 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) were calculated as follows:

For TCDD:

Divide the detection limit of the sample by the percent solids of the sample. Divide that number by 1,000 to convert to parts per billion (ppb) for the SQL of TCDD for that sample. The detection limits and percent solids for samples utilized in the Centredale Manor HRS Package can be found in Reference Number 68 of the Centredale Manor HRS Package.

WESTON

Reference 75

Paul Killion
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Steve Stodola
Company EPA Region I
Address Lexington, MA
Phone 781-860-4634
Subject Centredale Manor - Dioxin Data

Date 6/9/99
Time 2:45 AM/PM

☐ Originator Placed Call
☑ Originator Received Call
W.O. No.

Notes:

① Mr Stodola Stated that the Detection Limit value ~~gave~~ reported on the Form IB is generated by the instrument by integrating the noise. (When a result is reported, the instrument integrates the noise on either side of the peak.)

When an * is reported, it means that the analyst manually integrated the sample, therefore No noise integration/Detection Limit is available

Mr Stodola suggested using the to value of the lowest Standard as the Method Detection Limit (if needed).

② The QA office is still discussing the use of the HCX data. He will generate a memo (addressed to Matt Audet) indicating its usability. I asked him to send us a copy.

☐ File
☐ Tickle File ___/___/___
☐ Follow-Up By:
☐ Copy/Route To: SK, JK, JB

Follow-Up-Action:

Originator's Initials PFK

IF FOUND PLEASE RETURN TO:

Renata Wynnyk
Environmental Scientist

Roy F. Weston, Inc.
Superfund Technical Assessment
and Response Team (START)
217 Middlesex Turnpike
Burlington, MA 01803
Phone: 617-229-6430
Fax: 617-272-3619

In Association with Resource Applications Inc., C C Johnson & Malhotra PC and PRC Environmental Management Inc

00161-A

Reference 76

10:45 met OSC @ Contedale Manor. Crew began to repair existing hi-vis chainlink fence.
11:45-12:15 lunch break
12:15 START arrives at Romero Field, began and completed installing one section (175') feet of hi-vis fencing + warning signs. Completed hi-vis installation @ 16:00 pm, finished brush clearing @ Manor @ 15:30.
16.10 START departed site for home.
17:30 Arrived at home. (1/2 hr travel time each way subtracted per RCSA 5366-40-10 hours Contedale Regulations) E. Wagner

---

APRIL 6, 1999

0630 (5366-40) Departed home for site:
0730 met START members Leonard & Argue, OSC Bezeras, ERT member Camacho, RESC members Amanda Daly, John Williams & John Leale. Held brief site walk (or pavement) safety meeting. START continued clearing brush south of C. Manor, RESC left for EPA began setting up to do GPR & EM-61 (1-31) surveys.
11:15 SC met w/ EPA Bonnenigo - drove down river pathway in search of new sign locations. Returned to Manor, plotted location & sketched out sign locations. START members resumed brush clearing (1/2 hr. lunch)
START completed brush clearing for the day.

16:15 START
16:30 SL w
Ranch
fence
16:45 left
1800 Arrive
RESA
Repo

APRIL
0630 (5366
0730 met
along
COPC
CRCS
for
clear
mess
him o
START
SL b
of C
12-12:30 lunch
1300 Arrive
14:15 Meeti
met (
(loop
along
1500 left
1615 Arrive
Wine
1630 Prepa
1700 left

manor.
existing

cno Field,
nstalling one
is-vis fencing
eted hi-vis
finished
r @ 15:30.
or home. subtract
travel time out
Contractor

fc site:
ercd; Argue
er Camacho;
Dolly, John
Hood Bros
safety meeting.
bush south
PA boom
em-61 (-31) Sonays
igo - drove
search of
owned to
of; sketched
START members
(1/2 hr. lunch)
sh clearing

16:15 START members Argue & Gerard depart
16:30 SL Wynne departs Manor, drives to Rancho Seco Field - to check on fences & cement curing.
16:45 Left for home
18:00 Arrived at home (1/2 travel time subtracted) RS# 5366-40-11 hours Contractor Rate E Day

APRIL 7, 1999

0630 (5366-40) Departed home for site
0730 met START members Argue & Bowen along w/ ERT, ERM, RCRA @ Manor. Continued clearing brush in specified areas, also cont to mark 100' pts. for magnetometer survey - in cleared brush areas. Left two voice messages for GC Mouns - updated him on site activities
START returned rental equipment & began sketching out draft map of areas cleared today. (Left w/ ERT)
12-12:30 Lunch break, checked on fence field.
1300 Attended WAC meeting
1415 Meeting concluded; Jose requested that I deliver ERT/RCRA trip report (1 copy per) to Lee Johnston & U. Providence libraries for Admin. Record.
1500 left Libraries for START office.
1615 Arrived at office; unpacked & returned rental car.
1630 Proceed for Bix test pit + sampling
1700 Left the office

Third Edition

Reference 77

GLOSSARY OF GEOLOGY

Robert L. Bates and
Julia A. Jackson, Editors

American Geological Institute
Alexandria, Virginia
1987

ing, an estuary.

estuarine deposit A sedimentary deposit laid down in the brackish water of an estuary, characterized by fine-grained sediments (chiefly clay and silt) of marine and fluvial origin mixed with a high proportion of decomposed terrestrial organic matter; it is finer-grained and of more uniform composition than a *deltaic deposit*.

estuarine lagoon A lagoon produced by the temporary sealing of a river estuary by a storm barrier. Such lagoons are usually seasonal and exist until the river breaches the barrier; they occur in regions of low or spasmodic rainfall. Syn: *blind estuary*.

estuarine salinity Salinity that varies according to tidal or seasonal conditions, as in an estuary.

estuary (es'-tu-a'-ry) (a) The seaward end or the widened funnel-shaped tidal mouth of a river valley where fresh water comes into contact with seawater and where tidal effects are evident; e.g. a *tidal river*, or a partially enclosed coastal body of water where the tide meets the current of a stream. Cf: *freshwater estuary; inverse estuary; positive estuary*. (b) A portion of an ocean, as a *firth* or an arm of the sea, affected by fresh water; e.g. the Baltic Sea. (c) A *drowned river mouth* formed by the subsidence of land near the coast or by the drowning of the lower portion of a nonglaciated valley due to the rise of sea level.—See also: *ria; branching bay; liman; fjord*. Etymol: Latin *aestus*, "tide".

étang (e'-tang) A French term for a shallow pool, pond, or lake, esp. one lying among sand dunes, formed by the ponding of inland drainage by beach material thrown up by the sea, and gradually becoming filled with silt, like those along the Mediterranean coast of France (e.g. in Languedoc).

etched pothole *solution pan*.

etch figure A marking, usually in the form of minute pits, produced by a solvent on a crystal surface; the form varies with the mineral species and the solvent, but conforms to the symmetry of the crystal.

etching (etch'-ing) (a) The reduction of the Earth's surface by the slow processes of differential weathering, mass wasting (esp. creep), sheetwash, and deflation, so that areas underlain by more resistant rocks are brought into relief as the less resistant rocks are lowered (Rich, 1951). (b) A general term for the formation of a landform by erosion or chiseling, as the *etching* of a canyon by a stream.

etchplain (etch'-plain) A relatively inextensive erosion surface, believed to develop by the comparatively rapid but local differential lowering, during uplift, of a peneplain surface kept at or near base level by the removal of a deep overlying cover of weathered rock. The feature was originally described as an "etched plain" by Wayland (1934).

ethane (eth'-ane) A colorless, odorless, water-insoluble, gaseous paraffin hydrocarbon, formula C_2H_6, which occurs in natural gas or can be produced as a by-product in the cracking of petroleum.

ethmolith (eth'-mo-lith) A discordant pluton that is funnel-like in cross section.

ethology (e-thol'-o-gy) The science concerned with animal behavior, some effects of which are preserved in the fossil record, esp. as *trace fossils*.

etindite (e-tind'-ite) A dark-colored extrusive rock intermediate in composition between *leucitite* and *nephelinite*, with phenocrysts of clinopyroxene in a dense groundmass of leucite, nepheline, and clinopyroxene. Named by Lacroix in 1923 for Etinde, Cameroon. Not recommended usage.

etnaite (et'-na-ite) An alkali *olivine basalt* (Streckeisen, 1967, p. 185). Not recommended usage.

Etroeungtian (Et-ro-eung'-tian) European provincial stage: uppermost Devonian. See also: *Strunian*.

ettringite (et'-tring-ite) A mineral: $Ca_6Al_2(SO_4)_3(OH)_{12}\cdot 26H_2O$. It is isotopic with bentorite. Syn: *woodfordite*.

eu- A prefix meaning "well" or "well developed".

euaster (eu'-as-ter) A sponge spicule (microsclere) having the form of a modified aster in which the rays arise from a common center. Cf: *streptaster*.

euautochthony (eu-au-toch'-tho-ny) Accumulation of plant remains (such as roots, stumps, tree trunks) that are now found in the exact place, and more or less in the correct relative positions, in which they grew. Cf: *hypautochthony*.

eu-bitumen (eu-bi'-tu-men) A collective name for those fluid, viscid, or solid bitumens that are easily soluble in organic solvents. Examples are petroleum, ozokerite, elaterite, and asphalt (Tomkeieff, 1954).

eucairite (eu-cai'-rite) A silver-white to lead-gray isometric mineral: CuAgSe. Also spelled: *eukairite*.

euchlorin (eu-chlor'-in) An emerald-green mineral: $(K,Na)_8Cu_9(SO_4)_{10}(OH)_8$. Also spelled: *euchlorine; euchlorite*.

euchroite (eu'-chro-ite) An emerald-green or leek-green mineral: $Cu_2(AsO_4)(OH)\cdot 3H_2O$.

euclase (eu'-clase) A brittle monoclinic mineral: $BeAlSiO_4(OH)$. It occurs in pale tones of blue, green, yellow, or violet, and is sometimes colorless; the blue variety is greatly esteemed by gem collectors.

eucolite (eu'-co-lite) A variety of eudialyte that is optically negative. Also spelled: *eukolite*.

eucrite [ign] (eu'-crite) A very basic *gabbro* composed chiefly of calcic plagioclase (bytownite, anorthite) and clinopyroxene, with accessory olivine. Obsolescent. The name, given by Rose in 1864, is from Greek, "easily discerned".

eucrite [meteorite] An achondritic stony meteorite composed essentially of calcic plagioclase and pigeonite. It has a higher content of iron and calcium than that of howardite. Eucrites were originally regarded as anorthite-augite meteorites. Syn: *eukrite*.

eucryptite (eu-cryp'-tite) A colorless or white hexagonal mineral: $LiAlSiO_4$.

eucrystalline (eu-crys'-tal-line) *macrocrystalline*.

eudiagnostic (eu'-di-ag-nos'-tic) Said of the texture of a rock (esp. an igneous rock) in which all mineral components are of such size and shape as to be identifiable. The term includes both macrocrystalline and microcrystalline textures. It was originally used by Zirkel in German as *eudiagnostisch*. Ant: *adiagnostic*.

eudialyte (eu-di'-a-lyte) A pale-pink to brownish-red mineral: $Na_4(Ca,Fe^{++})_2ZrSi_8O_{22}(OH,Cl)_2$. It is optically positive. Cf: *eucolite*. Syn: *barsanovite*.

eudidymite (eu-did'-y-mite) A white, glassy, monoclinic mineral: $NaBeSi_2O_5(OH)$. It is dimorphous with epididymite.

eudiometer (eu-di-om'-e-ter) An instrument such as a graduated glass tube for measuring the amounts of different gases in a gas mixture by exploding the gases one at a time by passing an electric spark through the mixture.

eugenesis (eu-gen'-e-sis) The period of development and death of the organic material found in coal-ball concretions (McCullough, 1977, p. 133). It is followed in order by syngenesis, diagenesis, and epigenesis.

eugeocline (eu-ge'-o-cline) A term "tentatively used in the Great Basin to describe lower Paleozoic siliceous assemblage rocks that may be continental rise deposits" (Stewart & Poole, 1974, p. 29). Cf: *miogeocline*.

eugeogenous (eu-ge-og'-e-nous) Easily weathered; said of a rock that produces by weathering a large amount of detritus. Ant: *dysgeogenous*.

eugeosyncline (eu'-ge-o-syn'-cline) A geosyncline in which volcanism is associated with clastic sedimentation; the volcanic part of an *orthogeosyncline*, located away from the craton (Stille, 1940). Cf: *miogeosyncline*. Syn: *pliomagmatic zone*. See also: *ensimatic geosyncline*.

euglenoid (eu'-gle-noid) One of a group of unicellular flagellates with a gullet and with the cell usually bounded by a fairly firm but flexible membrane instead of a cell wall.

eugranitic (eu-gra-nit'-ic) *granular*.

euhedral (eu-hed'-ral) (a) Said of a mineral grain that is completely bounded by its own *rational faces*, and whose growth during crystallization or recrystallization was not restrained or interfered with by adjacent grains. (b) Said of the shape of such a crystal.—The term was proposed, originally in reference to igneous-rock components, by Cross et al. (1906, p. 698) in preference to the synonymous terms *idiomorphic* and *automorphic* (as they were originally defined). Cf: *anhedral; subhedral*.

euhedron (eu-hed'-ron) Geometrical term for a solid figure completely bounded by plane surfaces. In petrology, it applies to those grains completely bounded by natural crystal faces. Pl: *euhedrons; euhedra*. Ant: *anhedron*. Syn: *idiomorph*.

eukairite (eu-kai'-rite) *eucairite*.

eukaryote (eu-kar'-y-ote) One of a major group of organisms, characterized by a complex protoplasmic organization, a vesicular nucleus, and various sorts of membrane-bounded cytoplasmic organelles. Cf: *prokaryote*.

eukolite (eu'-ko-lite) A syn. of *eucolite*. Also spelled: *eukolyte*.

eukrite (eu'-krite) *eucrite [meteorite]*.

euktolite (eu'-kto-lite) *venanzite*.

eulerhabd (eu'-le-rhabd) A sinuous stout U-shaped oxea (sponge

Centredale Manor
Hazard Ranking System/National Priorities Listing Package
TDD No.: 99-05-0104
Project Note: Soil/Sediment Description Standardization,
START Centredale Manor Samples
Performed by: Joseph Schmidl, P.G. Date: 17 June 1999

On 9 September 1998 and 15 January 1999, personnel from the EPA Region I Superfund Technical Assessment and Response Team (START) collected soil and/or sediment samples from the Centredale Manor site and locations along the Woonasquatucket River in Rhode Island. The sample collectors comprised engineers and scientists with a variety of backgrounds. During each sampling event, separate teams of collectors operated simultaneously across the study area. For this reason, the sample descriptions, while accurate and complete, do not follow a standard nomenclature system.

During the preparation of the HRS Package for the Centredale Manor site, the inconsistency of the sample descriptions came to light. In order to establish observed release/contamination at the site, background samples of similar matrix were required for comparison to contaminated samples. As the samples were reviewed for compatibility with background samples, the descriptuions were found to lack similarity. Therefore, it was decided that the soil/sediment matrix descriptions should be standardized in order to make it clear in the HRS package that appropriate background samples were used to establish observed release/contamination.

The soil/sediment sample descriptions were reviewed by a professional geologist and translated into the Unified Classification System. The following general changes were made:

- The sample color was listed first.
- The primary grain size of the sample was listed, modified by secondary grain size(s), as appropriate.
- Grain sizes were converted to standard scientific terminology (e.g., "small rocks" was translated to gravel).
- For soil samples collected from the contaminated fill source, the description of native underlying material (i.e., silt underlying sandy fill) was included in the description as a secondary grain size, as these layers typically made up less than 10% of the sample interval.

The following tables include the logbook descriptions of the samples and the resultant translations which were used in the HRS package for the Centredale Manor site.

Centredale Manor
Hazard Ranking System/National Priorities Listing Package
TDD No.: 99-05-0104
Project Note: Soil/Sediment Description Standardization,
START Centredale Manor Samples
Performed by: Joseph Schmidl, P.G. Date: 17 June 1999

9 September 1998

Sample	Logbook Description	Translation
Soil Samples		
SS-02	Orange sandy soil with dark grey to black silty clay at approximately 14 inches. Debris present at sample location including rusted bung, cloth, brick, broken glass, etc. Heavy petroleum odor.	Orange silty sand.
Sediment Samples		
SD-10	Gray-black silt with traces of sand.	Gray-black sandy silt.
SD-11	Black organic silty clay.	Black organic silty clay.
SD-22	Brown-black silt and clay.	Brown-black silt and clay.
SD-26	Medium to coarse sandy soil (with pebbles).	Medium to coarse gravelly sand.
SD-27	Brown/gray coarse to medium sand.	Brown/gray coarse to medium sand.
SD-28	Brown coarse-grained sand.	Brown coarse sand.
SD-29	Light brown medium [to] coarse sand, some fine black silty sand.	Light brown medium to coarse silty sand.
SD-30	Dark brown to black clayey muck.	Dark brown to black clay.
SD-31	Medium to coarse sand, traces of silt, with some pebbles.	Medium to coarse gravelly, silty sand.
SD-32	Duplicate of SD-31 (Medium to coarse sand, traces of silt, with some pebbles.)	Medium to coarse gravelly, silty sand.
SD-33	Orange gravelly sand	Orange gravelly sand.
SD-34	Black sandy silt with trace organics.	Black sandy organic silt.

Centredale Manor
Hazard Ranking System/National Priorities Listing Package
TDD No.: 99-05-0104
Project Note: Soil/Sediment Description Standardization,
START Centredale Manor Samples
Performed by: Joseph Schmidl, P.G. Date: 17 June 1999

15 January 1999

Sample	Logbook Description	Translation
Soil Samples		
SS-99-01	Medium brown small rocks with silt, trace organics.	Brown silty gravel.
SS-99-03	Medium brown small rocks, sand, and trace organics.	Brown silty gravel.
SS-99-04	Medium brown coarse sand, organic[s], [and] green and clear glass fragments.	Brown organic coarse sand containing debris.
SS-99-05	Duplicate of SS-99-04 (Medium brown coarse sand, organic[s], [and] green and clear glass fragments.)	Brown organic coarse sand containing debris.
SS-99-06	Light to medium brown organics, silt, trace sand and small rocks.	Brown sandy, gravelly, organic silt.
SS-99-00	Medium brown small rocks with silt and trace organics.	Brown silty gravel.

WESTON® MANAGERS DESIGNERS/CONSULTANTS

SHEET 1 of 1

CLIENT/SUBJECT Centredale Manor W.O. NO. _____

TASK DESCRIPTION SQL for Sample AAL24-032 TASK NO. 7045-50

PREPARED BY P. Killian DEPT RFW/SI DATE 10/8/99

MATH CHECK BY DM DEPT RFW DATE 10/8/99

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY

DEPT _____ DATE _____

Reference 79

Sample SD-26 AAL24-032

Low Standard 0.5 $\frac{ng}{ml}$ run on 1/8/98

Sample weight 10.1 g % Solids = 82.3
extracted 10/15/98 Batch #4
Final volume 20 µL

$$0.5 \frac{ng}{ml} \times \frac{0.020\ ml}{10.1\ g \times 0.823} = 1.203 \times 10^{-3} \frac{ng}{g} \times \frac{1000\ g}{1\ kg}$$

$$= 1.203 \frac{ng}{kg} \times \frac{1\ \mu g}{1000\ ng} = \boxed{1.203 \times 10^{-3} \frac{\mu g}{kg}}$$

SQL

RFL
10/8/99

Reference 81

Scope of the CERCLA Petroleum Exclusion

JUL 31 1987

OSWER Directive #9838.1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MEMORANDUM

SUBJECT: Scope of the CERCLA Petroleum Exclusion Under Sections 101(14) and 104(a)(2)

FROM: Francis S. Blake /s/
General Counsel (LE-130)

TO: J. Winston Porter
Assistant Administrator
for Solid Waste and Emergency Response (WH-562A)

One critical and recurring issue arising in the context of Superfund response activities has been the scope of the petroleum exclusion under CERCLA. Specifically, you have asked whether used oil which is contaminated by hazardous substances is considered "petroleum" under CERCLA and thus excluded from CERCLA response authority and liability unless specifically listed under RCRA or some other statute. For the reasons discussed below, we believe that the contaminants present in used oil or any other petroleum substance are not within the petroleum exclusion. "Contaminants", as discussed below, are substances not normally found in refined petroleum fractions or present at levels which exceed those normally found in such fractions. If these contaminants are CERCLA hazardous substances, they are subject to CERCLA response authority and liability.

Background

Under the Comprehensive Environmental Response, Compensation and

Liability Act of 1980 as amended (CERCLA), governmental response authority, release notification requirements, and liability are largely tied to a release of a "hazardous substance." Section 104 authorizes government response to releases or threatened releases of hazardous substances, or "pollutants or contaminants." Similarly, liability for response costs and damages under Section 107 attaches to persons who generate, transport or dispose of hazardous substances at a site from which there is a release or threatened release of such substances. Under Section 103, a release of a reportable quantity of a hazardous substance triggers notification to the National Response Center.

The term "hazardous substance" is defined under CERCLA Section 101(14) to include approximately 714 toxic substances listed under four other environmental statutes, including RCRA. Both the definition of hazardous substance and the definition of "pollutant or contaminant" under Section 104(a)(2) exclude "petroleum, including crude oil or any fraction thereof", unless specifically listed under those statutes. (See footnote 1 below) Accordingly, no petroleum substance, including used oil, can be a "hazardous substance" except to the extent it is listed as a hazardous waste under RCRA or under one of the other statutes. Thus two critical issues in assessing whether a substance is subject to CERCLA is whether or not, and to what extent, a substance is "petroleum." This memorandum discusses the second type of petroleum exclusion issue. The question, therefore, is not whether used oil is "petroleum" and thus exempted from CERCLA jurisdiction, but to what extent substances found in used oil which are not found in crude oil or refined petroleum fractions are also "petroleum". If such substances are not "petroleum" then a release of used oil containing such substances may trigger CERCLA response actions, not to the release of used oil, but to the contaminants present in the oil.

========== Foot Note ==========

1 The full texts of these provisions are as follows:

Section 101(14)

. . . .

The term [hazardous substance] does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

Section 104 (a)(2)

. . . .

The term [pollutant of contaminant] does not include petroleum, including crude oil and any fraction thereof which is not otherwise specifically listed or designated as hazardous substances under section 101(14)(A) through (F) of this title, nor does it include natural gas, liquefied natural gas, or synthetic gas of pipleline quality (or mixtures of natural gas and such synthetic gas).

==========

Although the term "hazardous substance" is defined by statute, there is no CERCLA definition of "petroleum" and very little direct legislative history explaining the purpose or intended scope of this exclusion. None of the four early Superfund bills originally excluded responses to oil, although the apparent precursor to Section 101(14), found in S. 1480, excluded "petroleum" without explanation in all versions except that introduced. The legislative debates on the final compromise indicate only that Congress intended to enact later, separate superfund-type legislation to cover "oil spills." See generally 126 Cong. Rec. H11793-11802 (December 3, 1980).

Since the enactment of CERCLA, the Agency has provided some interpretations of the nature and scope of the petroleum exclusion. In providing guidance in 1981 on the notification required under Section 103 for non-RCRA hazardous waste sites the Agency stated that petroleum wastes, including waste oil, which are not specifically listed under RCRA are excluded from the definition of "hazardous substance" under 101(14). 46 Fed. Reg. 22145 (April 15, 1981). (See footnote 2 below)

In 1982 and in 1983, the General Counsel issued two opinions on the CERCLA petroleum exclusion. In the first opinion, the General Counsel distinguished under the petroleum exclusion between hazardous substances which are inherent in petroleum, such as benzene, and hazardous substances which are added to or mixed with petroleum products. The General Counsel concluded that the petroleum exclusion includes those hazardous substances which are inherent in petroleum but not those added to or mixed with petroleum products. Thus, the exclusion of diesel oil as "petroleum" includes its hazardous substance constituents, such as benzene and toulene, but PCB's mixed with oil would not be excluded. Moreover, if the petroleum product and an added hazardous substance are so commingled that, as a practical matter, they cannot be separated, then the entire oil spill is subject to CERCLA response authority.

========== Foot Note ==========

2 In the notice the Agency used the term "waste oil" without stating whether it was intended to include all waste oil or only unadulterated waste oil. The Agency has subsequently interpreted the reference to "waste oil" in this notice to include only unadulterated waste oil. 50 Fed. Reg. 13460 (April 4, 1985).

==========

In the second opinion, the General Counsel concluded that the petroleum exclusion as applied to crude oil "fractions" includes blended gasoline as well as raw gasoline, even though refined or blended gasoline contains higher levels of hazardous substances. The increased level of hazardous substances results from the blending of raw gasoline with other petroleum fractions to increase its octane levels. Because virtually all gasoline which leaves the refinery is blended gasoline, the petroleum exclusion would include virtually none of this fraction if the increased concentration of hazardous substances due only to its processing made it subject to CERCLA.

Finally, the Agency has interpreted the petroleum exclusion in two recent Federal Register notices. In the April 4, 1985 final rule adjusting reportable quantities under Section 102, the Agency provided its general interpretation of the exclusion:

> EPA interprets the petroleum exclusion to apply to materials such as crude oil, petroleum feedstocks, and refined petroleum products, even if a specifically listed or designated hazardous substance is present in such products. However, EPA does not consider materials such as waste oil to which listed CERCLA substances have been added to be within the petroleum exclusion. Similarly, pesticides are not within the petroleum exclusion, even though the active ingredients of the pesticide may be contained in a petroleum distillate: when an RQ of a listed pesticide is released, the release must be reported.

50 Fed. Reg. 13460 (April 4, 1985).

In March 10, 1986, the Agency published a notice of data availability and request for comments on the proposed used oil listing under RCRA. 51 Fed. Reg. 8206. In that notice, the Agency responded to commenters who had argued that the RCRA listing would discourage used

oil recycling because it would subject generators, transporters, processors, and users to Superfund liability. The Agency stated that used oil which contains hazardous substances at levels which exceed those normally found in petroleum are currently subject to CERCLA. 51 Fed. Reg. 8206 (March 10, 1986). Although the fact that the used oil is contaminated does not remove it from the protection of the petroleum exclusion, the contaminants in the used oil are subject to CERCLA response authority if they are hazardous substances. Accordingly, most used oil, even without a specific listing, would not be fully within the petroleum exclusion, irrespective of the listing.

Discussion

Because there is no definition of "petroleum" in CERCLA or any legislative history which clearly expresses the intended scope of this exclusion, there are several possible interpretations which could be given to this provision. However, we believe that our current interpretation, under which "petroleum" includes hazardous substances normally found in refined petroleum fractions but does not include either hazardous substances found at levels which exceed those normally found in such fractions or substances not normally found in such fractions, is most consistent with the statute and the relevant legislative history. Under this interpretation, the source of the contamination, whether intentional addition of hazardous substances to the petroleum or addition of hazardous substances by use of the petroleum, is not relevant to the applicability of the petroleum exclusion. The remainder of this memorandum explains in greater detail this interpretation and its legal basis, and responds to arguments raised in opposition to this interpretation.

The following is our interpretation of "petroleum" under CERCLA 101(14) and 104(a)(2), which we believe to be consistent with Congressional intent and the position which the Agency has taken on the scope of the petroleum exclusion thus far. First, we interpret this provision to exclude from CERCLA response and liability crude oil and fractions of crude oil, including the hazardous substances, such as benzene, which are indigenous in those petroleum substances. Because these hazardous substances are found naturally in all crude oil and its fractions, they must be included in the term "petroleum," for that provision to have any meaning.

Secondly, "petroleum" under CERCLA also includes hazardous substances which are normally mixed with or added to crude oil or crude oil fractions during the refining process. This includes hazardous substances the levels of which are increased during refining. These substances are also part of "petroleum" since their addition is part of the normal oil separation and processing operations at a refinery in order to produce the product commonly understood to be "petroleum."

Finally, hazardous substances which are added to petroleum or which increase in concentration solely as a result of contamination of the petroleum during use are not part of the "petroleum" and thus are not excluded from CERCLA under the exclusion. (See footnote 3 below) In such cases, EPA may respond to releases of the added hazardous substance, but not the oil itself.

We believe that an interpretation of "petroleum" to include only indigenous, refinery-added hazardous substances is the interpretation of this provision which is most consistent with Congressional intent. The language of the provision, its explanation in the legislative history, and the Congressional debates on the final Superfund bill clearly indicate that Congress had no intention of shielding from Superfund response and liability hazardous substances merely because they are added, intentionally or by use, to petroleum products.

The language of the petroleum exclusion describes "petroleum" principally in terms of crude oil and crude oil fractions. This language is virtually identical to the language used in an earlier Superfund bill to define "oil." (See footnote 4 below) There is no indication in the statute or legislative history that the term "petroleum" was to be given any meaning other than its ordinary, everyday meaning. See Malat v. Riddell, 383 U.S. 569, 571 (1966) (words of a statute should be interpreted where possible in their ordinary, everyday sense). Petroleum is defined in a standard dictionary as

> an oily flammable bituminous liquid that may vary from almost colorless to black, occurs in many places in the upper strata of the earth, is a complex mixture of hydrocarbons with small amounts of other substances, and is prepared for use as gasoline, naphtha, or other products by various refining processes.

Webster's Ninth New Collegiate Dictionary 880 (1985). Thus, an interpretation of the phrase "petroleum, including crude oil or any fraction thereof" to include only crude oil, crude oil fractions, and refined petroleum fractions is consistent with the plain language of the statute. (See footnote 5 below)

========== Foot Note ==========

3 The mixing of two or more excluded petroleum substances, such as blending of fuels, would not be considered contamination by use, and the mixture would thus also be an excluded substance.

4 See H.R. 85, 96th Cong., 2d Sess. Section 101(s) (as passed by the House, September 1980) (""Oil" means petroleum, including crude oil or any fraction or residue therefrom"). H.R. 85 was designed principally to provide compensation and assess liability for oil tanker spills in navigable waters. As discussed below, the omission of this "oil spill" coverage under the petroleum exclusion was believed to be the most significant omission in terms of response to environmental releases under the final Superfund bill.

Although the bill containing the precursor to Section 101(14), S. 1480, does not have a definition of "petroleum" its accompanying report did explain the term "petroleum oil" in the context of the taxing provisions:

The term "petroleum oil" as used in subsection 5 means petroleum, including crude petroleum and any of its fractions or residues other than carbon black.

S. Rep. No. 96-848, 96th Cong., 2d Sess. 70 (1980).

5 This distinction under the exclusion in Title I of CERCLA between petroleum as the substance that leaves the refinery and the hazardous substances which are added to it prior to, during or after use was also made by Congress in Title II, the revenue provisions or CERCLA. In Title II, Congress made a distinction between "chemicals", petrochemical feedstocks and inorganic substances, taxed in Subchapter B of Chapter 38 of Internal Revenue Code, and "petroleum", crude oil and petroleum products, taxed in Subchapter A. Section 211 of CERCLA. The list of taxed chemicals includes many of the contaminant hazardous substances typically found in used oil: arsenic, cadmium, chromium, lead oxide, and mercury. The term "petroleum products" was explained in the legislative history as including essentially crude oil and its refined fractions. H. Rep. No. 96-172, part III, 96th Cong., 2d

Sess. 5 (1980) (to accompany H.R. 85).
==========

The only legislative history which specifically discusses this provision states that

> petroleum, including crude oil and including fractions of crude oil which are not otherwise specifically listed or designated as hazardous substances under subparagraphs (A) through (F) of the definition, is excluded from the definition of a hazardous substance. __The reported bill does not cover spills or other releases strictly of oil__.

S. Rep. No. 96-848, 96th Cong., 2d Sess. 29-30 (1980) (emphasis added). Thus, the petroleum exclusion is explained as an exclusion from CERCLA for spills or releases ONLY of oil. The legislative history clearly contemplates that the petroleum exclusion will not apply to mixtures of petroleum and other toxic materials since these would not be releases "strictly of oil".

The Congressional debates on the final compromise Superfund legislation provides further clarification of Congressional intent concerning the scope of the petroleum exclusion, both in terms of what this provision deleted from the bill and what it did not. First, the major concern expressed with respect to the final compromise bill was the omission of its oil spill jurisdiction due to the petroleum exclusion. See e.g. 126 Cong. Rec. H11787 (Rep. Florio) (daily ed. December 3, 1980); id. at H11790 (Rep. Broyhill); id. at H11792 (Rep. Madigan); id. at H11793 (Rep. Studds); id. at H11795 (Rep. Biaggi); id. at H11796 (Rep. Snyder). This omission was of concern because it was believed to leave coastal areas and fisheries vunerable to tanker spills of crude and refined oil, such as the wreck of the Argo Merchant, and offshore oil well accidents. 126 Cong. Rec. H11793 (Rep. Studds) (daily ed. December 3, 1980). see also 126 Cong. Rec. S10578 (proposed amendment to S1480 by Sen. Magnuson) (daily ed. August 1, 1980); id. at S10845 (proposed amendment to S1480 by Sen. Gravel) (daily ed. August 5, 1980). The omitted coverage of oil spills was believed to include approximately 500 spills per year, 126 Cong. Rec. H11796 (Rep. Snyder) (daily ed. December 3, 1980), far less than the number of contaminated oil releases each year.

However, it was clear that the omission of oil coverage was intended to include spills of oil only, and there was no intent to exclude from the bill mixtures of oil and hazardous substances. The remarks of Rep. Mikulski are typical of the general understanding of the effect of the petroleum exclusion in the final bill:

> The Senate bill is substantially similar to the House measure, with the exception that there is no oil title.
>
> I realize that it is disappointing to see no oil-related provision in the bill, but we must also realize that this is our only chance to get hazardous waste dump site cleanup legislation enacted. . . .
>
> Moreover, there is already a mechanism in place that is designed to deal with spills in navigable waterways. There is not, however, any provision currently in our law that addresses the potentially ruinous situation of abandoned toxic dump sites.
>
> I, therefore, believe that it is imperative that we pass the Senate bill as a very important beginning in our attempt to defuse the ticking environmental time bomb of abandoned toxic waste sites.

Id. at H11796.

In addition, several speakers specifically identified such mixtures

as releases not only covered by the legislation but releases to which the bill was addressed.

> Mr. Edgar ...
>
> In my State, hazardous substances problems have been discovered at an alarming rate in recent years. In the summer of 1979, an oil slick appeared on the Susquehanna River near Pittston, Pa. When EPA officials responded under section 311 of the Clean Water Act, they learned that the slick contained a variety of highly poisonous chemicals in addition to the oil.
>
> Officials estimate that more than 300,000 gallons of acids, cyanide compounds, industrial solvents, waste oil and other chemicals remain at this site where they could be washed to the surface anywhere in a 10-square mile surface.

Id. at H11798. See also 126 Cong. Rec. S14963 (daily ed. November 24, 1980) (Sen. Randolph) (contaminated oil slick). Other petroleum products containing hazardous substance additives intended to be addressed by the legislation include PCB's in transformer fluid, id. at S14963 (Sen. Randolph) and S14967 (Sen. Stafford), dioxin in motor fuel used as a dust suppressant, id. at S14974 (Sen. Mitchell), PCB's in waste oil, id. at (Sen. Mitchell) (See footnote 6 below) and contaminated waste oil, id. at S14980 (Sen. Cohen). Accordingly, Congress understood the petroleum exclusion to remove from CERCLA jurisdiction spills only of oil, not releases of hazardous substances mixed with the oil.

There are two principal arguments which have been raised in opposition to this interpretation. First, the argument has been made that this interpretation narrows the petroleum exclusion to the extent that it has became virtually meaningless. As we have noted in previous opinions on this issue, an interpretation which emasculates a provision of a statute is strongly disfavored. Marsano v. Laird, 412 F.2d 65, 70 (2d Cir. 1969). However, this interpretation leaves a significant number of petroleum spills outside the reach of CERCLA. Spills or releases of gasoline remain excluded from CERCLA under the petroleum exclusion. As indicated by the legislative history for the 1984 underground storage tank legislation, leaking of gasoline from underground tanks appears to be the greatest source of groundwater contamination in the United States. 130 Cong. Rec. S2027, 2028 (daily ed. February 29, 1984) (Sen. Durenberger). In addition, spills of crude or refined petroleum are not subject to Superfund, as was frequently noted prior to its passage. See generally 126 Cong. Rec. H11786-H11802 (daily ed. December 5, 1980). Moreover, under this interpretation not all releases of used oil will be subject to CERCLA since used oil does not necessarily contain non-indigenous hazardous substances or hazardous substances in elevated levels. (See footnote 7 below) Although used oil is generally "contaminated" by definition, see e.g., RCRA Section 1005 (36), the impurities added by use may not be CERCLA hazardous substances.

========== Foot Note ==========

6 The illegal disposal of PCB's in North Carolina described by Senator Mitchell was a result of the spraying of 131,000 gallons of PCB-contaminated waste oil along a roadway. See 126 Cong. Rec. H9448 (daily ed. September 23, 1980).

7 Data submitted to EPA by the Utility Solid Waste Activities Group et al. in Appendix C of their comments on the RCRA Used Oil listing, February 11, 1986.

==========

A second argument which has been made opposing this interpretation is that Congress intended to include in the term "petroleum" all

hazardous substances added through normal use of the petroleum substance. However, even if it were possible to determine in a response situation whether a hazardous substance was added intentionally or only through normal use or to determine what additions are "intentional", the legislative history is contrary to such a distinction. As noted above, the Senate Report explaining this provision states that it excludes releases or spills strictly of oil. This explanation expresses Congressional intent that releases of mixtures of oil and toxic chemicals, i.e. releases which are not strictly of oil, would be subject to CERCLA response authority. Releases of contaminated oil even if contaminated due to "normal use" are not releases strictly of oil.

Furthermore, the Congressional debates prior to passage clearly indicate an intent that contaminated oil would be subject to Superfund as several such releases were discussed as the focus of the legislation. Congress was concerned with the environmental and health effect of abandoned toxic waste sites, not whether the presence of such hazards was intentional or due to normal practices. In fact, one of the petroleum-hazardous substance mixtures most often mentioned during the debates was that of PCB contaminated oil, which is a type of contamination arguably resulting the "normal use" of the oil in transformers. Accordingly, an interpretation of the petroleum exclusion which includes as "petroleum" hazardous substances added during use of the petroleum would not be consistent with Congressional intent.

Finally, although the Superfund Amendments and Reauthorization Act of 1986 (SARA) contains several provisions related to oil and oil releases, it did not amend the petroleum exclusion under CERCLA. Moreover, the new provisions concerning oil and oil releases and their legislative history do not indicate a Congressional intent inconsistent with this opinion.

The only discussion of "petroleum" in the Conference Report for SARA is in the context of defining the scope of the new petroleum response fund for leaking underground storage tanks under Subtitle I of the Resource Conservation and Recovery Act (RCRA). Subtitle I defines "petroleum" in a manner nearly identical to CERCLA. The Conference Report specifies that used oil would be subject to the response fund notwithstanding its contamination with hazardous substances. H. Rep. No. 99-962, 99th Cong., 2d Sess. 228 (1986). The Conference Report is not inconsistent with the Agency's position on "petroleum" under CERCLA since it merely specifies that the leaking underground storage tank (UST) response fund is applicable to tanks containing certain mixtures of oil and hazardous substances, as well as to tanks containing uncontaminated petroleum. In fact, the Report further states that the UST response fund must cover releases of used oil from tanks since "releases from tanks containing used oil would not rise to the priority necessary...for CERCLA response", id. (emphasis added), not because such releases would be entirely excluded from CERCLA jurisdiction. See also 132 Cong. Rec. S14928 (daily ed. October 3, 1986) (Senator Chaffee) (Nothing in Section 114, pertaining to liability for releases of recycled oil, "shall affect or impair the authority of the President to take a response action pursuant to Section 104 or 106 of CERCLA with respect to any release...of used oil or recycled oil"); 132 Cong. Rec. H9611 (daily ed. October 8, 1986) (Rep. Schneider) ("...the oil companies are rightfully assessed a significant share of the Superfund tax...Waste oils laced with contaminants have been identified at least 153 Superfund sites in 32 States.").

Return to the top of this document.

Return to OSRE Home Page

Last Updated: February 27, 1998
URL: http://es.epa.gov/oeca/osre/870731.html

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL RESEARCH LABORATORY
27 TARZWELL DRIVE
NARRAGANSETT, RHODE ISLAND 02882

July 26, 1996

Reference 82

Indira Balkissoon, Urban Environmental Project Manager
EPA - Region
John F. Kennedy Federal Building
Boston, MA 02203-0001

Dear Ms. Balkissoon:

We have completed work on the fish samples from the Woonasquatucket River. Chemical analyses were conducted on two tissue types (muscle and offal) from sunfish and American eel. For the sunfish (Valley Street site), three composite samples (composite of five individual fish) were analyzed for each type of tissue. The three eels that were collected from the Smith Street location were combined into one composite sample for each tissue type (muscle and offal). All of the chemical analyses were conducted using the methods described in the Laboratory Operating Procedures that were previously provided.

Attached please find data tables that contain the results of our analyses. Also included for each suite of analytes (metals, PCBs and chlorinated pesticides, and PCDD/Fs) is a summary of the quality control/quality assurance information. Please note that the data for the coplanar PCBs (congeners 77, 126 and 169) are on the table with the PCDD/PCDF results. These toxic congeners were measured along with the PCDDs and PCDFs using GC-MS because of their importance and low abundance relative to other PCB compounds. Also note that they are reported with units of pg/g instead of ng/g.

Please call me at (401)782-3091 if you have any questions.

Sincerely,

Richard J. Pruell

Richard J. Pruell
Research Chemist

cc: S. Jayaraman
D. McGovern
R. McKinney
N. Rubinstein
S. Schimmel
B. Taplin

Woonasquatucket River Fish Samples (ug/g wet)

sampnum	chemid	kind	sta	date	description	Cd	Cr	Cu	Ni	Pb	Zn	Hg
903008	26192	BGM	WR1	5/13/96	Sunfish muscle composite 1	<0.002	0.02	0.53	<0.13	0.04	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.35	0.21	5.13	0.21	2.30	26.6	0.04
903010	26194	BGM	WR1	5/13/96	Sunfish muscle composite 2	<0.002	0.03	0.31	<0.13	0.01	12.9	0.15
903011	26195	BGO	WR1	5/13/96	Sunfish offal composite 1	0.12	0.22	2.12	0.13	0.86	21.6	0.04
903012	26196	BGM	WR1	5/13/96	Sunfish muscle composite 3	<0.002	0.03	0.31	<0.13	0.03	14.7	0.19
903013	26197	BGO	WR1	5/13/96	Sunfish offal composite 1	0.08	0.38	4.60	0.25	2.49	24.2	0.05
903014	26198	EEM	WR2	5/13/96	Eel muscle composite 1	<0.002	0.04	0.71	<0.13	0.12	24.9	0.17
903015	26199	EEO	WR2	5/13/96	Eel offal composite 1	0.22	0.10	8.84	0.14	0.55	32.6	0.06

Woonasquatucket River Fish Samples QA Summary (ug/g dry)

sampnum	chemid	kind	description	rep	Cd	Cr	Cu	Ni	Pb	Zn	Hg
92426	26190	KP	Procedural blank	1	< 0.01	< 0.06	< 1.00	< 0.65	< 0.03	< 0.30	< 0.003
[illegible]	[illegible]	DORM1	Dogfish muscle ref material	1	0.07	3.05	4.77	< 1.01	0.47	20.2	0.90
		DORM1	Certified value		0.09	3.60	5.22	1.20	0.40	21.3	0.80
		DORM1	Recovery		81%	85%	91%		118%	95%	113%
903014	26198	EEM	Procedural replicate	1	< 0.005	0.12	1.96	< 0.36	0.34	69.2	0.48
903014	26198-2	EEM	Procedural replicate	2	< 0.007	0.13	1.91	< 0.46	0.30	68.6	0.46
903014	26198-3	EEM	Procedural replicate	3	< 0.007	0.16	1.87	< 0.49	0.32	75.1	0.46
			%RSD			15%	2%		6%	5%	3%

Woonasquatucket Fish Samples

Fish Offal and Muscle Analysis for PCBs and Pesticides

Description	FISH OFFAL	FISH MUSCLE	FISH OFFAL	FISH MUSCLE	FISH OFFAL	FISH MUSCLE
	C-1	C-1	C-2	C-2	C-3	C-3
PCBs						
CB008	0.85	0.30	1.46	(0.21)	1.30	0.21
CB018	5.50	2.05	4.92	0.73	4.43	0.74
CB028	48.7	15.6	12.2	1.58	9.38	1.64
CB052	66.8	18.3	51.4	5.88	45.4	5.39
CB044	19.2	6.44	12.0	1.54	10.5	1.44
CB066	79.5	21.9	38.9	3.97	28.3	3.10
CB101	71.1	16.1	154	13.5	109	8.95
CB118	63.4	15.6	135	12.1	86.0	6.94
CB153	80.2	16.3	142	12.1	90.2	7.43
CB105	29.3	7.70	34.1	3.67	23.2	2.09
CB138	71.8	16.9	150	14.4	93.1	8.00
CB187	35.4	6.81	22.9	2.44	14.5	1.77
CB128	11.4	2.99	29.7	2.87	17.1	1.55
CB180	50.8	9.62	47.2	4.07	23.9	2.51
CB170	18.8	3.66	16.9	1.64	10.0	1.08
CB195	11.5	2.49	10.1	1.03	4.46	0.52
CB206	18.9	4.09	21.0	2.03	8.58	1.00
CB209	11.9	2.71	10.8	1.27	4.40	0.64
PESTICIDES						
HCB	0.46	0.17	1.57	0.26	1.05	0.18
PPDDE	43.1	10.9	63.2	5.85	60.0	5.47
LINDANE	0.26	(0.45)	0.26	(0.45)	0.26	(0.45)
ACHLORDA	5.13	1.09	16.7	1.40	10.2	0.79
TNONACHL	20.0	4.03	40.6	3.88	25.7	2.35
PPDDD	21.0	4.03	27.2	3.51	22.0	2.57
PPDDT	1.85	1.47	10.9	1.44	8.41	0.74
Concentration	are in ng/g wet weight.					
Numbers with	( ) are Method Detection Limits.					

Woonasquatucket Fish Samples

Eel Offal and Muscle Analysis for PCBs and Pesticides

PCBs	E-1	E-2
ANALYTES	Muscle	OFFAL
CB008	(0.21)	(0.21)
CB018	0.21	(0.16)
CB028	2.51	0.76
CB052	24.3	6.70
CB044	4.81	1.08
CB066	10.2	3.76
CB101	48.9	10.9
CB118	64.6	16.0
CB153	77.6	16.8
CB105	22.7	5.13
CB138	90.0	18.3
CB187	16.7	3.86
CB128	17.5	3.29
CB180	29.5	4.34
CB170	9.59	1.83
CB195	7.40	1.74
CB206	15.5	3.31
CB209	7.55	1.99
PESTICIDES		
HCB	2.37	0.58
PPDDE	39.5	8.16
LINDANE	0.78	(0.45)
ACHLORDANE	24.3	3.83
TNONACHLOR	38.1	7.23
PPDDD	25.3	7.35
PPDDT	14.5	0.36
Concentrations are in ng/g wet weight.		
Numbers within ( ) are Method Detection Limits.		

CARP 1

Standard Reference Material*

PCBs and Pesticides

PCBs		NRC Certified conc	NIST Certified conc	93' Exercise Consensus Results
CB008	1.75		<5	3.9 (2.7)
CB018	16.4		25.5(1.4)	21.3 (4.9)
CB028	21.5		24.1(0.9)	29.3 (8.2)
CB052	106	124 ± 32	119(16)	113 (32)
CB044	72.3		65(4.7)	68 (18)
CB066	112		161(7.0)	134 (41)
CB101	120	124 ± 37	119.7(2.2)	120 (19)
CB118	127	132 ± 60	95.5(5.3)	117 (32)
CB153	91.4	83 ± 39	61.7(3.7)	82 (21)
CB105	51.2	54 ± 24	44.3(2.1)	51 (16)
CB138	91.9	102 ± 23	101.6(6.4)	101 (26)
CB187	33.2		33.0(3.3)	29.6 (7.5)
CB128	16.9		21.5(2.0)	16.9 (4.9)
CB180	46.2	46 ± 14	45.2(5.3)	42 (11)
CB170	20.6	22 ± 8	20.6(1.2)	21.1 (5.7)
CB195	5.51		5.79(0.46)	4.5 (1.4)
CB206	6.15		4.89(0.11)	4.6 (1.4)
CB209	5.50		5.56(0.19)	4.7 (1.3)
PESTICIDES				
HCB	2.38		<5	3.2 (1.0)
PPDDE	146		124(5.0)	149 (25)
LINDANE	0.52		<5	1.4 (1.3)
ACHLORDANI	8.15		13.1(1.4)	9.1 (4.6)
TNONACHLOI	10.2		15.8(.50)	9.5 (9.9)
PPDDD	92.7		77.8(5.1)	74.4 (22.1)
PPDOT	(0.66)		7.79(0.26)	15.0 (8.1)
Concentrations	e in ng/g wet weight.			

Standard Refe ice Material" : CARP-1 "Ground Whole Carp Reference Material for Organochlorine ompounds" was obtained from National Research Council (NRC) of Canada. CARP-1 has NI : certified concentrations, the results of Nations Institute of Standards and Technology (NI) analyses and the exercise consensus results from 1993 in which CARP-1 was used as an ntercomparison material for the NIST/NOAA/EPA Organics QA program.

US EPA
Atlantic Ecology Division
Reg. 1 Technical Assistance
Woonasquatucket River Fish

Sample Name:	6251A	26252A	26253A	26254A	26255A	26256A	26257A	26258A
Data File Name:	6569.D	A6570.D	A6571.D	A6572.D	A6573.D	A6576.D	A6577.D	A6578.D
Sample Description:	Sunfish C-1	Sunfish C-1	Sunfish C-2	Sunfish C-2	Sunfish C-3	Sunfish C-3	Eel E-1	Eel E-1
Tissue Type:	Muscle	Offal	Muscle	Offal	Muscle	Offal	Muscle	Offal
COMPOUND				PG/G WET WT.				
2,3,7,8-TCDD	17	75.6	63.1	554	42.2	385	91.7	31.8
2,3,7,8-TCDF	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6,8-TCDT	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,7,8-PeCDD	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,7,8-PeCDF	ND	ND	1.73	ND	ND	ND	ND	ND
2,3,4,7,8-PeCDF	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4,7,8-HxCDD	ND	ND	ND	ND	ND	7.76	ND	ND
1,2,3,6,7,8-HxCDD	ND	ND	11.8	ND	ND	6.19	10.3	ND
1,2,3,7,8,9-HxCDD	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4,7,8-HxCDF	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,6,7,8-HxCDF	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HpCDD	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HpCDF	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND	ND	ND	ND	ND
OCDD	ND	ND	ND	ND	ND	ND	ND	ND
OCDF	ND	ND	ND	ND	ND	ND	ND	ND
CB77	150	4080	64.8	478	59.5	502	10.8	26.8
CB126	3.2	71.8	16	131	10.8	85.2	139	13.2
CB169	ND	ND	ND	ND	3.78	3.7	38.5	ND

Reg. 1 Tech. Assist. Woonasqu tucket River Project
CRM CARP-1

Sample Name:	2840	Certified
Data File Name:	A657 D	Values
Sample Description:	CRM C. P-1	CRM CARP-1
Tissue Type:	Mus	Muscle

COMPOUND	G/G WET WT.	
2,3,7,8-TCDD	4.2	6.6 +/- 0.6
2,3,7,8-TCDF	11.	11.9 +/- 2.7
2,4,6,8-TCDT	NC	NA
1,2,3,7,8-PeCDD	3.8	4.4 +/- 1.1
1,2,3,7,8-PeCDF	4.7	5.0 +/- 2.0
2,3,4,7,8-PeCDF	13.	NA
1,2,3,4,7,8-HxCDD	NC	1.9 +/- 0.7
1,2,3,6,7,8-HxCDD	7.6	5.6 +/- 1.3
1,2,3,7,8,9-HxCDD	ND	0.7 +/- 0.4
1,2,3,4,7,8-HxCDF	NC	NA
1,2,3,6,7,8-HxCDF	ND	NA
1,2,3,7,8,9-HxCDF	NC	NA
2,3,4,6,7,8-HxCDF	ND	NA
1,2,3,4,6,7,8-HpCDD	8.2	6.5 +/- 1.8
1,2,3,4,6,7,8-HpCDF	ND	NA
1,2,3,4,7,8,9-HpCDF	11.	NA
OCDD	ND	6.3 +/- 1.9
OCDF	ND	NA
CB77	109	NA
CB126	368	NA
CB169	24	NA

Reg. 1 Tech. Assist. Woonasquatucket River Project
Procedural Blank

Sample Name:	26569X
Data File Name:	A6574.D
Sample Description:	Proc. Blk.

COMPOUND	PG/G WET WT.
2,3,7,8-TCDD	ND
2,3,7,8-TCDF	ND
2,4,6,8-TCDT	ND
1,2,3,7,8-PeCDD	ND
1,2,3,7,8-PeCDF	ND
2,3,4,7,8-PeCDF	ND
1,2,3,4,7,8-HxCDD	ND
1,2,3,6,7,8-HxCDD	ND
1,2,3,7,8,9-HxCDD	ND
1,2,3,4,7,8-HxCDF	ND
1,2,3,6,7,8-HxCDF	ND
1,2,3,7,8,9-HxCDF	ND
2,3,4,6,7,8-HxCDF	ND
1,2,3,4,6,7,8-HpCDD	ND
1,2,3,4,6,7,8-HpCDF	ND
1,2,3,4,7,8,9-HpCDF	ND
OCDD	ND
OCDF	ND
CB77	3.21
CB126	ND
CB169	ND

WESTON

Reference 83

Sean Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Chris Turner
Company Office of Watershed Management - RI DEM
Address Providence, RI
Phone (401) 222-3961 X7229
Subject Providence River

Date 7/26/99
Time 1345 AM/PM

☒ Originator Placed Call
☐ Originator Received Call
W.O. No. 20098141001704550

Notes:

Is the entire Providence River considered a saline or tidal river?

Mr. Turner stated that the entire Providence River is saline and subject to tides. SK

☒ File Centredale Manor HRS
☐ Tickle File ___/___/___
☐ Follow-Up By: _____
☐ Copy/Route To: _____

Follow-Up-Action: _____

Originator's Initials SK

Data Validation
Report Number 2

Steve Stodola
US EPA Approval Signature

June 10, 1999
Date

April 28, 1999
B-99-04-E-07
Revised: June 9, 1999

Ms. Christine Clark
Regional Sample Control Custodian
Office of Environmental Measurement and Evaluation
U.S. EPA Region I
60 Westview Street
Lexington, Massachusetts 02421

Reference 84

Re: WA No. 01-99-3-02, Task No. 2, TDF No. 118 B
Case No. 3428 / SDG No. 3428-CMS-109
Triangle Laboratories - Durham, NC
Woonasquatucket River/Centredale Manor Site, N. Providence, RI

Dioxin/Furan: 22/Soil/3428-CMS-109, 3428-CMS-117, 3428-CMS-118, 3428-CMS-124, 3428-CMS-125, 3428-CMS-126, 3428-CMS-126DUP, 3428-CMS-127, 3428-CMS-128, 3428-CMS-131, 3428-CMS-132, 3428-CMS-133, 3428-CMS-134, 3428-CMS-139, 3428-CMS-140, 3428-CMS-141, 3428-CMS-147, 3428-CMS-152, 3428-CMS-153 3428-CMS-155, 3428-CMS-160, 3428-CMS-160DUP (Soil Field Duplicate Pairs/3428-CMS-126 and 3428-CMS-126DUP, 3428-CMS-160 and 3428-CMS-160DUP)

1/Soil PE/PC00255

Dear Ms. Clark:

A Tier III data validation was performed on the Dioxin/Furan analytical data for 22 soil samples and one PE sample collected by Roy F. Weston, Inc. for the U.S. EPA at the Woonasquatucket River/Centredale Manor Site in N. Providence, RI. The samples were analyzed according to EPA Method 8290 Rev. 0, September 1994. The samples were validated using first the criteria in EPA Method 8290, defaulting second to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria and finally to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98). Unless otherwise stated all criteria used were Method 8290 criteria. The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)
- * Preservation and Technical Holding Times
- * PE Samples/Accuracy Check
- * Window Defining Mix

01

*	•	Initial and Continuing Calibrations
*	•	Chromatographic Resolution
*	•	Instrument Sensitivity Check
	•	Blanks
	•	Matrix Spike/Matrix Spike Duplicate
*	•	Laboratory and Field Duplicates
	•	Internal/Clean-up/Recovery Standards
*	•	Sample Analysis and Identification
	•	Sample Quantitation
*	•	Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity
*	•	Required Sample Reruns and Second Column Confirmation
	•	System Performance

* - All criteria were met for this parameter.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes Site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor
- To determine potential sources of dioxin/furan contamination
- These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.

TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.020 ppb.

One single blind performance evaluation (PE) sample (fortified native soil PC00255) was evaluated for this SDG. All congeners and homologue groups were scored acceptable.

The majority of the sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

Data Completeness

Several pages were missing from the raw data package. Pages 1180-1201 were requested from the laboratory via the EPA WAM on 4/6/99. These pages were received on 4/12/99.

Pages 1058 and 1439 were missing from the raw data package and were requested from the laboratory via the EPA WAM on 6/4/99. These pages were received on 6/4/99 by fax.

Matrix Spike/Matrix Spike Duplicate

One matrix spike/matrix spike duplicate pair was evaluated for this SDG (3428-CMS-124). The 2378-TCDD isomer had a low %recovery and did not meet the recovery criterion of 50-150% for soils/sediment as specified in EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98). However, samples were not qualified since the native concentration of 2378-TCDD was greater than 4x the spike amount.

Blanks

The table below summarizes the compounds that were detected in the laboratory method blanks, the action levels, and the samples affected:

Compound	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
1234678-HpCDD	Method Blank	0.54	2.7	None
OCDD	Method Blank	1.1	11	None
123478-HxCDF	Method Blank	0.40	2.0	3428-CMS-127, 3428-CMS-153
123678-HxCDF	Method Blank	0.30	1.5	3428-CMS-127, 3428-CMS-128, 3428-CMS-132, 3428-CMS-133
123789-HxCDF	Method Blank	0.30	1.5	3428-CMS-109, 3428-CMS-118, 3428-CMS-124, 3428-CMS-125, 3428-CMS-126, 3428-CMS-126DUP, 3428-CMS-131, 3428-CMS-134, 3428-CMS-141, 3428-CMS-152, 3428-CMS-155, 3428-CMS-160, 3428-CMS-160DUP
234678-HxCDF	Method Blank	0.34	1.7	3428-CMS-125, 3428-CMS-127, 3428-CMS-132, 3428-CMS-133
1234678-HpCDF	Method Blank	0.47	2.35	None
OCDF	Method Blank	0.96	9.6	3428-CMS-128
Total Tetra Dioxin	Method Blank	0.43	4.3	None
Total Hexa Dioxin	Method Blank	0.62	6.2	None

Compound	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
Total Hepta Dioxin	Method Blank	0.54	5.4	None
Total Hexa Furan	Method Blank	0.74	7.4	None
Total Hepta Furan	Method Blank	0.47	4.7	None

Blank action levels are based on ten times the highest concentration of the contaminant determined in any blank for OCDD/OCDF or Total Homologues. Blank action levels are based on five times the highest concentration of the contaminant determined in any blank for all other analytes as specified in the Dioxin Data Validation SOP (ESAT-01-0007, 11/20/98). The positive results less than the action level are reported as non-detects and estimated (UJ) on the Data Summary Table.

Internal/Clean-up/Recovery Standards

- Clean-up Standards

The following table summarizes the cleanup standards with recoveries which did not meet the method acceptance criterion of 40%-130%:

Standard	% Recovery	Action		Affected Samples #
		Positive Detects	NDs	
^{37}C -2378-TCDD	133	J	UJ	3428-CMS-131 $
^{37}C -2378-TCDD	505	J	UJ	3428-CMS-134 &
^{37}C -2378-TCDD	3090	J	UJ	3428-CMS-140 ∞
^{37}C -2378-TCDD	3060	J	UJ	3428-CMS-141 &
^{37}C -2378-TCDD	176	J	UJ	3428-CMS-147 ◊
^{37}C -2378-TCDD	236	J	UJ	3428-CMS-155 &
^{37}C -2378-TCDD	461	J	UJ	3428-CMS-160 $
^{37}C -2378-TCDD	499	J	UJ	3428-CMS-160DUP $

\# All analyses were without dilution. Analytes reported from a 1:100 dilution were unaffected.

$ TCDD reported from a 1:100 dilution analysis.

& TCDD and OCDD reported from a 1:100 dilution analysis.

∞ TCDD, TCDF, OCDD, OCDF, 1234678-HpCDD, 1234678-HpCDF reported from a 1:100 dilution analysis.

◊ TCDD, TCDF, OCDD, 1234678-HpCDD, 1234678-HpCDF reported from a 1:100 dilution analysis.

- Recovery Standards

The following table summarizes the recovery standards with area counts which failed to meet the acceptance criterion of 50-200% of the area counts of the associated daily calibration standard as specified in the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996, Internal Standard Section:

Recovery Standard	RS Area	Area Limits	Action		Affected Samples
			Positive Detects*	NDs*	
^{13}C-1234-TCDD	354	83-333	J	UJ	3428-CMS-131 $
^{13}C-123789-HxCDD	117	121-484	J	UJ	3428-CMS-133 #
^{13}C-123789-HxCDD	68.9	121-484	J	UJ	3428-CMS-140 ∞
^{13}C-123789-HxCDD	437	105-420	J	UJ	3428-CMS-147 ◊

* For those compounds associated with the recovery standard referenced.

^{13}C-1234-TCDD	^{13}C-123789-HxCDD
TCDD/TCDF	HxCDD/HxCDF
PeCDD/PeCDF	HpCDD/HpCDF
	OCDD/OCDF

$ Sample analysis at a 1:100 dilution. TCDD was reported from this analysis and was affected.

\# Sample analysis without dilution (1:1). Affected analytes are as referenced above. TCDD was reported from the 1:100 dilution analysis, and was not affected.

∞ Sample analysis without dilution (1:1). Affected analytes are as referenced above. However, TCDD, TCDF, OCDD, OCDF, 1234678-HpCDD, 1234678-HpCDF were reported from a 1:100 dilution analysis, and were not affected. (Only HxCDD/HxCDF, 1234789-HpCDF were affected)

◊ Sample analysis at a 1:100 dilution. Affected analytes are as referenced above. However, only TCDD, TCDF, OCDD, 1234678-HpCDD, 1234678-HpCDF were reported from this analysis. (Only OCDD, 1234678-HpCDD, 1234678-HpCDF were affected)

Sample Quantitation

Positive results reported below the reporting limits were flagged as estimated (J) on the Data Summary Table.

The laboratory reported several values which were above the upper calibration range. Since quantitative accuracy is questionable above the upper range of calibration, the ESAT validator reported the following values from 1:100 dilutions:

Congener	Affected Sample
2378-TCDD Total TCDD	3428-CMS-109, 3428-CMS-117, 3428-CMS-118, 3428-CMS-131, 3428-CMS-133, 3428-CMS-152, 3428-CMS-160, 3428-CMS-160DUP
2378-TCDD† OCDD Total TCDD†	3428-CMS-134, 3428-CMS-141†, 3428-CMS-155
2378-TCDD† 1234678-HpCDD OCDD 2378-TCDF 1234678-HpCDF OCDF Total TCDD† Total HpCDD Total TCDF Total HpCDF	3428-CMS-140†
2378-TCDD 1234678-HpCDD OCDD 2378-TCDF 1234678-HpCDF Total TCDD Total HpCDD Total TCDF Total HpCDF	3428-CMS-147

† The analyte concentrations from the 1:100 dilutions were also beyond the instrument calibration range. Samples 3428-CMS-140 and 3428-CMS-141 were reextracted and reanalyzed by Method 8280A Low Resolution and the results are submitted in SDG 3428-CMS-140 as Attachment I. 2378-TCDD and Total TCDD values were reported from the reanalyses by Low Resolution on the Data Summary Tables. Please see Attachment I for Data Validation of these results.

Toxicity Equivalency Factor (TEF) and Isomer Specificity

All TEQ values were calculated by the ESAT data validator. The data were reported in accordance with standard Region I validation procedures which take into account the observed blank contamination, dilutions, and EMPC values. These calculated values are reported on the Data Summary Tables on a dry weight basis, where applicable. The TEF values are published in EPA/625/3-89/016, "Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs)" and 1989 Update, Part II, page 13.

System Performance

One or both of the recovery standards did not meet area count criteria for several samples. This could be related to congener loss during analysis, improperly capped sample vials, interferences, and/or degradation of the recovery standard spiking solution.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Leslie Chan
Scientist

Louis Macri
ESAT Team Manager

Attachments: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Data Summary Tables
Data Validation Worksheets
Support Documentation

Table I
Recommendation Summary Table for Dioxins/Furans
Centredale Manor Site
Case No. 3428/SDG No. 3428-CMS-109

Sample Nos.	3428-CMS-109	3428-CMS-117	3428-CMS-118	3428-CMS-124	3428-CMS-125	3428-CMS-126	3428-CMS-126 DUP	3428-CMS-127
Compound								
2378-TCDD	A	A	A	A	A	A	A	A
12378-PeCDD	A	A	A	A	A	A	A	A
123478-HxCDD	A	A	A	A	A	A	A	A
123678-HxCDD	A	A	A	A	A	A	A	A
123789-HxCDD	A	A	A	A	A	A	A	A
1234678-HpCDD	A	A	A	A	A	A	A	A
OCDD	A	A	A	A	A	A	A	A
2378-TCDF	A	A	A	A	A	A	A	A
12378-PeCDF	A	A	A	A	A	A	A	A
23478-PeCDF	A	A	A	A	A	A	A	A
123478-HxCDF	A	A	A	A	A	A	A	J[1]
123678-HxCDF	A	A	A	A	A	A	A	J[1]
123789-HxCDF	J[1]	A	J[1]	J[1]	J[1]	J[1]	J[1]	A
234678-HxCDF	A	A	A	A	J[1]	A	A	J[1]
1234678-HpCDF	A	A	A	A	A	A	A	A
1234789-HpCDF	A	A	A	A	A	A	A	A
OCDF	A	A	A	A	A	A	A	A

Table I
Recommendation Summary Table for Dioxins/Furans
Centredale Manor Site
Case No. 3428/SDG No. 3428-CMS-109

Sample Nos.	3428-CMS-128	3428-CMS-131	3428-CMS-132	3428-CMS-133	3428-CMS-134	3428-CMS-139	3428-CMS-140	3428-CMS-141
Compound								
2378-TCDD	A	J[3]	A	A	A	A	J[2]	J[2]
12378-PeCDD	A	J[4]	A	A	J[4]	A	J[4]	J[4]
123478-HxCDD	A	J[4]	A	J[3]	J[4]	A	J[3,4]	J[4]
123678-HxCDD	A	J[4]	A	J[3]	J[4]	A	J[3,4]	J[4]
123789-HxCDD	A	J[4]	A	J[3]	J[4]	A	J[3,4]	J[4]
1234678-HpCDD	A	J[4]	A	J[3]	J[4]	A	A	J[4]
OCDD	A	J[4]	A	J[3]	A	A	A	A
2378-TCDF	A	J[4]	A	A	J[4]	A	A	J[4]
12378-PeCDF	A	J[4]	A	A	J[4]	A	J[4]	J[4]
23478-PeCDF	A	J[4]	A	A	J[4]	A	J[4]	J[4]
123478-HxCDF	A	J[4]	A	J[3]	J[4]	A	J[3,4]	J[4]
123678-HxCDF	J[1]	J[4]	J[1]	J[1,3]	J[4]	A	J[3,4]	J[4]
123789-HxCDF	A	J[1,4]	A	J[3]	J[1,4]	A	J[3,4]	J[1,4]
234678-HxCDF	A	J[4]	J[1]	J[1,3]	J[4]	A	J[3,4]	J[4]
1234678-HpCDF	A	J[4]	A	J[3]	J[4]	A	A	J[4]
1234789-HpCDF	A	J[4]	A	J[3]	J[4]	A	J[3,4]	J[4]
OCDF	J[1]	J[4]	A	J[3]	J[4]	A	A	J[4]

Table I
Recommendation Summary Table for Dioxins/Furans
Centredale Manor Site
Case No. 3428/SDG No. 3428-CMS-109

Sample Nos.	3428-CMS-147	3428-CMS-152	3428-CMS-153	3428-CMS-155	3428-CMS-160	3428-CMS-160 DUP
Compound						
2378-TCDD	A	A	A	A	A	A
12378-PeCDD	J[4]	A	A	J[4]	J[4]	J[4]
123478-HxCDD	J[4]	A	A	J[4]	J[4]	J[4]
123678-HxCDD	J[4]	A	A	J[4]	J[4]	J[4]
123789-HxCDD	J[4]	A	A	J[4]	J[4]	J[4]
1234678-HpCDD	J[3]	A	A	J[4]	J[4]	J[4]
OCDD	J[3]	A	A	A	J[4]	J[4]
2378-TCDF	A	A	A	J[4]	J[4]	J[4]
12378-PeCDF	J[4]	A	A	J[4]	J[4]	J[4]
23478-PeCDF	J[4]	A	A	J[4]	J[4]	J[4]
123478-HxCDF	J[4]	A	J[1]	J[4]	J[4]	J[4]
123678-HxCDF	J[4]	A	A	J[4]	J[4]	J[4]
123789-HxCDF	J[4]	J[1]	A	J[1,4]	J[1,4]	J[1,4]
234678-HxCDF	J[4]	A	A	J[4]	J[4]	J[4]
1234678-HpCDF	J[3]	A	A	J[4]	J[4]	J[4]
1234789-HpCDF	J[4]	A	A	J[4]	J[4]	J[4]
OCDF	J[4]	A	A	J[4]	J[4]	J[4]

Table I
Recommendation Summary Table for Dioxins/Furans

A	-	Accept results.
J[1]	-	Blank contamination: The positive results listed in the table in affected samples were reported as estimated detection limits (EDL) and were estimated (UJ).
J[2]	-	Value reported from reanalyses by Method 8280A Low Resolution. Please see Attachment I for the Recommendation Summary Table for the 2378-TCDD isomer of samples 3428-CMS-140 and 3428-CMS-141.
J[3]	-	Recovery standard area counts outside criteria: J detects, UJ non-detects.
J[4]	-	Cleanup standard recoveries outside criteria: J detects, UJ non-detects.

EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error		
To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor To determine potential sources of dioxin/furan contamination These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.	Yes, Sampling Method appropriate for all samples. Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: J[1,2,3,4,5]	Refer to qualification in R/S Key on Table I: N/A	**	TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.020 ppb. One single blind performance evaluation (PE) sample (fortified native soil PC00255) was evaluated for this SDG. All congeners and homologue groups were scored acceptable. The majority of the sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

* The evaluation of "sampling error" cannot be completely assessed in the data validation.

** Sampling variability is not assessed in data validation.

Validator: fc

Date: 5/26/99

Data Summary Table
Dioxin/Furan Analysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-109

SAMPLE NUMBER:	3428-CMS-109 #		3428-CMS-117 #		3428-CMS-118 #		3428-CMS-124 #		3428-CMS-125 #		3428-CMS-126 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	1080 $		6540 $		2510 $		191		27.7		37.0	
1,2,3,7,8-PeCDD	2.2 J		1.4 J		3.6 J		3.8 J		1.0 J			0.9 *
1,2,3,4,7,8-HxCDD	3.6 J		1.2 J		2.6 J		4.5 J		1.2 J		1.0 J	
1,2,3,6,7,8-HxCDD	11.8		4.0 J		9.6		6.5		2.5 J		4.1 J	
1,2,3,7,8,9-HxCDD	10.4		3.6 J		10.0		13.2		3.6 J		2.8 J	
1,2,3,4,6,7,8-HpCDD	254		78.5		150		84.0		48.1		45.7	
OCDD	1830		561		1750		591		514		1070	
2,3,7,8-TCDF	5.2		2.5		13.9		50.8		3.3		5.7	
1,2,3,7,8-PeCDF	2.1 J		0.99 J		4.4 J		10.4			0.94 *	1.7 J	
2,3,4,7,8-PeCDF	3.5 J			1.4 *	8.4		13.1		1.8 J		3.4 J	
1,2,3,4,7,8-HxCDF	7.8		3.1 J		18.9		18.8		4.3 J		7.9	
1,2,3,6,7,8-HxCDF	5.4		2.1 J		7.1		6.8		1.7 J		2.7 J	
2,3,4,6,7,8-HxCDF	7.5		3.1 J		8.5		7.8		UJ	1.2	3.2 J	
1,2,3,7,8,9-HxCDF	UJ	0.27	U	0.2	UJ	0.56	UJ	0.26	UJ	0.1	UJ	0.16
1,2,3,4,6,7,8-HpCDF	73.3		23.7		48.6		31.2		8.1		18.0	
1,2,3,4,7,8,9-HpCDF	5.3		1.8 J		5.5		2.9 J		1.0 J		1.9 J	
OCDF	137		45.1		170		38.7		20.2		549	
TOTAL TCDD	1080 $J	1110 *	6610 $J		2510 $J	2530 *	249 J	251 *	*32.5 J		43.1 J	
TOTAL PeCDD	13.1 J	15.0 *	6.3 J	12.0 *	30.7 J	33.1 *	47.3 J	75.8 *	6.4 J	10.0 *	6.5 J	13.2 *
TOTAL HxCDD	87.0 J		29.3 J	29.7 *	98.2 J		100 J		26.9 J	27.0 *	40.2 J	
TOTAL HpCDD	535 J		148 J		305 J		191 J		95.1 J		95.4 J	
TOTAL TCDF	46.8 J	47.0 *	24.1 J	25.3 *	84.2 J	84.5 *	279 J		19.2 J		31.6 J	31.9 *
TOTAL PeCDF	106 J	108 *	39.7 J	43.4 *	125 J	126 *	192 J		20.9 J	21.9 *	41.4 J	41.6 *
TOTAL HxCDF	135 J	135 *	51.8 J	52.2 *	158 J	159 *	111 J	113 *	20.8 J	21.1 *	44.1 J	44.5 *
TOTAL HpCDF	199 J		67.5 J		120 J		54.0 J		14.1 J	14.6 *	32.8 J	
TOXICITY EQUIVALENCY:	1093 J		6545 J		2527 J		213 J		31.9 J		44.3 J	
% SOLIDS:	68.4		75.6		77.3		67.7		78.4		77.5	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DA	03/04/99		03/04/99		03/04/99		03/04/99		03/04/99		03/04/99	
ANALYSIS DATE:	03/20/99		03/19/99		03/19/99		03/19/99		03/19/99		03/19/99	
LAB SAMPLE ID:	U991139		U991118		U111901		U991124		U991127		U991128	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J". Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
$ = Value reported from a 1:100 dilution analysis

Data Summary Table
Dioxin/Furan Analysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-109

SAMPLE NUMBER:	3428-CMS-126DUP #		3428-CMS-127 #		3428-CMS-128 #		3428-CMS-131 #		3428-CMS-132 #		3428-CMS-133 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	36.6		35.1		11.4		3300 $J		16.8		721 $	
1,2,3,7,8-PeCDD	1.0 J		0.74 J		1.1 J		4.1 J		0.65 J		2.9 J	
1,2,3,4,7,8-HxCDD	1.2 J		0.86 J		1.6 J		3.5 J		0.52 J		4.5 J	
1,2,3,6,7,8-HxCDD	4.5 J		1.5 J		2.7 J		8.4 J		1.3 J		9.5 J	
1,2,3,7,8,9-HxCDD	3.1 J		2.0 J		3.7 J		13.4 J		1.9 J		12.6 J	
1,2,3,4,6,7,8-HpCDD	50.7		34.8		53.1		150 J		22.5		164 J	
OCDD	1110		1990		2080		1320 J		399		735 J	
2,3,7,8-TCDF	6.7		1.7		4.3		13.1 J		2.4		2.9	
1,2,3,7,8-PeCDF		1.5 *	0.53 J		1.4 J		5.4 J		0.71 J		U	0.2
2,3,4,7,8-PeCDF	3.7 J		0.91 J		2.6 J		6.3 J		1.3 J		1.2 J	
1,2,3,4,7,8-HxCDF	8.4		UJ	1.7	3.5 J		19.0 J		2.7 J		2.5 J	
1,2,3,6,7,8-HxCDF	2.6 J		UJ	0.72	UJ	1.4	12.9 J		UJ	1.1	UJ	1.3
2,3,4,6,7,8-HxCDF	3.4 J		UJ	0.83	1.9 J		10.7 J		UJ	0.95	UJ	1.4
1,2,3,7,8,9-HxCDF	UJ	0.2	U	0.10	U	0.09	UJ	0.81	U	0.1	UJ	0.4
1,2,3,4,6,7,8-HpCDF	19.9		4.0 J		6.3		129 J		6.5			11.3 *
1,2,3,4,7,8,9-HpCDF	2.0 J			0.48 *	0.76 J		7.9 J			0.69 *	UJ	1.1
OCDF	545		10.2		UJ	7.4	150 J		19.7		11.2 J	
TOTAL TCDD	42.2 J	42.7 *	37.8 J	38.1 *	15.7 J	16.0 *	3360 $J		21.0 J	21.5 *	721 $J	
TOTAL PeCDD	8.8 J	13.2 *	3.9 J	7.4 *	7.0 J	10.1 *	37.3 J	52.2 *	4.9 J	8.7 *	9.9 J	
TOTAL HxCDD	47.4 J	47.6 *	16.8 J		29.3 J		108 J		16.4 J	16.8 *	84.5 J	
TOTAL HpCDD	111 J		77.5 J		109 J		296 J		48.7 J		312 J	
TOTAL TCDF	36.0 J	36.1 *	11.7 J	12.3 *	25.3 J	25.4 *	98.8 J	99.8 *	18.6 J		17.4 J	19.6 *
TOTAL PeCDF	42.8 J	44.3 *	18.0 J	19.3 *	37.6 J	38.0 *	173 J	176 *	23.9 J	25.3 *	22.4 J	
TOTAL HxCDF	50.6 J	50.8 *	13.5 J	13.6 *	21.7 J		232 J	233 *	17.9 J		27.3 J	
TOTAL HpCDF	34.5 J		7.2 J	7.7 *	11.2 J		228 J		11.2 J	11.9 *	10.8 J	22.1 *
TOXICITY EQUIVALENCY:	44.4 J		39.0 J		17.8 J		3318 J		19.4 J		729 J	
% SOLIDS:	75.6		86.4		80.3		66		79.9		92.1	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DA	03/04/99		03/04/99		03/04/99		03/04/99		03/04/99		03/07/99	
ANALYSIS DATE:	03/19/99		03/19/99		03/19/99		03/19/99		03/19/99		03/19/99	
LAB SAMPLE ID:	U991129		U991130		U991131		U991132		U991133		T991854	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J". Values without an "*" are the Detection Limits.
# = These values are reported on a dry weight basis.
$ = Value reported from a 1:100 dilution analysis.

Data Sumr Table
Dioxin/Furan Analy Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-109

SAMPLE NUMBER:	3428-CMS-134 #		3428-CMS-139 #		3428-CMS-140 #		3428-CMS-141 #		3428-CMS-147 #		3428-CMS-152 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	15520 $		147		116000 @J		35400 @J		5630 $		1300 $	
1,2,3,7,8-PeCDD	21.6 J		2.3 J		94.0 J		22.3 J		73.3 J		7.40	
1,2,3,4,7,8-HxCDD	32.2 J		2.9 J		87.7 J		32.1 J		78.0 J		6.80	
1,2,3,6,7,8-HxCDD	70.2 J		6.7		335 J		71.2 J		230 J		17.5	
1,2,3,7,8,9-HxCDD	89.3 J		10.2		309 J		87.4 J		291 J		26.9	
1,2,3,4,6,7,8-HpCDD	1410 J		127		9790 $		1310 J		4740 $J		356	
OCDD	13540 $		1200		167640 $		11510 $		24430 $J		2940	
2,3,7,8-TCDF	69.0 J		7.6		810 $		49.6 J		1510 $		137	
1,2,3,7,8-PeCDF	10.9 J			1.9 *	209 J		11.0 J		182 J		39.5	
2,3,4,7,8-PeCDF	22.4 J		3.9 J		330 J		19.0 J		393 J		64.9	
1,2,3,4,7,8-HxCDF	37.5 J		10.3		1380 J		49.5 J		1530 J		189	
1,2,3,6,7,8-HxCDF	16.2 J		4.0 J		406 J		21.9 J		461 J		62.4	
2,3,4,6,7,8-HxCDF	21.2 J		4.5 J		566 J		26.0 J		692 J		58.4	
1,2,3,7,8,9-HxCDF	UJ	0.67	U	0.4	13.7 J		UJ	0.83	15.5 J		UJ	0.93
1,2,3,4,6,7,8-HpCDF	248 J		22.5		4190 $		188 J		4040 $J		205	
1,2,3,4,7,8,9-HpCDF	8.20 J		2.9 J		266 J		11.8 J		254 J		20.2	
OCDF	204 J		53.4		10230 $		209 J		1220 J		150	
TOTAL TCDD	15690 $J	15780 *	160 J		120000 @J	143000 *	35400 @J	70700 *	7670 $J		1400 $J	1430 *
TOTAL PeCDD	122 J	129 *	16.2 J	17.7 *	1510 J	2630 *	109 J	115 *	1300 J	2290 *	78.6 J	85 *
TOTAL HxCDD	630 J	636 *	71.3 J		4470 J		700 J		3650 J		211 J	
TOTAL HpCDD	2640 J		247 J		25140 $J		2470 J		9120 $J		703 J	
TOTAL TCDF	406 J	408 *	40.8 J	42.1 *	4010 $J	4090 *	333 J		6730 $J		753 J	
TOTAL PeCDF	366 J	367 *	47.6 J	49.8 *	4620 J		420 J	421 *	5140 J		722 J	726 *
TOTAL HxCDF	346 J		54.2 J	56.3 *	6100 J		419 J	421 *	5800 J		614 J	615 *
TOTAL HpCDF	525 J		56.6 J	58.6 *	14100 $J		375 J		6760 $J		354 J	
TOXICITY EQUIVALENCY:	15607 J		158 J		116934 J		35482 J		6469 J		1397 J	
% SOLIDS:	58.3		61.7		46.7		38.2		70 8		65.8	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DA	03/07/99		03/07/99		03/07/99		03/07/99		03/07/99		03/07/99	
ANALYSIS DATE:	03/19/99		03/19/99		03/19/99		03/19/99		03/19/99		03/20/99	
LAB SAMPLE ID:	T991855		T991856		T991857		T991858		T991862		T991863	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits

= These values are reported on a dry weight basis.

$ = Value reported from a 1:100 dilution analysis.

@J = Value reported from Method 8280A Low Resolution analysis. See Attachment I.

Data Summ[illegible] Table

Dioxin/Furan Analy[illegible]oil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-109

SAMPLE NUMBER:	3428-CMS-153 #		3428-CMS-155 #		3428-CMS-160 #		3428-CMS-160DUP #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	35.2		6700 $		12610 $		11270 $	
1,2,3,7,8-PeCDD	3.4 J		24.8 J		6.6 J		5.6 J	
1,2,3,4,7,8-HxCDD	1.8 J		8.8 J		4.2 J		3.6 J	
1,2,3,6,7,8-HxCDD	3.3 J		27.8 J		12.1 J		10.2 J	
1,2,3,7,8,9-HxCDD	16.2		27.2 J		14.0 J		11.4 J	
1,2,3,4,6,7,8-HpCDD	54.5		815 J		220 J		188 J	
OCDD	1120		19080 $		1600 J		1370 J	
2,3,7,8-TCDF		0.71 *	127 J		34.1 J		31.7 J	
1,2,3,7,8-PeCDF	U	0.3	30.8 J		9.3 J		8.2 J	
2,3,4,7,8-PeCDF	U	0.3	49.2 J		12.3 J		11.1 J	
1,2,3,4,7,8-HxCDF	UJ	0.91	121 J		30.5 J		24.8 J	
1,2,3,6,7,8-HxCDF	U	0.3	38.3 J		13.3 J		12.3 J	
2,3,4,6,7,8-HxCDF	U	0.4	45.6 J		14.7 J		12.1 J	
1,2,3,7,8,9-HxCDF	U	0.5	UJ	1.3	UJ	0.60	UJ	0.66
1,2,3,4,6,7,8-HpCDF	3.6 J		214 J		98.5 J		85.2 J	
1,2,3,4,7,8,9-HpCDF	U	1.3	25.0 J		7.6 J		6.3 J	
OCDF	U	3.0	350 J		122 J		103 J	
TOTAL TCDD	54.6 J	57.9 *	6890 $J	6920 *	12610 $J	12820 *	11410 $J	
TOTAL PeCDD	37.3 J	41.8 *	160 J	227 *	49.0 J	53.2 *	37.5 J	44.7 *
TOTAL HxCDD	82.5 J	87.1 *	346 J		148 J		122 J	125 *
TOTAL HpCDD	128 J		1890 J		468 J		388 J	
TOTAL TCDF	0.36 J	1.1 *	708 J		285 J		275 J	
TOTAL PeCDF	3.5 J		814 J	817 *	298 J	305 *	256 J	263 *
TOTAL HxCDF	7.9 J		734 J		293 J		248 J	249 *
TOTAL HpCDF	6.9 J		553 J		208 J		168 J	
TOXICITY EQUIVALENCY:	40.8 J		6808 J		12637 J		11294 J	
% SOLIDS:	85.9		79.2		62.9		61.3	
DILUTION FACTOR:	1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DA	03/07/99		03/07/99		03/07/99		03/07/99	
ANALYSIS DATE:	03/20/99		03/20/99		03/20/99		03/20/99	
LAB SAMPLE ID:	T991864		T991865		T991866		T991867	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits

= These values are reported on a dry weight basis.

$ = Value reported from a 1:100 dilution analysis.

Data Validation
Report Number 4

Steve Stodola
US EPA Approval Signature

June 7, 1999
Date

May 5, 1999
B-99-05-E-01
Revised: June 7, 1999

Ms. Christine Clark
Regional Sample Control Custodian
Office of Environmental Measurement and Evaluation
U.S. EPA Region I
60 Westview Street
Lexington, Massachusetts 02421

Reference 85

Re: WA No. 01-99-3-02, Task No. 2, TDF No. 129
Case No. 3428 / SDG No. 3428-CMS-044
Triangle Laboratories - Durham, NC
Woonasquatucket River/Centredale Manor Site, N. Providence, RI

Dioxin/Furan: 30/Soil/3428-CMS-044, 3428-CMS-047, 3428-CMS-050, 3428-CMS-053, 3428-CMS-056 to 3428-CMS-061, 3428-CMS-061DUP, 3428-CMS-062 to 3428-CMS-068, 3428-CMS-068DUP, 3428-CMS-216, 3428-CMS-217, 3428-CMS-217DUP, 3428-CMS-218 to 3428-CMS-225
(Soil Field Duplicate Pairs/3428-CMS-061 and 3428-CMS-061DUP, 3428-CMS-068 and 3428-CMS-068DUP, 3428-CMS-217 and 3428-CMS-217DUP)

1/Soil PE/PC00259

Dear Ms. Clark:

A Tier III data validation was performed on the Dioxin/Furan analytical data for 30 soil samples and one PE sample collected by Roy F. Weston, Inc. for the U.S. EPA at the Woonasquatucket River/Centredale Manor Site in N. Providence, RI. The samples were analyzed according to EPA Method 8290 Rev. 0, September 1994. The samples were validated using first the criteria in EPA Method 8290, defaulting second to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria and finally to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98). Unless otherwise stated all criteria used were Method 8290 criteria. The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)
- * Preservation and Technical Holding Times
- PE Samples/Accuracy Check
- * Window Defining Mix

*	•	Initial and Continuing Calibrations
*	•	Chromatographic Resolution
*	•	Instrument Sensitivity Check
	•	Blanks
	•	Matrix Spike/Matrix Spike Duplicate
	•	Laboratory and Field Duplicates
	•	Internal/Clean-up/Recovery Standards
*	•	Sample Analysis and Identification
	•	Sample Quantitation
*	•	Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity
*	•	Required Sample Reruns and Second Column Confirmation
	•	System Performance

* - All criteria were met for this parameter.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes Site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor
- To determine potential sources of dioxin/furan contamination
- These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.

Sample 3428-CMS-219 had percent solids less than 30% but greater than 10%. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively, and the non-detects were not rejected.

TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.250 ppb.

2378-TCDD was scored Action High in the fortified native soil PE sample PC00259. All non 2378-TCDD congeners were scored acceptable. The ESAT data validator used professional

judgement to estimate 2378-TCDD values for all samples in this SDG. The majority of the 2378-TCDD sampling and analysis quality control met acceptance criteria and the 2378-TCDD sample data can be used for the site objectives. Although assorted quality control issues were present for the non-2378-TCDD congeners (tetra furans, and penta - octa dioxins and furans), overall data usability should not be adversely impacted.

Data Completeness

A continuing calibration standard (lab file ID T991872) was missing from the raw data package. This data was requested from the laboratory via the EPA WAM on 4/22/99. These pages were received on 04/28/99.

PE Samples/Accuracy Check

The fortified PE sample for this sampling event is PC00259

The following table summarizes the PE sample results for the fortified PE sample PC00259 which did not meet criteria, and the resulting sample qualifications:

Compound	Score	Action		Affected Samples
		Positive Detects	NDs	
2378-TCDD	Action High	J	A	All

Blanks

The table below summarizes the compounds that were detected in the laboratory method blanks, the action levels, and the samples affected:

Compound	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
2378-TCDD	Cleanup Blank	4.6	23	3428-CMS-044, 3428-CMS-047, 3428-CMS-053, 3428-CMS-059, 3428-CMS-062, 3428-CMS-065, 3428-CMS-068, 3428-CMS-068DUP, 3428-CMS-220, 3428-CMS-224
12378-PeCDD	Method Blank	0.34	1.7	3428-CMS-044, 3428-CMS-047, 3428-CMS-053, 3428-CMS-058, 3428-CMS-067, 3428-CMS-068, 3428-CMS-068DUP, 3428-CMS-220, 3428-CMS-222
2378-TCDF	Method Blank	0.63	3.15	3428-CMS-044, 3428-CMS-050, 3428-CMS-062, 3428-CMS-065, 3428-CMS-067, 3428-CMS-224

Compound	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
123478-HxCDF	Method Blank	0.31	1.55	3428-CMS-224
Total Tetra Dioxin	Cleanup Blank	4.6	46	3428-CMS-044, 3428-CMS-047, 3428-CMS-053, 3428-CMS-059, 3428-CMS-062, 3428-CMS-065, 3428-CMS-068, 3428-CMS-068DUP, 3428-CMS-220, 3428-CMS-224
Total Penta Dioxin	Method Blank	719*	7190	All samples, except 3428-CMS-050
Total Hexa Dioxin	Method Blank	1.8	18	3428-CMS-050, 3428-CMS-065, 3428-CMS-067, 3428-CMS-224
Total Tetra Furan	Method Blank	1.2*	12	3428-CMS-044, 3428-CMS-050, 3428-CMS-224

*EMPC value

Blank action levels are based on ten times the highest concentration of the contaminant determined in any blank for OCDD/OCDF or Total Homologues. Blank action levels are based on five times the highest concentration of the contaminant determined in any blank for all other analytes as specified in the Dioxin Data Validation SOP (ESAT-01-0007, 11/20/98). The positive results less than the action level are reported as non-detects and estimated (UJ) on the Data Summary Table.

Matrix Spike/Matrix Spike Duplicate

Two matrix spike/matrix spike duplicate pairs were evaluated for this SDG: 3428-CMS-060MS/ 3428-CMS-060MSD, and 3428-CMS-225MS/3428-CMS-225MSD. Matrix spike/matrix spike duplicate pair 3428-CMS-225MS/3428-CMS-225MSD met criteria. Matrix spike/matrix spike duplicate pair 3428-CMS-060MS/3428-CMS-060MSD did not meet criteria for 2378-TCDD and OCDD. However, samples were not qualified since native concentrations were greater than 4x the spike amount for these analytes.

Laboratory and Field Duplicates

Three field duplicate pairs were evaluated for this SDG (3428-CMS-061/3428-CMS-061DUP, 3428-CMS-068/3428-CMS-068DUP, and 3428-CMS-217/3428-CMS-217DUP). Duplicate pair 3428-CMS-068/3428-CMS-068DUP met criteria.

The tables below summarizes the soil field duplicate results that did not meet the duplicate criterion of Relative Percent Difference (RPD) < 50% for soil/sediments as specified in EPA Region I's Environmental Services Assistance Team Dioxin Validation SOP ESAT-01-0007 (11/20/98):

Compound	3428-CMS-061	3428-CMS-061DUP	RPD	Action		Affected Samples
	%Solids (72.4%)	%Solids (76.3%)		Positive Detects	NDs	
	Sample Conc. (ng/Kg)	Duplicate Conc. (ng/Kg)				
OCDD	29990	14630	69	J	UJ	All samples

Compound	3428-CMS-217	3428-CMS-217DUP	RPD	Action		Affected Samples
	%Solids (53.4%)	%Solids (51.7%)		Positive Detects	NDs	
	Sample Conc. (ng/Kg)	Duplicate Conc. (ng/Kg)				
2378-TCDD	2360	4980	71	J	UJ	All samples

Professional judgement was used to estimate all of the positive results and non-detects, (J) and (UJ) respectively, for 2378-TCDD, 12378-PeCDF, and OCDD in all soil samples.

Internal/Clean-up/Recovery Standards

- Clean-up Standards

The following table summarizes the cleanup standards with recoveries which did not meet the method acceptance criterion of 40%-130%:

Standard	% Recovery	Action		Affected Samples #
		Positive Detects	NDs	
^{37}C -2378-TCDD	309	J	UJ	3428-CMS-057 $
^{37}C -2378-TCDD	2390	J	UJ	3428-CMS-060 $
^{37}C -2378-TCDD	272	J	UJ	3428-CMS-063 $
^{37}C -2378-TCDD	499	J	UJ	3428-CMS-216 ∞
^{37}C -2378-TCDD	181	J	UJ	3428-CMS-217 &
^{37}C -2378-TCDD	188	J	UJ	3428-CMS-217DUP $
^{37}C -2378-TCDD	135	J	UJ	3428-CMS-218 $

\# All analyses were without dilution. Analytes reported from a 1:100 dilution were unaffected.

$ TCDD reported from a 1:100 dilution analysis.

& TCDD and OCDD reported from a 1:100 dilution analysis.

∞ TCDD, OCDD, 1234678-HpCDD reported from a 1:100 dilution analysis.

- Recovery Standards

The following table summarizes the recovery standards with area counts which failed to meet the acceptance criterion of 50-200% of the area counts of the associated daily calibration standard as specified in the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996, Internal Standard Section:

Recovery Standard	RS Area	Area Limits	Action		Affected Samples
			Positive Detects*	NDs*	
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	924 636	190-758 98-394	J J	UJ UJ	3428-CMS-044
^{13}C-123789-HxCDD	505	98-394	J	UJ	3428-CMS-053
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	994 722	190-758 98-394	J J	UJ UJ	3428-CMS-056
^{13}C-123789-HxCDD	5155	5568-22270	J	UJ	3428-CMS-059 ∞
^{13}C-1234-TCDD	4675	6723-26890	J	UJ	3428-CMS-060 ◊
^{13}C-123789-HxCDD	69	102-407	J	UJ	3428-CMS-061 #
^{13}C-123789-HxCDD	79	102-407	J	UJ	3428-CMS-061DUP #
^{13}C-123789-HxCDD	146	180-719	J	UJ	3428-CMS-217 #
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	53 27	297-1189 180-719	J J	UJ UJ	3428-CMS-217DUP $
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	451 159	530-2119 287-1149	J J	UJ UJ	3428-CMS-219 $

* For those compounds associated with the recovery standard referenced.

^{13}C-1234-TCDD	^{13}C-123789-HxCDD
TCDD/TCDF	HxCDD/HxCDF
PeCDD/PeCDF	HpCDD/HpCDF
	OCDD/OCDF

\# Sample analysis without dilution (1:1). Affected analytes are as referenced above. OCDD was reported from the 1:100 dilution analysis, and was not affected.

$ Sample analysis without dilution (1:1). Affected analytes are as referenced above. TCDD was reported from the 1:100 dilution analysis, and was not affected.

∞ Sample analysis at a 1:100 dilution. OCDD was reported from this analysis and was affected.

◊ Sample analysis at a 1:100 dilution. TCDD was reported from this analysis and was affected.

Sample Quantitation

Positive results reported below the reporting limit were flagged as estimated (J) on the Data Summary Table.

Sample 3428-CMS-219 had percent solids of 26.7%, which is less than 30% but greater than 10%. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively, and the non-detects were not rejected.

The laboratory reported several values which were above the upper calibration range. Since quantitative accuracy is questionable above the upper range of calibration, the ESAT validator reported the following values from 1:100 dilutions:

Congener	Affected Sample
2378-TCDD Total TCDD	3428-CMS-057, 3428-CMS-063, 3428-CMS-064, 3428-CMS-217DUP, 3428-CMS-218, 3428-CMS-219
OCDD	3428-CMS-059, 3428-CMS-061, 3428-CMS-061DUP
2378-TCDD † Total TCDD † Total HxCDF	3428-CMS-060 †
2378-TCDD 1234678-HpCDD OCDD Total TCDD Total HpCDD	3428-CMS-216
2378-TCDD OCDD Total TCDD	3428-CMS-217, 3428-CMS-221

† The analyte concentration from the 1:100 dilution is also beyond the instrument calibration range. This value has been flagged as estimated (J) on the Data Summary Table. Sample 3428-CMS-060 was reextracted and reanalyzed by Method 8280A Low Resolution and the results are submitted in SDG 3428-CMS-060 as Attachment I. However, please note that no results were used from the Low Resolution analysis due to QC exceedences. Please see Attachment I for Data Validation of these results.

Toxicity Equivalency Factor (TEF) and Isomer Specificity

All TEQ values were calculated by the ESAT data validator. The data were reported in accordance with standard Region I validation procedures which take into account the observed blank contamination, dilutions, and EMPC values. These calculated values are reported on the Data Summary Tables on a dry weight basis, where applicable. The TEF values are published in EPA/625/3-89/016, "Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs)" and 1989 Update, Part II, page 13.

System Performance

One or both of the recovery standards did not meet area count criteria for several samples. This could be related to congener loss during analysis, improperly capped sample vials, interferences, and/or degradation of the recovery standard spiking solution.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Leslie Chan
Scientist

Louis Macri
ESAT Team Manager

Attachments: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Data Summary Tables
Data Validation Worksheets
Support Documentation

Table I
Recommendation Summary Table for Dioxins/Furans
Centredale Manor Site
Case No. 3428/SDG No. 3428-CMS-044

Sample Nos.	3428-CMS-044	3428-CMS-047	3428-CMS-050	3428-CMS-053	3428-CMS-056	3428-CMS-057	3428-CMS-058	3428-CMS-059	3428-CMS-060	3428-CMS-061
Compound										
2378-TCDD	J[1,2,4,5]	J[1,2,4]	J[1,4]	J[1,2,4]	J[1,4,5]	J[1,4]	J[1,4]	J[1,2,4]	J[1,3,4,5]	J[1,4]
12378-PeCDD	J[2,5]	J[2]	A	J[2]	J[5]	J[6]	J[2]	A	J[6]	A
123478-HxCDD	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
123678-HxCDD	J[5]	A	J[2]	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
123789-HxCDD	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
1234678-HpCDD	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
OCDD	J[4,5]	J[4]	J[4]	J[4,5]	J[4,5]	J[4,6]	J[4]	J[4,5]	J[4,6]	J[4]
2378-TCDF	J[2,5]	A	J[2]	A	J[5]	J[6]	A	A	J[6]	A
12378-PeCDF	J[5]	A	A	A	J[5]	J[6]	A	A	J[6]	A
23478-PeCDF	J[5]	A	A	A	J[5]	J[6]	A	A	J[6]	A
123478-HxCDF	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
123678-HxCDF	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
123789-HxCDF	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
234678-HxCDF	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
1234678-HpCDF	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
1234789-HpCDF	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]
OCDF	J[5]	A	A	J[5]	J[5]	J[6]	A	A	J[6]	J[5]

Table I
Recommendation Summary Table for Dioxins/Furans
Centredale Manor Site
Case No. 3428/SDG No. 3428-CMS-044

Sample Nos.	3428-CMS-061DUP	3428-CMS-062	3428-CMS-063	3428-CMS-064	3428-CMS-065	3428-CMS-066	3428-CMS-067	3428-CMS-068	3428-CMS-068DUP	3428-CMS-216
Compound										
2378-TCDD	J[1,4]	J[1,2,4]	J[1,4]	J[1,4]	J[1,2,4]	J[1,4]	J[1,4]	J[1,2,4]	J[1,2,4]	J[1,4]
12378-PeCDD	A	A	J[6]	A	A	A	J[2]	J[2]	J[2]	J[6]
123478-HxCDD	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
123678-HxCDD	J[5]	A	J[6]	A	J[2]	A	A	A	A	J[6]
123789-HxCDD	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
1234678-HpCDD	J[5]	A	J[6]	A	A	A	A	A	A	A
OCDD	J[4]	J[4]	J[4,6]	J[4]	J[4]	J[4]	J[4]	J[4]	J[4]	J[4]
2378-TCDF	A	J[2]	J[6]	A	J[2]	A	J[2]	A	A	J[6]
12378-PeCDF	A	A	J[6]	A	A	A	A	A	A	J[6]
23478-PeCDF	A	A	J[6]	A	A	A	A	A	A	J[6]
123478-HxCDF	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
123678-HxCDF	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
123789-HxCDF	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
234678-HxCDF	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
1234678-HpCDF	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
1234789-HpCDF	J[5]	A	J[6]	A	A	A	A	A	A	J[6]
OCDF	J[5]	A	J[6]	A	A	A	A	A	A	J[6]

Table I
Recommendation Summary Table for Dioxins/Furans
Centredale Manor Site
Case No. 3428/SDG No. 3428-CMS-044

Sample Nos.	3428-CMS-217	3428-CMS-217DUP	3428-CMS-218	3428-CMS-219	3428-CMS-220	3428-CMS-221	3428-CMS-222	3428-CMS-223	3428-CMS-224	3428-CMS-225
Compound										
2378-TCDD	J[1,4]	J[1,4]	J[1,4]	J[1,4,7]	J[1,2,4]	J[1,4]	J[1,4]	J[1,4]	J[1,2,4]	J[1,4]
12378-PeCDD	J[6]	J[5,6]	J[6]	J[5,7]	J[2]	A	J[2]	A	A	A
123478-HxCDD	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
123678-HxCDD	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	J[2]	A
123789-HxCDD	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
1234678-HpCDD	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
OCDD	J[4]	J[4,5,6]	J[4,6]	J[4,5,7]	J[4]	J[4]	J[4]	J[4]	J[4]	J[4]
2378-TCDF	J[6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	J[2]	A
12378-PeCDF	J[6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
23478-PeCDF	J[6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
123478-HxCDF	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	J[2]	A
123678-HxCDF	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
123789-HxCDF	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
234678-HxCDF	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
1234678-HpCDF	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
1234789-HpCDF	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A
OCDF	J[5,6]	J[5,6]	J[6]	J[5,7]	A	A	A	A	A	A

Table I
Recommendation Summary Table for Dioxins/Furans

A	-	Accept results.
J[1]	-	Unacceptable PES score: J detects.
J[2]	-	Blank contamination: The positive results listed in the table in affected samples were reported as estimated detection limits (EDL) and were estimated (UJ).
J[3]	-	Concentration exceeded the instrument calibration range. Value was estimated (J).
J[4]	-	Field Duplicate precision outside criteria: J detects, UJ non-detects.
J[5]	-	Recovery standard area counts outside criteria: J detects, UJ non-detects.
J[6]	-	Cleanup standard recoveries outside criteria: J detects, UJ non-detects.
J[7]	-	Sample percent solids were less than 30% but greater than 10%: J detects, UJ non-detects.

EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error		
To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor To determine potential sources of dioxin/furan contamination These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.	No, Sample 3428-CMS-219 had percent solids less than 30% but greater than 10%. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively, and the non-detects were not rejected. Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: $J^{1,2,3,5,6}$	Refer to qualification in R/S Key on Table I: $J^{4,7}$	**	TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.025 ppb. 2378-TCDD was scored Action High in the fortified native soil PE sample PC00259. All non 2378-TCDD congeners were scored acceptable. The ESAT data validator used professional judgement to estimate 2378-TCDD values for all samples in this SDG. The majority of the sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

* The evaluation of "sampling error" cannot be completely assessed in the data validation.

** Sampling variability is not assessed in data validation.

Validator: _____

Date: 5/18/99

Data Summary Table
Dioxin/F[illegible]nalysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO. 3428 SDG NO.: 3428-CMS-044

SAMPLE NUMBER:	3428-CMS-044 #		3428-CMS-047 #		3428-CMS-050 #		3428-CMS-053 #		3428-CMS-056 #		3428-CMS-057 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	12.1	UJ	10.8	53.0 J		UJ	4.3	214 J		16340 $J	
1,2,3,7,8-PeCDD	UJ	0.63	UJ	1.1	U	0.6	UJ	1.2	5.2 J		3.6 J	
1,2,3,4,7,8-HxCDD		0.82 *	1.2 J		U	0.7		0.56 *	5.5 J		1.4 J	
1,2,3,6,7,8-HxCDD	2.3 J		10.3		UJ	1.2	1.8 J		8.8 J		4.3 J	
1,2,3,7,8,9-HxCDD	3.8 J		5.7		2.6 J		3.2 J		15.2 J		4.1 J	
1,2,3,4,6,7,8-HpCDD	41.3 J		83.7		28.0		26.3 J		107 J		64.9 J	
OCDD	439 J		534 J		481 J		272 J		902 J		545 J	
2,3,7,8-TCDF	UJ	1.7	4.8		UJ	1.2	4.2		45.7 J		5.5 J	
1,2,3,7,8-PeCDF	0.51 J		1.6 J		U	0.3		1.8 *	10.1 J		1.6 J	
2,3,4,7,8-PeCDF	0.57 J		1.6 J		U	0.3	1.3 J		18.2 J		4.1 J	
1,2,3,4,7,8-HxCDF	1.6 J		3.7 J		1.7 J		3.8 J		75.9 J		5.4 J	
1,2,3,6,7,8-HxCDF		0.74 *	1.8 J		0.84 J		1.6 J		18.9 J		2.8 J	
2,3,4,6,7,8-HxCDF		0.95 *	2.5 J		0.88 J		2.2 J		23.8 J		4.2 J	
1,2,3,7,8,9-HxCDF	UJ	0.08	0.11 J		U	0.5	UJ	0.3		0.8 *	UJ	1.2
1,2,3,4,6,7,8-HpCDF	8.8 J		14.6		7.2		10.2 J		95.0 J		25.5 J	
1,2,3,4,7,8,9-HpCDF	1.0 J		1.3 J		U	0.8	1.1 J		11.0 J		1.9 J	
OCDF	19.5 J		30.1		17.6		20.4 J		83.7 J		43.8 J	
TOTAL TCDD	UJ	14.0	UJ	19.1	54.3 J	55.1 *	UJ	10.2	241 J	242 *	16500 $J	
TOTAL PeCDD	UJ	6.2	UJ	12.3	UJ	0.60	UJ	11.6	UJ	85.8	UJ	14.8
TOTAL HxCDD	23.1 J	24.0 *	70.4 J		UJ	17.2	19.8 J	20.4 *	146 J		44.4 J	
TOTAL HpCDD	79.0 J		173 J		55.6 J		53.8 J		215 J		134 J	
TOTAL TCDF	UJ	9.3	26.5 J	27.2 *	UJ	6.3	16.6 J	20.1 *	155 J	156 *	50.0 J	
TOTAL PeCDF	11.2 J	11.7 *	32.2 J		6.6 J		23.6 J	28.1 *	256 J		120 J	123 *
TOTAL HxCDF	15.2 J	16.9 *	30.8 J	30.9 *	12.1 J	15.3 *	23.6 J	24.8 *	257 J	258 *	327 J	
TOTAL HpCDF	23.6 J		31.8		16.0 J		21.4 J	22.1 *	151 J		64.6 J	
TOXICITY EQUIVALENCY:	2.30 J		5.45 J		54.5 J		3.12 J		249 J		16300 J	
% SOLIDS:	87.3		72.9		88.0		78.4		79.3		75.2	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DATE:	02/28/99		02/28/99		02/28/99		02/28/99		02/28/99		02/28/99	
ANALYSIS DATE:	03/15/99		03/22/99		03/15/99		03/15/99		03/15/99		03/15/99	
LAB SAMPLE ID:	T991739		U991203		T991741		T991742		T991743		T991744	

* = These values are EMPCs (Estimated Maximum Possible Concentration). EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.

= These values are reported on a dry weight basis.

$ = Value reported from a 1:100 dilution analysis.

Data Summary Table
Dioxin/F[illegible]alysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-044

SAMPLE NUMBER:	3428-CMS-058 #		3428-CMS-059 #		3428-CMS-060 #		3428-CMS-061 #		3428-CMS-061DUP #		3428-CMS-062 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC :	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	178 J		UJ	13.3	115820 $J		111 J		161 J		UJ	4.8
1,2,3,7,8-PeCDD	UJ	1.2	6.7		28.0 J		16.0		13.1		2.4 J	
1,2,3,4,7,8-HxCDD	1.7 J		17.7		7.6 J		34.5 J		29.0 J		4.7 J	
1,2,3,6,7,8-HxCDD	4.4 J		40.3		93.3 J		56.9 J		48.8 J		12.0	
1,2,3,7,8,9-HxCDD	5.0		34.3		44.2 J		72.5 J		56.6 J		10.6	
1,2,3,4,6,7,8-HpCDD	104		914		276 J		1540 J		1270 J		276	
OCDD	1010 J		12680 $J		1710 J		29990 $J		14630 $J		2390 J	
2,3,7,8-TCDF	4.6		4.8		78.8 J		10.5		13.0		UJ	2.9
1,2,3,7,8-PeCDF	1.8 J		2.0 J		15.6 J		3.9 J		5.3		U	0.7
2,3,4,7,8-PeCDF	2.6 J		3.2 J		56.6 J		6.9		6.5		1.6 J	
1,2,3,4,7,8-HxCDF	10.3		11.4		47.3 J		24.1 J		24.6 J		4.5 J	
1,2,3,6,7,8-HxCDF	4.6 J		9.1		16.0 J		14.8 J		15.0 J		3.2 J	
2,3,4,6,7,8-HxCDF	4.1 J		12.1		21.2 J		18.4 J		17.1 J		5.5	
1,2,3,7,8,9-HxCDF	U	0.5	U	1.3	0.6 J		UJ	2.6	UJ	1.6	U	0.9
1,2,3,4,6,7,8-HpCDF	24.7		179		102 J		275 J		229 J		60.6	
1,2,3,4,7,8,9-HpCDF	3.6 J		9.3		UJ	12.4	15.7 J		14.8 J		3.7 J	
OCDF	58.5		350		131 J		495 J		419 J		154	
TOTAL TCDD	185 J		UJ	20.3	118450 $J	118560 *	165 J	182 *	220 J		UJ	6.7
TOTAL PeCDD	UJ	7.4	UJ	30.5	UJ	201	UJ	149	UJ	124	UJ	9.0
TOTAL HxCDD	38.4 J		266 J		940 J		538 J		409 J	414 *	73.9 J	77.4 *
TOTAL HpCDD	193 J		1730 J		628 J		2740 J		2200 J		526 J	
TOTAL TCDF	24.3 J		37.0 J	41.2 *	663 J		70.5 J	74.2 *	96.9 J		17.4 J	19.3 *
TOTAL PeCDF	35.3 J	36.7 *	110 J	114 *	2090 J	2110 *	150 J		151 J		39.1 J	44.0 *
TOTAL HxCDF	56.6 J	57.5 *	235 J		6150 $J	6740 *	372 J		338 J		85.4 J	
TOTAL HpCDF	59.9 J		415 J	420	203 J		631 J	638 *	545 J		158 J	
TOXICITY EQUIVALENCY	185 J		42.1 J		116000 J		195 J		222 J		12.0 J	
% SOLIDS:	86.2		66.7		70.6		72.4		76.3		78.8	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DATE:	02/28/99		02/28/99		02/28/99		02/28/99		02/28/99		02/28/99	
ANALYSIS DATE:	03/15/99		03/20/99		03/20/99		03/20/99		03/20/99		03/14/99	
LAB SAMPLE ID:	T991745		T991876		T991877		T991880		T991881		T991720	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J". Values without an "*" are the Detection Limits.
# = These values are reported on a dry weight basis.
$ = Value reported from a 1:100 dilution analysis

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-044

SAMPLE NUMBER:	3428-CMS-063 #		3428-CMS-064 #		3428-CMS-065 #		3428-CMS-066 #		3428-CMS-067 #		3428-CMS-068 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	4430 $J		689 $J		UJ	8.2	62.0 J		115 J		UJ	7.9
1,2,3,7,8-PeCDD	4.2 J		1.9 J		U	0.2	2.1 J		UJ	0.58	UJ	1.1
1,2,3,4,7,8-HxCDD	2.8 J		2.5 J		U	0.3	1.7 J		U	0.5	2.2 J	
1,2,3,6,7,8-HxCDD	9.3 J		4.3 J		UJ	0.75	3.8 J		1.4 J		8.2	
1,2,3,7,8,9-HxCDD	6.9 J		5.7		U	0.3	6.3		1.5 J		6.3	
1,2,3,4,6,7,8-HpCDD	245 J		94.9		6.8		76.4		29.9		179	
OCDD	2700 J		1050 J		62.5 J		1300 J		756 J		2070 J	
2,3,7,8-TCDF	31.5 J		7.8		UJ	2.2	9.8		UJ	3.0	3.7	
1,2,3,7,8-PeCDF	7.0 J		1.6 J			0.66 *	3.0 J			0.89 *	1.4 J	
2,3,4,7,8-PeCDF	15.5 J		5.4		1.8 J		6.7		1.5 J		2.0 J	
1,2,3,4,7,8-HxCDF	25.1 J		8.1		2.3 J		29.1		4.2 J		4.4 J	
1,2,3,6,7,8-HxCDF	9.1 J		3.0 J		0.81 J		12.5		1.6 J		2.4 J	
2,3,4,6,7,8-HxCDF	12.1 J		4.3 J		0.99 J		8.9		1.7 J		3.6 J	
1,2,3,7,8,9-HxCDF	UJ	0.6	U	0.7	U	0.2	U	0.2	U	0.3	U	0.2
1,2,3,4,6,7,8-HpCDF	83.7 J		26.3		4.9 J		29.9		10.0		37.0	
1,2,3,4,7,8,9-HpCDF	6.4 J		2.5 J		U	0.5	7.0			1.1 *		1.7 *
OCDF	379 J		68.5		6.7 J		76.4		38.1		111	
TOTAL TCDD	4510 $J		689 $J		UJ	10.3	73.2 J	77.5 *	118 J	119 *	UJ	11.4
TOTAL PeCDD	UJ	36.2	UJ	14.7	UJ	1.4	UJ	16.2	UJ	3.0	UJ	6.5
TOTAL HxCDD	110 J		49.6 J	51.1 *	UJ	7.3	48.5 J	49.9 *	UJ	14.1	50.1 J	50.9 *
TOTAL HpCDD	496 J		195 J		13.7 J		160 J		63.9 J		336 J	
TOTAL TCDF	209 J		54.0 J		12.8 J	14.0 *	56.4 J	61.1 *	17.2 J	17.9 *	18.6 J	20.5 *
TOTAL PeCDF	332 J	339 *	128 J	131	13.0 J	13.7 *	92.3 J	92.6 *	21.3 J	24.6 *	42.1 J	42.6 *
TOTAL HxCDF	657 J		432 J	434	12.6 J	12.7 *	115 J		27.7 J	28.7 *	56.0 J	57.0 *
TOTAL HpCDF	341 J		76.1 J		7.7 J		76.7 J		24.3 J	26.0 *	91.8 J	93.6 *
TOXICITY EQUIVALENCY:	4460 J		699 J		1.53 J		76.3 J		118 J		8.51 J	
% SOLIDS:	79.6		77.1		81.3		79.1		80.4		76.9	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DATE:	02/28/99		02/28/99		02/28/99		02/28/99		02/28/99		02/28/99	
ANALYSIS DATE:	03/14/99		03/14/99		03/14/99		03/14/99		03/14/99		03/14/99	
LAB SAMPLE ID:	T991721		T991722		T991723		T991724		T991725		T991726	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
# = These values are reported on a dry weight basis.
$ = Value reported from a 1.100 dilution analysis

Data Summary Table
Dioxin/Furan Analysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-044

SAMPLE NUMBER:	3428-CMS-068DUP #		3428-CMS-216 #		3428-CMS-217 #		3428-CMS-217DUP #		3428-CMS-218 #		3428-CMS-219 #	
STATION LOCATION:	AREA 1		RESIDENCE 1		RESIDENCE 2		RESIDENCE 2		RESIDENCE 2		RESIDENCE 2	
MATRIX	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	6.8	10330 $J		2360 $J		4980 $J		2190 $J		2170 $J	
1,2,3,7,8-PeCDD	UJ	1.5	66.2 J		22.2 J		17.4 J		19.9 J		12.8 J	
1,2,3,4,7,8-HxCDD	2.6 J		63.7 J		29.0 J		25.1 J		19.7 J		18.1 J	
1,2,3,6,7,8-HxCDD	7.4		120 J		52.7 J		52.4 J		58.1 J		34.5 J	
1,2,3,7,8,9-HxCDD	6.3		133 J		64.3 J		59.1 J		69.1 J		41.0 J	
1,2,3,4,6,7,8-HpCDD	176		2760 $		888 J		863 J		766 J		652 J	
OCDD	2160 J		15610 $J		4370 $J		3930 J		3510 J		3880 J	
2,3,7,8-TCDF	3.6		137 J		40.7 J		36.8 J		62.5 J		23.5 J	
1,2,3,7,8-PeCDF	1.3 J		19.6 J		7.7 J			7.7 *	23.8 J		11.8 J	
2,3,4,7,8-PeCDF	1.8 J		46.6 J		10.2 J		10.8 J		30.0 J		10.8 J	
1,2,3,4,7,8-HxCDF	4.2 J		87.7 J		33.8 J		29.7 J		60.6 J		33.7 J	
1,2,3,6,7,8-HxCDF	2.2 J		37.9 J		21.8 J		17.8 J		76.7 J		22.5 J	
2,3,4,6,7,8-HxCDF	3.7 J		48.1 J		25.2 J		23.1 J		100 J		2.7 J	
1,2,3,7,8,9-HxCDF	U	1.8	2.3 J		1.0 J		UJ	1.6	UJ	0.1	UJ	0.9
1,2,3,4,6,7,8-HpCDF	37.2		403 J		253 J		229 J		1880 J		415 J	
1,2,3,4,7,8,9-HpCDF	2.5		38.6 J		12.1 J		12.4 J		30.5 J		18.8 J	
OCDF	127		477 J		231 J		242 J		789 J		336 J	
TOTAL TCDD	UJ	11.0	10900 $J		2490 $J		4980 $J	5080 *	2360 $J		2260 $J	
TOTAL PeCDD	UJ	7.3	UJ	401	UJ	185	UJ	75.8	UJ	233	UJ	74.4
TOTAL HxCDD	47.5 J	48.3	1110 J	1110 *	470 J		417 J		567 J		314 J	
TOTAL HpCDD	328 J		5200 $J		1700 J		1610 J		1450 J		1260 J	
TOTAL TCDF	20.5 J	22.1 *	2120 J		569 J	572 *	597 J	602 *	1260 J		148 J	
TOTAL PeCDF	36.0 J	36.6 *	2060 J	2080 *	452 J		455 J	482 *	1680 J		520 J	520 *
TOTAL HxCDF	55.3 J	55.7 *	1070 J		571 J	574 *	488 J		2070 J		521 J	523 *
TOTAL HpCDF	107 J		961 J		540 J		466 J	479 *	2990 J		721 J	
TOXICITY EQUIVALENCY:	8.41 J		10500 J		2420 J		5030 J		2290 J		2220 J	
% SOLIDS:	77.2		48.4		53.4		51.7		54.5		26.7	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DATE:	02/28/99		02/28/99		02/28/99		02/28/99		02/28/99		02/28/99	
ANALYSIS DATE:	03/14/99		03/14/99		03/14/99		03/14/99		03/15/99		03/15/99	
LAB SAMPLE ID:	T991727		T991728		T991729		T991730		U104302		T991757	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
# = These values are reported on a dry weight basis.
$ = Value reported from a 1:100 dilution analysis.

Data Summary Table
Dioxin/Fu[illegible]alysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-044

SAMPLE NUMBER:	3428-CMS-220 #		3428-CMS-221 #		3428-CMS-222 #		3428-CMS-223 #		3428-CMS-224 #		3428-CMS-225 #	
STATION LOCATION:	RESIDENCE 3		RESIDENCE 4		RESIDENCE 5		RESIDENCE 6		RESIDENCE 7		RESIDENCE 8	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	22.1	1950 $J		93.4 J		105 J		UJ	3.2	76.6 J	
1,2,3,7,8-PeCDD	UJ	0.73	7.5		UJ	1.2		2.4 *	U	0.3	6.6	
1,2,3,4,7,8-HxCDD	U	0.3	15.2			0.98 *	3.1 J		U	0.4	6.0	
1,2,3,6,7,8-HxCDD	3 5 J		35.4		2.3 J		5.5		UJ	1.1	16.9	
1,2,3,7,8,9-HxCDD	2.1 J		29.3		2.5 J		6.8		0.94 J		15.3	
1,2,3,4,6,7,8-HpCDD	29 5		758		32.1		160		29.9		208	
OCDD	204 J		7600 $J		185 J		1160 J		283 J		1120 J	
2,3,7,8-TCDF	3.2		10.3		8.9		25.3		UJ	1.4	63.3	
1,2,3,7,8-PeCDF	1 5 J		3.7 J		3.7 J		5.6		0.41 J		16.0	
2,3,4,7,8-PeCDF	1.5 J		5.4		3.9 J		7.9		0.52 J		39.9	
1,2,3,4,7,8-HxCDF	2.3 J		15.2		5.2		11.9		UJ	1.2	44.9	
1,2,3,6,7,8-HxCDF	1.2 J		8.6		2.2 J			4.9 *	0.44 J		39.3	
2,3,4,6,7,8-HxCDF	1.8 J		11.2		3.1 J		7.8		0.62 J		89.1	
1,2,3,7,8,9-HxCDF	U	0.2	1.9 J			0.29 *	U	0.3	U	0.3	0.77 J	
1,2,3,4,6,7,8-HpCDF	10 6		112		11.4		36.8		8.0		159	
1,2,3,4,7,8,9-HpCDF		0.48 *	7.1		1.0 J		2.1 J		0.59 J		8.7	
OCDF	15 4		213		13.6		33.9		17.2		171	
TOTAL TCDD	UJ	29.2	2000 $J		107 J		152 J		UJ	4.4	177 J	
TOTAL PeCDD	UJ	5.8	UJ	40.7	UJ	8.9	UJ	27.3	UJ	0.75	UJ	119
TOTAL HxCDD	35.9 J		247 J		24.3 J	25.3 *	65.4 J		UJ	8.7	199 J	
TOTAL HpCDD	61.9 J		1420 J		63.8 J		286 J		58.7 J		450 J	
TOTAL TCDF	20 4 J	21.6 *	73.9 J	77.8 *	45.2 J	53.5 *	181 J		UJ	8.9	827 J	
TOTAL PeCDF	33.9 J	35.2 *	149 J	151 *	60.5 J	61.3 *	177 J		8.5 J		2260 J	
TOTAL HxCDF	29.0 J		229 J		47.0 J	47.3 *	120 J	127 *	10.0 J		1270 J	
TOTAL HpCDF	21 8 J	22.3 *	287 J		20.4 J		70.8 J		21.5 J		319 J	
TOXICITY EQUIVALENCY:	2.86 J		1990 J		98.7 J		120 J		1.17 J		133 J	
% SOLIDS:	78 9		44.5		71.4		68.9		88.0		70.4	
DILUTION FACTOR:	1 0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DATE:	02/28/99		02/28/99		02/28/99		02/28/99		02/28/99		02/28/99	
ANALYSIS DATE:	03/17/99		03/17/99		03/17/99		03/15/99		03/15/99		03/15/99	
LAB SAMPLE ID	T991787		T991788		T991789		T991750		T991751		T991752	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
# = These values are reported on a dry weight basis
$ = Value reported from a 1 100 dilution analysis

Data Validation
Report Number 6

Steve Stodola
US EPA Approval Signature

6-2-99
Date

May 24, 1999
B-99-5-Y-3

Ms. Christine Clark
Regional Sample Control Custodian
Office of Environmental Measurement and Evaluation
U.S. EPA Region I
60 Westview Street
Lexington, Massachusetts 02421

Reference 86

Re: WA No. 01-99-3-02, Task No. 2, TDF No. 136
Case No. 3428 / SDG No. 3428-CMS-026
Triangle Laboratories - Durham, NC
Woonasquatucket River/Centredale Manor Site, N. Providence, RI

Dioxin/Furan: 30/Soil/3428-CMS-026 thru 3428-CMS-031, 3428-CMS-033, 3428-CMS-034, 3428-CMS-037, 3428-CMS-038, 3428-CMS-041, 3428-CMS-048, 3428-CMS-051, 3428-CMS-052, 3428-CMS-052DUP, 3428-CMS-054, 3428-CMS-069 thru 3428-CMS-071, 3428-CMS-071DUP, 3428-CMS-072, 3428-CMS-074 thru 3428-CMS-076, 3428-CMS-080 thru 3428-CMS-082, 3428-CMS-086 thru 3428-CMS-088
(Soil Field Duplicate Pairs/3428-CMS-052 and 3428-CMS-052DUP, 3428-CMS-071 and 3428-CMS-071DUP)

1/PE/PC00537

Dear Ms. Clark:

A Tier III data validation was performed on the Dioxin/Furan analytical data for 30 soils and one PE sample collected by Roy F. Weston, Inc. for the U.S. EPA at the Woonasquatucket River/Centredale Manor Site in N. Providence, RI. The samples were analyzed according to EPA Method 8290 Rev. 0, September 1994. The samples were validated using first the criteria in EPA Method 8290, defaulting second to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria and finally to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98). Unless otherwise stated all criteria used were Method 8290 criteria. The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)
- * Preservation and Technical Holding Times
- * PE Samples/Accuracy Check
- * Window Defining Mix

01

*	•	Initial and Continuing Calibrations
*	•	Chromatographic Resolution
*	•	Instrument Sensitivity Check
	•	Blanks
	•	Matrix Spike/Matrix Spike Duplicate
	•	Laboratory and Field Duplicates
	•	Internal/Clean-up/Recovery Standards
*	•	Sample Analysis and Identification
	•	Sample Quantitation
*	•	Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity
*	•	Required Sample Reruns and Second Column Confirmation
	•	System Performance

* - All criteria were met for this parameter.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes Site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor
- To determine potential sources of dioxin/furan contamination
- These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.

Sample 3428-CMS-082 had percent solids of 24.0%. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10 g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively and the non-detects were not rejected.

TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.100 ppb.

One single blind performance evaluation (PE) sample (fortified native soil PC00537) was evaluated for this SDG. All congeners and homologue groups were scored acceptable.

The majority of the sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

Data Completeness (CSF Audit - Tier I)

The data validation revealed information and/or discrepancies in the data package submitted by the laboratory. The following information/discrepancies are noted:

1. Missing the quant report for sample # 3428-CMS-069.

2. Missing the quant report and raw data for sample # 3428-CMS-072.

3. Missing the Form Is, quant report and raw data for sample # 3428-CMS-087DIL (100X).

The information was requested via the WAM on April 30, 1999. Items 1 and 2 were submitted on May 6, 1999. The diluted sample analysis was submitted on May 21, 1999.

Blanks

The table below summarizes the compounds that were detected in the solid laboratory method blanks, the action levels, and the samples affected:

Compound	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
2378-TCDD	Method Blank	5.9	29.5	3428-CMS-026, 3428-CMS-029, 3428-CMS-034, 3428-CMS-037, 3428-CMS-038, 3428-CMS-041, 3428-CMS-048, 3428-CMS-052DUP, 3428-CMS-054, 3428-CMS-070, 3428-CMS-071, 3428-CMS-071DUP, 3428-CMS-072
2378-TCDF	Method Blank	0.34	1.7	3428-CMS-033, 3428-CMS-041, 3428-CMS-048, 3428-CMS-054, 3428-CMS-070, 3428-CMS-071DUP
123478-HxCDF	Method Blank	0.28	1.4	3428-CMS-041, 3428-CMS-054, 3428-CMS-070, 3428-CMS-071, 3428-CMS-071DUP
Total TCDD	Method Blank	7.2*	72	3428-CMS-026 thru 3428-CMS-029, 3428-CMS-034, 3428-CMS-037, 3428-CMS-038, 3428-CMS-041, 3428-CMS-048, 3428-CMS-052, 3428-CMS-052DUP, 3428-CMS-054, 3428-CMS-070, 3428-CMS-071, 3428-CMS-071DUP, 3428-CMS-072
Total PeCDD	Method Blank	2.2	22	3428-CMS-026 thru 3428-CMS-030, 3428-CMS-031, 3428-CMS-033, 3428-CMS-037, 3428-CMS-038, 3428-CMS-041, 3428-CMS-048, 3428-CMS-051, 3428-CMS-052, 3428-CMS-052DUP, 3428-CMS-054, 3428-CMS-070, 3428-CMS-071DUP, 3428-CMS-072, 3428-CMS-080, 3428-CMS-086 thru 3428-CMS-088
Total HxCDD	Method Blank	1.6	16	3428-CMS-041, 3428-CMS-052, 3428-CMS-052DUP, 3428-CMS-054, 3428-070, 3428-CMS-071, 3428-CMS-071DUP
Total HpCDD	Method Blank	1.1	11	3428-CMS-070
Total TCDF	Method Blank	0.34	3.4	3428-CMS-054

* EMPC value

The following contamination was found in the method blanks: 2378-TCDD, 2378-TCDF, 123478-HxCDF, Total TCDD, Total PeCDD, Total HxCDD, Total HpCDD, and Total TCDF. Professional judgement was used to apply action levels to all of the soil samples from this SDG.

Blank actions are based on EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98) criteria. Blank action levels are calculated as ten times the highest concentration of the contaminant determined in any blank for common contaminants (OCDD/OCDF and Total Homologues) and five times the action level for all other analytes. The positive sample results that are less than the action level are reported as non-detects and estimated (UJ) on the Data Summary Table.

Matrix Spike/Matrix Spike Duplicate

Six matrix spike/matrix spike duplicate pairs were evaluated for this SDG: 3428-CMS-027MS/3428-CMS-027MSD, 3428-CMS-041MS/3428-CMS-041MSD, 3428-CMS-051MS/3428-CMS-051MSD, 3428-CMS-074MS/3428-CMS-074MSD, 3428-CMS-086MS/3428-086MSD, and 3428-CMS-088MS/3428-CMS-088MS. The pair 3428-CMS-041MS/3428-CMS-041MSD met the criteria. One or more of the following analytes: 2378-TCDD and OCDD did not meet the recovery criterion of 50-150% and/or Relative Percent Difference (RPD) < 50% for soils/sediment as specified in EPA Region I's Environmental Services Assistance Team Dioxin Validation SOP ESAT-01-0007 (11/20/98). However, samples were not qualified since native concentrations were greater than 4x the spike amount for most analytes.

Laboratory and Field Duplicates

Two field duplicate pairs were evaluated for this SDG (3428-CMS-052/3428-CMS-052DUP and 3428-CMS-071/3428-CMS-071DUP).

The tables below summarize the soil field duplicate results that did not meet the duplicate criterion of Relative Percent Difference (RPD) < 50% for soils/sediments as specified in EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98):

Compound	3428-CMS-052	3428-CMS-052DUP	RPD	Action		Affected Samples
	% Solids (80.5%)	% Solids (82.0%)				
	Sample Conc. (ng/Kg)	Duplicate Conc. (ng/Kg)		Positive Detects	NDs	
2378-TCDD	42.0	14.3	98.5	J	UJ	All soil samples

Compound	3428-CMS-071	3428-CMS-071DUP	RPD	Action		Affected Samples
	% Solids (78.0%)	% Solids (77.4%)				
	Sample Conc. (ng/Kg)	Duplicate Conc. (ng/Kg)		Positive Detects	NDs	
2378-TCDD	6.2	2.8	74.2	J	UJ	All soil samples
23478-PeCDF	1.4	0.71	67.0	J	UJ	All soil samples
123678-HxCDF	1.3	0.56	76.0	J	UJ	All soil samples
234678-HxCDF	2.3	0.83	94.1	J	UJ	All soil samples
OCDF	6.7	12.0	56.8	J	UJ	All soil samples

Professional judgment was used to estimate all of the positive results and non-detects (J) and (UJ), respectively, for 2378-TCDD, 23478-PeCDF, 123678-HxCDF, 234678-HxCDF, and OCDF in all soil samples.

Internal/Clean-up/Recovery Standards

- Internal Standards

The following table summarizes the internal standards with recoveries which did not meet the acceptance method criterion of 25-130%:

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{13}C-OCDD	205	J	UJ	3428-CMS-075

- Clean-up Standards

The following table summarizes the clean-up standards with recoveries which did not meet the method acceptance criterion of 40-130%:

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{37}C -2378-TCDD	145	J	UJ	3428-CMS-075

- Recovery Standards

The following table summarizes the recovery standards with area counts which failed to meet the acceptance criterion of 50-200% of the area counts of the associated daily calibration standard as specified in the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996, Internal Standard Section:

Recovery Standard	RS Area	Area Limits	Action		Affected Samples
			Positive Detects*	NDs*	
^{13}C-123789-HxCDD	123	126-504	J	UJ	3428-CMS-026
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	648 488	99.4-398 42.0-168	J J	UJ UJ	3428-CMS-048
^{13}C-123789-HxCDD	7853	10956-43826	J	UJ	3428-CMS-051
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	602 371	99.4-398 42.0-168	J J	UJ UJ	3428-CMS-052
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	678 442	99.4-398 42.0-168	J J	UJ UJ	3428-CMS-052DUP
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	614 384	99.4-398 42.0-168	J J	UJ UJ	3428-CMS-054
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	1732 1090	6438-25753 4166-16663	J J	UJ UJ	3428-CMS-075#
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	3149 1638	6438-25753 4166-16663	J J	UJ UJ	3428-CMS-080
^{13}C-123789-HxCDD	3945	4166-16663	J	UJ	3428-CMS-081#&
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	180 102	241-963 177-709	J J	UJ UJ	3428-CMS-086
^{13}C-123789-HxCDD	82.7	177-709	J	UJ	3428-CMS-087
^{13}C-1234-TCDD	1597	213-850	J	UJ	3428-CMS-087DIL$
^{13}C-123789-HxCDD	13105	2877-11509	J	UJ	3428-CMS-088

* For those compounds associated with the recovery standard referenced.
\# 2378-TCDD values were reported from a 1:100 dilution.
& OCDD values were reported from a 1:100 dilution.
$ 2378-TCDD only

Sample Quantitation

Positive results reported below the reporting limits were flagged as estimated (J) on the Data Summary Table.

Sample 3428-CMS-082 had 24.0% solids. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10 g and the quantitation limits were met, positive detects and non-detects were estimated J and UJ, respectively and the non-detects were not rejected.

The laboratory reported several values which were above the upper calibration range. Since quantitative accuracy is questionable above the upper range of calibration, the ESAT validator reported the following values from 1:100 dilutions:

Congener	Affected Samples
2378-TCDD OCDD Total TCDD	3428-CMS-081, 3428-CMS-082
OCDD	3428-CMS-029
2378-TCDD Total TCDD	3428-CMS-051, 3428-CMS-069, 3428-CMS-074, 3428-CMS-075, 3428-CMS-076, 3428-CMS-087

Toxicity Equivalency Factor (TEF) and Isomer Specificity

All TEQ values were calculated by the ESAT data validator. The data were reported in accordance with standard Region I validation procedures which take into account the observed blank contamination, dilutions, and EMPC values. These calculated values are reported on the Data Summary Tables on a dry weight basis, where applicable. The TEF values are published in EPA/625/3-89/016, "Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs)" and 1989 Update, Part II, page 13.

System Performance

One or both of the recovery standards did not meet area count criteria for several samples. This could be related to congener loss during analysis, improperly capped sample vials, interferences, and/or degradation of the recovery standard spiking solution.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Janine Bartels
Principal Scientist

Louis Macri
ESAT Team Manager

Attachments: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Data Summary Tables
Data Validation Worksheets
Field Sampling Notes
Support Documentation

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 3428/SDG No. 3428-CMS-026

Sample Nos.	3428-CMS-026	3428-CMS-027	3428-CMS-028	3428-CMS-029	3428-CMS-030	3428-CMS-031	3428-CMS-033	3428-CMS-034	3428-CMS-037
Compound									
2378-TCDD	J[1,6]	J[1]	J[1]	J[1,6]	J[1]	J[1]	J[1]	J[1,6]	J[1,6]
12378-PeCDD	A	A	A	A	A	A	A	A	A
123478-HxCDD	J[3]	A	A	A	A	A	A	A	A
123678-HxCDD	J[3]	A	A	A	A	A	A	A	A
123789-HxCDD	J[3]	A	A	A	A	A	A	A	A
1234678-HpCDD	J[3]	A	A	A	A	A	A	A	A
OCDD	J[3]	A	A	A	A	A	A	A	A
2378-TCDF	A	A	A	A	A	A	J[6]	A	A
12378-PeCDF	A	A	A	A	A	A	A	A	A
23478-PeCDF	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]
123478-HxCDF	J[3]	A	A	A	A	A	A	A	A
123678-HxCDF	J[1,3]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]
123789-HxCDF	J[3]	A	A	A	A	A	A	A	A
234678-HxCDF	J[1,3]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]
1234678-HpCDF	J[3]	A	A	A	A	A	A	A	A
1234789-HpCDF	J[3]	A	A	A	A	A	A	A	A
OCDF	J[1,3]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]	J[1]

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 3428/SDG No. 3428-CMS-026

Sample Nos.	3428-CMS-038	3428-CMS-041	3428-CMS-048	3428-CMS-051	3428-CMS-052	3428-CMS-052DUP	3428-CMS-054	3428-CMS-069	3428-CMS-070
Compound									
2378-TCDD	J[1,6]	J[1,6]	J[1,3,6]	J[1]	J[1,3]	J[1,3,6]	J[1,3,6]	J[1]	J[1,6]
12378-PeCDD	A	A	J[3]	A	J[3]	J[3]	J[3]	A	A
123478-HxCDD	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
123678-HxCDD	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
123789-HxCDD	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
1234678-HpCDD	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
OCDD	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
2378-TCDF	A	J[6]	J[3,6]	A	J[3]	J[3]	J[3,6]	A	J[6]
12378-PeCDF	A	A	J[3]	A	J[3]	J[3]	J[3]	A	A
23478-PeCDF	J[1]	J[1]	J[1,3]	J[1]	J[1,3]	J[1,3]	J[1,3]	J[1]	J[1]
123478-HxCDF	A	J[6]	J[3]	J[3]	J[3]	J[3]	J[3,6]	A	J[7]
123678-HxCDF	J[1]	J[1]	J[1,3]	J[1,3]	J[1,3]	J[1,3]	J[1,3]	J[1]	J[1]
123789-HxCDF	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
234678-HxCDF	J[1]	J[1]	J[1,3]	J[1,3]	J[1,3]	J[1,3]	J[1,3]	J[1]	J[1]
1234678-HpCDF	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
1234789-HpCDF	A	A	J[3]	J[3]	J[3]	J[3]	J[3]	A	A
OCDF	J[1]	J[1]	J[1,3]	J[1,3]	J[1,3]	J[1,3]	J[1,3]	J[1]	J[1]

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 3428/SDG No. 3428-CMS-026

Sample Nos.	3428-CMS-071	3428-CMS-071DUP	3428-CMS-072	3428-CMS-074	3428-CMS-075	3428-CMS-076	3428-CMS-080	3428-CMS-081	3428-CMS-082
Compound									
2378-TCDD	J[1,6]	J[1,6]	J[1,6]	J[1]	J[1,4]	J[1]	J[1,3]	J[1]	J[1,2]
12378-PeCDD	A	A	A	A	J[3,4]	A	J[3]	A	J[2]
123478-HxCDD	A	A	A	A	J[3,4]	A	J[3]	J[3]	J[2]
123678-HxCDD	A	A	A	A	J[3,4]	A	J[3]	J[3]	J[2]
123789-HxCDD	A	A	A	A	J[3,4]	A	J[3]	J[3]	J[2]
1234678-HpCDD	A	A	A	A	J[3,4]	A	J[3]	J[3]	J[2]
OCDD	A	A	A	A	J[3,4,5]	A	J[3]	A	J[2]
2378-TCDF	J[6]	J[6]	A	A	J[3,4]	A	J[3]	A	J[2]
12378-PeCDF	A	A	A	A	J[3,4]	A	J[3]	A	J[2]
23478-PeCDF	J[1]	J[1]	J[1]	J[1]	J[1,3,4]	J[1]	J[1,3]	J[1]	J[1,2]
123478-HxCDF	J[6]	J[6]	A	A	J[3,4]	A	J[3]	J[3]	J[2]
123678-HxCDF	J[1]	J[1]	J[1]	J[1]	J[1,3,4]	J[1]	J[1,3]	J[1,3]	J[1,2]
123789-HxCDF	A	A	A	A	J[3,4]	A	J[3]	J[3]	J[2]
234678-HxCDF	J[1]	J[1]	J[1]	J[1]	J[1,3,4]	J[1]	J[1,3]	J[1,3]	J[1,2]
1234678-HpCDF	A	A	A	A	J[3,4]	A	J[3]	J[3]	J[2]
1234789-HpCDF	A	A	A	A	J[3,4]	A	J[3]	J[3]	J[2]
OCDF	J[1]	J[1]	J[1]	J[1]	J[1,3,4,5]	J[1]	J[1,3]	J[1,3]	J[1,2]

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 3428/SDG No. 3428-CMS-026

Sample Nos.	3428-CMS-086	3428-CMS-087	3428-CMS-088
Compound			
2378-TCDD	J[1,3]	J[1,3]	J[1,3]
12378-PeCDD	J[3]	A	A
123478-HxCDD	J[3]	J[3]	J[3]
123678-HxCDD	J[3]	J[3]	J[3]
123789-HxCDD	J[3]	J[3]	J[3]
1234678-HpCDD	J[3]	J[3]	J[3]
OCDD	J[3]	J[3]	J[3]
2378-TCDF	J[3]	A	A
12378-PeCDF	J[3]	A	A
23478-PeCDF	J[1,3]	J[1]	A
123478-HxCDF	J[3]	J[3]	J[3]
123678-HxCDF	J[1,3]	J[1,3]	J[1,3]
123789-HxCDF	J[3]	J[3]	J[3]
234678-HxCDF	J[1,3]	J[1,3]	J[1,3]
1234678-HpCDF	J[3]	J[3]	J[3]
1234789-HpCDF	J[3]	J[3]	J[3]
OCDF	J[1,3]	J[1,3]	J[1,3]

Table I
Recommendation Summary Table for Dioxins/Furans

J[1]	-	Field duplicate RPD >50%; J detects; UJ non-detects.
J[2]	-	% solids < 30%; J detects; UJ non-detects.
J[3]	-	Recovery standard area counts outside criteria; J detects; UJ non-detects.
J[4]	-	Clean-up standard % recovery outside criteria; J detects; UJ non-detects.
J[5]	-	Internal standard % recovery outside criteria; J detects; UJ non-detects.
J[6]	-	Method blank contamination, report concentration; UJ detects

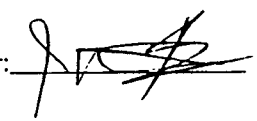
EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error		
To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor To determine potential sources of dioxin/furan contamination These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.	No, Sample 3428-CMS-082 had percent solids of 24.0%. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10 g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively and the non-detects were not rejected. Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: $J^{2,4,5,6}$	Refer to qualification in R/S Key on Table I: $J^{1,3}$	**	TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.100 ppb. One single blind performance evaluation (PE) sample (fortified native soil PC00537) was evaluated for this SDG. All congeners and homologue groups were scored acceptable. The majority of the sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

* The evaluation of "sampling error" cannot be completely assessed in the data validation.

** Sampling variability is not assessed in data validation.

Validator: 

Date: 5/24/94

Data Summary Table
Dioxin/Furan Analysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-026

SAMPLE NUMBER:	3428-CMS-026#		3428-CMS-027#		3428-CMS-028#		3428-CMS-029#		3428-CMS-030#		3428-CMS-031#		3428-CMS-033#	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	4.7	44.4 J		54.1 J		UJ	8.1	94.3 J		103 J		170 J	
1,2,3,7,8-PeCDD	3.3 J		3.4 J		0.77 J		4.0 J		1.00 J		0.75 J		3.0 J	
1,2,3,4,7,8-HxCDD		7.5 *	6.4		1.1 J		11.2		1.5 J		0.93 J		8.3	
1,2,3,6,7,8-HxCDD	15.5 J		20.3		2.7 J		44.1		6.2		3.1 J		17.5	
1,2,3,7,8,9-HxCDD	15.3 J		19.8		3.0 J		27.6		4.0 J		2.9 J		17.6	
1,2,3,4,6,7,8-HpCDD	402 J		444		54.3		1310		119		48.8		429	
OCDD	2770 J		3010		372		6890 $		912		318		2480	
2,3,7,8-TCDF	1.8		4.6		3.7		3.3 J		4.8		3.6		UJ	1.6
1,2,3,7,8-PeCDF	U	1.1	1.4 J		1.5 J		1.3 J		1.5 J		1.3 J		U	0.5
2,3,4,7,8-PeCDF	UJ	1.1		2.5 *	1.2 J		2.1 J		2.1 J		1.3 J		UJ	0.6
1,2,3,4,7,8-HxCDF	5.7 J			6.9 *	2.8 J		10.0		4.0 J		2.8 J		4.7 J	
1,2,3,6,7,8-HxCDF	4.8 J		6.3 J		1.8 J		8.5 J		2.4 J		1.4 J		4.4 J	
2,3,4,6,7,8-HxCDF	6.6 J		10.0 J		2.4 J		15.4 J		3.8 J		2.6 J		5.0 J	
1,2,3,7,8,9-HxCDF	UJ	1.8	U	0.9	U	0.2	U	0.4	U	0.3	U	0.3	UJ	0.6
1,2,3,4,6,7,8-HpCDF	99.4 J		119		17.7		381		28.4		15.2		82.1	
1,2,3,4,7,8,9-HpCDF	6.2 J			5.7 *	1.5 J		24.5		2.0 J		0.95 J		4.1 J	
OCDF	229 J		302 J		33.6 J		1360 J		47.8 J		27.4 J		118 J	
TOTAL TCDD	UJ	4.7	UJ	49.0	UJ	57.3	UJ	11.5	99.3 J		106 J	107 *	170 J	173 *
TOTAL PeCDD	UJ	6.9	UJ	16.8	UJ	5.2	UJ	22.9	UJ	7.6	UJ	4.7	UJ	10.3
TOTAL HxCDD	105 J	113 *	129 J		21.9 J		197 J		38.4 J		22.6 J		122 J	123 *
TOTAL HpCDD	758 J		735 J		101 J		2080 J		219 J		93.3 J		705 J	
TOTAL TCDF	12.1 J	15.2 *	42.1 J	48.1 *	21.3 J	21.8 *	30.3 J		33.9 J		21.3 J		9.6 J	
TOTAL PeCDF	45.0 J	48.9 *	105 J	114 *	34.1 J	36.5 *	88.2 J		54.2 J		32.7 J	33.0 *	30.1 J	
TOTAL HxCDF	127 J		153 J	168 *	34.9 J	35.2 *	327 J		98.8 J	99.8 *	35.0 J	35.7 *	109 J	
TOTAL HpCDF	248 J		320 J	328 *	44.7 J		1400 J		68.6 J	69.8 *	36.0 J		170 J	
TOXICITY EQUIVALENCY:	15.5 J		63.9 J		58.0 J		40.5 J		101 J		107 J		185 J	
% SOLIDS:	71.0		64.0		79.0		81.5		80.9		76.8		83.2	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION DATE:	02/28/99		02/27/99		02/27/99		02/27/99		02/27/99		02/27/99		02/27/99	
ANALYSIS DATE:	03/08/99		03/06/99		03/08/99		03/08/99		03/08/99		03/08/99		03/09/99	
LAB SAMPLE ID:	T991578		S991321		U097103		U097104		U097105		U097106		T991579	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
$ = These values are reported from a 1:100 dilution

Data Summary Table

Dioxin/Furan Analysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-026

SAMPLE NUMBER:	3428-CMS-034#		3428-CMS-037#		3428-CMS-038#		3428-CMS-041#		3428-CMS-048#		3428-CMS-051#		3428-CMS-052#	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	6.4	UJ	22.1	UJ	16.8	UJ	11.0	UJ	28.6	1470 JS		42.0 J	
1,2,3,7,8-PeCDD	U	1.3	2.3 J		1.2 J		U	0.6		0.48 *	2.0 J		0.70 J	
1,2,3,4,7,8-HxCDD	1.2 J		U	1.6		1.5 *	U	0.9	0.74 J		1.8 J			0.47 *
1,2,3,6,7,8-HxCDD	2.4 J		5.8		4.2 J		2.4 J		1.7 J		4.0 J		1.1 J	
1,2,3,7,8,9-HxCDD	2.4 J		6.5		4.7 J		2.4 J		2.3 J		5.6 J		1.6 J	
1,2,3,4,6,7,8-HpCDD	82.5		132		120		59.1		38.1 J		44.8 J		17.7 J	
OCDD	477		1190		1210		753		606 J		433 J		159 J	
2,3,7,8-TCDF	2.6 J		5.8		2.5		UJ	1.7	UJ	1.7	9.0		3.6 J	
1,2,3,7,8-PeCDF	U	0.8	1.4 J		U	0.6	U	0.4		0.41 *	3.4 J		1.7 J	
2,3,4,7,8-PeCDF	UJ	0.9		1.6 *	UJ	0.6	UJ	0.4	0.86 J		10.3 J		1.1 J	
1,2,3,4,7,8-HxCDF	2.0 J		4.2 J		2.6 J		UJ	1.4	1.8 J		18.2 J		2.4 J	
1,2,3,6,7,8-HxCDF	0.97 J		2.0 J		1.5 J		0.69 J		0.80 J		7.1 J		0.98 J	
2,3,4,6,7,8-HxCDF	1.7 J		3.0 J		2.2 J		0.91 J		1.3 J		9.8 J		1.4 J	
1,2,3,7,8,9-HxCDF	U	1.1	U	1.1	U	0.8	U	0.6	UJ	0.1	0.39 J		UJ	0.2
1,2,3,4,6,7,8-HpCDF	15.4		26.4		25.6		12.0		8.9 J		39.5 J		5.7 J	
1,2,3,4,7,8,9-HpCDF	U	1.9	1.5 J		1.5 J		U	1.0	0.73 J			1.5 *	UJ	0.3
OCDF	32.8 J		48.8 J		68.6 J		37.2 J		25.6 J		19.6 J		10.1 J	
TOTAL TCDD	UJ	10.0	UJ	28.4	UJ	18.7	UJ	11.7	UJ	31.1	1470 S		UJ	45.7
TOTAL PeCDD	UJ	1.3	UJ	4.6	UJ	2.7	UJ	0.6	UJ	4.5	UJ	24.8	UJ	6.6
TOTAL HxCDD	18.0 J	19.4 *	49.6 J	51.5 *	33.2 J	34.7 *	UJ	17.7	16.1 J	17.5 *	64.9 J		UJ	13.2
TOTAL HpCDD	107 J		248 J		209 J		104 J		72.5 J		99.4 J		36.5 J	
TOTAL TCDF	4.6 J	6.2 *	19.6 J	30.8 *	10.4 J	11.1 *	4.0 J	5.5 *	10.5 J	10.7 *	59.1 J		15.5 J	16.9 *
TOTAL PeCDF	15.8 J		29.6 J	35.6 *	16.7 J		8.1 J		9.9 J	12.6 *	207 J	209 *	22.4 J	22.7 *
TOTAL HxCDF	22.5 J		45.8 J	46.2 *	33.3 J		15.6 J		17.9 J	18.2 *	835 J		18.3 J	
TOTAL HpCDF	34.0 J		57.3 J	58.4 *	64.8 J		30.7 J		23.1 J		53.9 J	55.4 *	11.9 J	
TOXICITY EQUIVALENC	2.62 J		7.59 J		5.27 J		2.14 J		2.66 J		1480 J		44.5 J	
% SOLIDS:	81.8		60.1		79.0		84.1		77.8		78.4		80.5	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION D	02/27/99		02/27/99		02/27/99		02/27/99		03/22/99		02/27/99		03/22/99	
ANALYSIS DATE:	03/09/99		03/09/99		03/09/99		03/09/99		03/29/99		03/15/99		03/29/99	
LAB SAMPLE ID:	T991580		T991581		T991582		T991583		T992099		U104403		T992096	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits

= These values are reported on a dry weight basis.

$ = These values are recorded from a 1:100 dilution

Data Summary Table
Dioxin/Furan Analysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-026

SAMPLE NUMBER:	3428-CMS-052DUP#		3428-CMS-054#		3428-CMS-069#		3428-CMS-070#		3428-CMS-071#		3428-CMS-071DUP#		3428-CMS-072#	
STATION LOCATIO	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.	ng/Kg	DL/EMPC	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	UJ	14.3	UJ	25.2	2400 $J		UJ	20 9	UJ	6 2	UJ	2 8	UJ	11 9
1,2,3,7,8-PeCDD	0.46 J		0.51 J		5.1		U	0 2	U	0 4	U	0 3		0 65 *
1,2,3,4,7,8-HxCDD	UJ	0.4		0.47 *	3.2 J		U	0.3	U	0.5	U	0.3	0.88 J	
1,2,3,6,7,8-HxCDD	1.0 J		0.99 J		10.6		0.44 J		1.0 J		0.69 J		1.9 J	
1,2,3,7,8,9-HxCDD	1.6 J		1.4 J		10.8			0.55 *	0 91 J		U	0 3	4.0 J	
1,2,3,4,6,7,8-HpCD	16.2 J		19.3 J		138		5.5		9 9		15.4		35 0	
OCDD	142 J		267 J		1370		43.2		189		235		636	
2,3,7,8-TCDF	3.4 J		UJ	0.94	22.7		UJ	1.2	1.9 J		UJ	1.4	4 2	
1,2,3,7,8-PeCDF	1.6 J			0.32 *	6.6		0.36 J		U	0.3	U	0.2		1 3 *
2,3,4,7,8-PeCDF	1.1 J		0.46 J		17.7 J			0.72 *	1.4 J		0.71 J		1.2 J	
1,2,3,4,7,8-HxCDF	2.2 J		UJ	1.4	30.3		UJ	1.1	UJ	1.7	UJ	1.3	4.9 J	
1,2,3,6,7,8-HxCDF	0.90 J		0.50 J		11.5 J		0.43 J		1.3 J		0 56 J		1.8 J	
2,3,4,6,7,8-HxCDF	1.2 J		0.61 J		19.8 J		0 60 J		2 3 J			0.83 *	1 3 J	
1,2,3,7,8,9-HxCDF	UJ	0.3	UJ	0.3	0.70 J		U	0.2	U	0.3	U	0.2	U	2 8
1,2,3,4,6,7,8-HpCD	6.0 J		4.7 J		74.8		3.0 J		3 8 J		3 7 J		11 2	
1,2,3,4,7,8,9-HpCD	UJ	0.5	UJ	0.5	6.2		U	0 4	U	0.6	U	0 4	1 2 J	
OCDF	13.0 J		9.4 J		154 J		6.3 J		6.7 J		12 0 J		UJ	10 0
TOTAL TCDD	UJ	17.3	UJ	26.4	2470 $J		UJ	22.5	UJ	7.4	UJ	3.7	UJ	17 9
TOTAL PeCDD	UJ	6 5	UJ	3.4	42.3 J	63.9 *	UJ	0.44	UJ	0.4	UJ	1.3	UJ	5 7
TOTAL HxCDD	UJ	11.9	UJ	10.4	117 J	118 *	UJ	4 7	UJ	9.9	UJ	6 1	28.3 J	28.9 *
TOTAL HpCDD	33.5 J		38.9 J		272 J		UJ	11.0	19.5 J		56.4 J		75.1 J	
TOTAL TCDF	14.5 J	15.2 *	UJ	6.6	173 J	180 *	5.9 J	7.8 *	30 3 J	31 0 *	10 5 J	11.7 *	21.5 J	24 2 *
TOTAL PeCDF	17.4 J	18 9 *	6.3 J	7.9 *	492 J	493 *	11 1 J	12.3 *	75.7 J		17 7 J	19 6 *	20.3 J	25 0 *
TOTAL HxCDD	18.1 J		12.7 J	13.0 *	920 J		21.2 J		30 4 J		8 2 J	11 2 *	25 1 J	
TOTAL HpCDF	13.8 J	14.2 *	9.8 J		125 J		4.9 J		6 5 J		9.2 J		20 7 J	
TOXICITY EQUIVAL	2.27 J		1.41 J		2430 J		0.71 J		1 77 J		1.00 J		4 00 J	
% SOLIDS:	82.0		89.7		91.3		84.3		78 0		77.4		82 5	
DILUTION FACTOR	1.0		1.0		1.0		1.0		1 0		1 0		1.0	
DATE SAMPLED.	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTI	03/22/99		03/22/99		02/27/99		03/22/99		03/22/99		03/22/99		03/22/99	
ANALYSIS DATE:	03/29/99		03/29/99		03/16/99		03/29/99		03/29/99		03/29/99		03/29/99	
LAB SAMPLE ID:	T992097		T992098		U991052		T992112		T992103		T992104		T992105	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J". Values without an "*" are the Detection Limits
# = These values are reported on a dry weight basis.
$ = These values are reported from a 1:100 dilution

Data Summary Table

Dioxin/Furan Analysis - Soil Samples

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-026

SAMPLE NUMBER:	3428-CMS-074#		3428-CMS-075#		3428-CMS-076#		3428-CMS-080#		3428-CMS-081#		3428-CMS-082#	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	1730 $J		8700 $J		2000 $J		383 J		986 $J		1170 $J	
1,2,3,7,8-PeCDD	3 4 J		7.5 J		4.6 J		UJ	2.6	5.7		18 2 J	
1,2,3,4,7,8-HxCDD	3.0 J			5.7 *	4.1 J		5.0 J		11.9 J		29 6 J	
1,2,3,6,7,8-HxCDD	7.6		18.2 J		13.9		10.7 J		29.5 J		63 4 J	
1,2,3,7,8,9-HxCDD	8.9			15.3 *	11.6		9.0 J		23.5 J		74.1 J	
1,2,3,4,6,7,8-HpCDD	127		264 J		212		198 J		649 J		1400 J	
OCDD	1260		2960 J		2560		1140 J		5930 $		18840 $J	
2,3,7,8-TCDF	25.9		61.6 J		31.1		6.4 J		11.7		27 5 J	
1,2,3,7,8-PeCDF	6.4		12.8 J		8.2		UJ	1.9	10.1		8 5 J	
2,3,4,7,8-PeCDF	11.8 J		33.9 J		15.6 J		3.4 J		6.80 J		14.5 J	
1,2,3,4,7,8-HxCDF	17.4		61.0 J		32.0		8.1 J		22.0 J		40 2 J	
1,2,3,6,7,8-HxCDF	7.6 J		21.9 J		11.7 J			4.6 *	14.1 J		25 5 J	
2,3,4,6,7,8-HxCDF	11.9 J		30.7 J		14.4 J		8.2 J		18.1 J		29.5 J	
1,2,3,7,8,9-HxCDF	0.78 J		UJ	3.2	U	0.4	UJ	2 9	UJ	0.8	0 90 J	
1,2,3,4,6,7,8-HpCDF	54.9		130 J		62.7		69.1 J		195 J		343 J	
1,2,3,4,7,8,9-HpCDF	4.3 J		19.7 J		9.4		6.9 J		14.9 J		22.0 J	
OCDF	203 J		419 J		205 J		119 J		412 J		622 J	
TOTAL TCDD	1730 $J		8700 $J		2000 $J		396 J		986 $J	1030 *	1230 $J	
TOTAL PeCDD	34.5 J	37.2 *	39.5 J	49.8 *	50.8 J	68 9 *	UJ	15.5	39.0 J	55 4 *	139 J	178 *
TOTAL HxCDD	89.1 J	91.3 *	173 J	199 *	145 J		84.7 J		215 J		602 J	
TOTAL HpCDD	253 J		515 J		437 J		373 J		1270 J		2840 J	
TOTAL TCDF	164 J	164 *	482 J	497 *	194 J	195 *	30.9 J	37.2 *	119 J		226 J	
TOTAL PeCDF	220 J	228 *	983 J	1000 *	246 J	248 *	92.1 J		234 J	240 *	348 J	350 *
TOTAL HxCDF	308 J		1610 J		336 J	337 *	150 J	155 *	352 J	354 *	596 J	
TOTAL HpCDF	141 J		283 J		144 J		186 J		502 J		821 J	
TOXICITY EQUIVALENC	1750 J		8750 J		2030 J		394 J		1020 J		1250 J	
% SOLIDS:	62.2		86.3		79 4		73 2		47.0		24 0	
DILUTION FACTOR:	1 0		1.0		1 0		1.0		1.0		1 0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99		02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION D	02/27/99		02/27/99		02/27/99		02/27/99		02/27/99		02/27/99	
ANALYSIS DATE:	03/17/99		03/16/99		03/16/99		03/16/99		03/16/99		03/16/99	
LAB SAMPLE ID:	U991065		W991237		W991238		W991239		W991240		W991241	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J". Values without an "*" are the Detection Limits.

= These values are reported on a dry weight basis.

$ = These values are reported from a 1:100 dilution

Data Summary Table

Dioxin/Furan Analysis - Soil Sample

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
CASE NO.: 3428 SDG NO.: 3428-CMS-026

SAMPLE NUMBER:	3428-CMS-086#		3428-CMS-087#		3428-CMS-088#	
STATION LOCATION:	AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	233 J		669 $J		127 J	
1,2,3,7,8-PeCDD	UJ	0.9		2.2 *	0.99 J	
1,2,3,4,7,8-HxCDD		2.1 *	4.4 J		1.8 J	
1,2,3,6,7,8-HxCDD	7.5 J		11.8 J		4.6 J	
1,2,3,7,8,9-HxCDD	5.1 J		9.1 J		3.7 J	
1,2,3,4,6,7,8-HpCDD	110 J		213 J		96.7 J	
OCDD	694 J		1260 J		1420 J	
2,3,7,8-TCDF	5.6 J		9.9		3.8	
1,2,3,7,8-PeCDF	3.5 J		2.5 J			0.96 *
2,3,4,7,8-PeCDF	2.6 J		5.8 J		1.9 J	
1,2,3,4,7,8-HxCDF	6.3 J		14.8 J		4.2 J	
1,2,3,6,7,8-HxCDF	3.3 J		6.7 J		2.4 J	
2,3,4,6,7,8-HxCDF	5.1 J		10.4 J		2.9 J	
1,2,3,7,8,9-HxCDF	UJ	0.8	UJ	0.8		0.16 *
1,2,3,4,6,7,8-HpCDF	38.8 J		77.6 J		29.7 J	
1,2,3,4,7,8,9-HpCDF	3.1 J			4.9 *	2.3 J	
OCDF	86.2 J		137 J		76.4 J	
TOTAL TCDD	252 J		700 $J		135 J	135 *
TOTAL PeCDD	UJ	9.2	UJ	27.5	UJ	8.8
TOTAL HxCDD	52.7 J	54.8 *	86.8 J		35.5 J	
TOTAL HpCDD	211 J		408 J		184 J	
TOTAL TCDF	39.4 J	49.8 *	70.8 J	74.1 *	25.8 J	27.0 *
TOTAL PeCDF	81.5 J		121 J		35.9 J	37.4 *
TOTAL HxCDF	87.5 J		170 J	172 *	47.7 J	48.3 *
TOTAL HpCDF	112 J		220 J	225 *	84.3 J	
TOXICITY EQUIVALEN	240 J		684 J		134 J	
% SOLIDS:	75.2		70.0		78.2	
DILUTION FACTOR:	1.0		1.0		1.0	
DATE SAMPLED:	02/16/99		02/16/99		02/16/99	
DATE OF RECEIPT:	02/17/99		02/17/99		02/17/99	
SAMPLE EXTRACTION	02/27/99		02/27/99		02/27/99	
ANALYSIS DATE:	03/17/99		03/17/99		03/16/99	
LAB SAMPLE ID:	T991790		T991794		U105701	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits

= These values are reported on a dry weight basis.

$ = These values are reported from a 1:100 dilution

20

Data Validation
Report Number 7

Steve Stodola
US EPA Approval Signature

6-3-99
Date

June 3, 1999
B-99-6-Y-6

Ms. Christine Clark
Regional Sample Control Custodian
Office of Environmental Measurement and Evaluation
U.S. EPA Region I
60 Westview Street
Lexington, Massachusetts 02421

Reference 87

Re: WA No. 01-99-3-02, Task No. 2, TDF No. 148
Case No. 3428 / SDG No. 3428-CMS-085
Triangle Laboratories - Durham, NC
Woonasquatucket River/Centredale Manor Site, N. Providence, RI

Dioxin/Furan: 27/Soil/3428-CMS-085, 3428-CMS-090, 3428-CMS-091, 3428-CMS-098 thru 3428-CMS-100, 3428-CMS-107, 3428-CMS-108, 3428-CMS-114, 3428-CMS-114DUP, 3428-CMS-115, 3428-CMS-116, 3428-CMS-121, 3428-CMS-123, 3428-CMS-130, 3428-CMS-135 thru 3428-CMS-137, 3428-CMS-142 thru 3428-CMS-144, 3428-CMS-148, 3428-CMS-149, 3428-CMS-239 thru 3428-CMS-242
(Soil Field Duplicate Pair/3428-CMS-114 and 3428-CMS-114DUP)

2/PE/PC00539, PC00543

Dear Ms. Clark:

A Tier III data validation was performed on the Dioxin/Furan analytical data for 27 soils and two PE samples collected by Roy F. Weston, Inc. for the U.S. EPA at the Woonasquatucket River/Centredale Manor Site in N. Providence, RI. The samples were analyzed according to EPA Method 8290 Rev. 0, September 1994. The samples were validated using first the criteria in EPA Method 8290, defaulting second to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria and finally to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98). Unless otherwise stated all criteria used were Method 8290 criteria. The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)
- Preservation and Technical Holding Times
- * PE Samples/Accuracy Check
- * Window Defining Mix

01

*	•	Initial and Continuing Calibrations
*	•	Chromatographic Resolution
*	•	Instrument Sensitivity Check
	•	Blanks
	•	Matrix Spike/Matrix Spike Duplicate
	•	Laboratory and Field Duplicates
	•	Internal/Clean-up/Recovery Standards
*	•	Sample Analysis and Identification
	•	Sample Quantitation
*	•	Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity
*	•	Required Sample Reruns and Second Column Confirmation
	•	System Performance

* - All criteria were met for this parameter.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes Site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor
- To determine potential sources of dioxin/furan contamination
- These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.

Samples 3428-CMS-091, 3428-CMS-099, and 3428-CMS-107 had percent solids less than 30% but greater than 10%. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10 g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively and the non-detects were not rejected.

TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.500 ppb.

Two single blind performance evaluation (PE) samples (fortified native soils PC00539 and PC00543) were evaluated for this SDG. All congeners and homologue groups were scored acceptable.

The majority of the sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

Data Completeness (CSF Audit - Tier I)

The data validation revealed information and/or discrepancies in the data package submitted by the laboratory. The following information/discrepancies are noted:

Missing pages 878 (sample 3428-CMS-123), 1564 (sample 3428-CMS-239), 1730 (sample 3428-CMS-242), and 959 thru 977 (MSD).

The information was requested via the WAM on May 11, 1999. All information was submitted by the laboratory on May 19, 1999.

Preservation and Technical Holding Times

Sample number 3428-CMS-085 exceeded Method 8290 30 day extraction holding time by 4 days, positive detects and non-detects were estimated, J and UJ, respectively.

Blanks

The table below summarizes the compounds that were detected in the solid laboratory method blanks, the action levels, and the samples affected:

Compound	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
2378-TCDF	Method Blank	0.29	1.45	3428-CMS-137
Total TCDD	Method Blank	8.2*	82	3428-CMS-090, 3428-CMS-100, 3428-CMS-108, 3428-CMS-114, 3428-CMS-114DUP, 3428-CMS-136, 3428-CMS-137
Total PeCDD	Method Blank	17.6	176	3428-CMS-085, 3428-CMS-090, 3428-CMS-091, 3428-CMS-098 thru 3428-CMS-100, 3428-CMS-107, 3428-CMS-108, 3428-CMS-114, 3428-CMS-114DUP, 3428-CMS-115, 3428-CMS-116, 3428-CMS-121, 3428-CMS-123, 3428-CMS-130, 3428-CMS-136, 3428-CMS-137, 3428-CMS-143, 3428-CMS-144, 3428-CMS-149, 3428-CMS-239 thru 3428-CMS-242
Total HxCDD	Method Blank	10.9	109	3428-CMS-090, 3428-CMS-100, 3428-CMS-130, 3428-CMS-136, 3428-CMS-137, 3428-CMS-143, 3428-CMS-144, 3428-CMS-240

* Concentration reported as an EMPC value.

The following contamination was found in the method blanks: 2378-TCDF, Total TCDD, Total PeCDD, and Total HxCDD. Professional judgement was used to apply action levels to all of the soil samples from this SDG.

Blank actions are based on EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98) criteria. Blank action levels are calculated as ten times the highest concentration of the contaminant determined in any blank for common contaminants (OCDD/OCDF and Total Homologues) and five times the action level for all other analytes. The positive sample results that are less than the action level are reported as non-detects and estimated (UJ) on the Data Summary Table.

Matrix Spike/Matrix Spike Duplicate

Two matrix spike/matrix spike duplicate pairs were evaluated for this SDG: 3428-CMS-123MS/3428-CMS-123MSD, and 3428-CMS-144MS/3428-CMS-144MSD. The pair 3428-CMS-144MS/3428-CMS-144MSD met the criteria. 3428-CMS-123MS/3428-CMS-123MSD for 2378-TCDD and OCDD did not meet the recovery criterion of 50-150% and/or Relative Percent Difference (RPD) < 50% for soils/sediment as specified in EPA Region I's Environmental Services Assistance Team Dioxin Validation SOP ESAT-01-0007 (11/20/98). However, samples were not qualified since native concentrations were greater than 4x the spike amount for most analytes.

Laboratory and Field Duplicates

One field duplicate pair was evaluated for this SDG (3428-CMS-114/3428-CMS-114DUP).

The table below summarizes the soil field duplicate results that did not meet the duplicate criterion of Relative Percent Difference (RPD) < 50% for soils/sediments as specified in EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/20/98):

Compound	3428-CMS-114	3428-CMS-114DUP	RPD	Action		Affected Samples
	% Solids (81.4%)	% Solids (84.7%)				
	Sample Conc. (ng/Kg)	Duplicate Conc. (ng/Kg)		Positive Detects	NDs	
OCDF	24.3	13.1	59.9	J	UJ	All soil samples

Professional judgment was used to estimate all of the positive results and non-detects (J) and (UJ), respectively, for OCDF in all soil samples.

Internal/Clean-up/Recovery Standards

- Internal Standards

The following table summarizes the internal standards with recoveries which did not meet the acceptance method criterion of 25-130%:

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{13}C-OCDD	191	J	UJ	3428-CMS-091DIL
^{13}C-OCDD	181	J	UJ	3428-CMS-098DIL
^{13}C-OCDD	177	J	UJ	3428-CMS-099DIL
^{13}C-OCDD	196	J	UJ	3428-CMS-107DIL
^{13}C-1234678-HpCDD	134	J	UJ	3428-CMS-107DIL
^{13}C-OCDD	174	J	UJ	3428-CMS-108DIL
^{13}C-OCDD	157	J	UJ	3428-CMS-115DIL
^{13}C-OCDD	194	J	UJ	3428-CMS-121DIL
^{13}C-1234678-HpCDD	148	J	UJ	3428-CMS-121DIL
^{13}C-1234678-HpCDD	133	J	UJ	3428-CMS-142DIL

- Clean-up Standards

The following table summarizes the clean-up standards with recoveries which did not meet the method acceptance criterion of 40-130%:

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{37}C -2378-TCDD	929	J	UJ	3428-CMS-098
^{37}C -2378-TCDD	135	J	UJ	3428-CMS-099
^{37}C -2378-TCDD	146	J	UJ	3428-CMS-123
^{37}C -2378-TCDD	572	J	UJ	3428-CMS-135
^{37}C -2378-TCDD	270	J	UJ	3428-CMS-142
^{37}C -2378-TCDD	333	J	UJ	3428-CMS-148
^{37}C -2378-TCDD	535	J	UJ	3428-CMS-149
^{37}C -2378-TCDD	191	J	UJ	3428-CMS-240
^{37}C -2378-TCDD	179	J	UJ	3428-CMS-241
^{37}C -2378-TCDD	946	J	UJ	3428-CMS-242

- Recovery Standards

The following table summarizes the recovery standards with area counts which failed to meet the acceptance criterion of 50-200% of the area counts of the associated daily calibration standard as specified in the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996, Internal Standard Section:

Recovery Standard	RS Area	Area Limits	Action		Affected Samples
			Positive Detects*	NDs*	
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	22171 10791	4539-18156 2506-10024	J J	UJ UJ	3428-CMS-085&
^{13}C-123789-HxCDD	130	28.7-115	J	UJ	3428-CMS-091DIL=
^{13}C-123789-HxCDD	135	28.7-115	J	UJ	3428-CMS-098DIL=
^{13}C-123789-HxCDD	112	120-478	J	UJ	3428-CMS-099#&$
^{13}C-123789-HxCDD	138	28.7-115	J	UJ	3428-CMS-099DIL@
^{13}C-123789-HxCDD	74.1	120-478	J	UJ	3428-CMS-100
^{13}C-123789-HxCDD	41.3	120-478	J	UJ	3428-CMS-107#&$
^{13}C-123789-HxCDD	122	28.7-115	J	UJ	3428-CMS-107DIL@
^{13}C-123789-HxCDD	58.4	120-478	J	UJ	3428-CMS-108&$
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	3312 2447	670-2680 255-1018	J J	UJ UJ	3428-CMS-130
^{13}C-1234-TCDD ^{13}C-123789-HxCDD	11092 7607	14541-58162 8876-35504	J J	UJ UJ	3428-CMS-142DIL^
^{13}C-1234-TCDD	14415	14541-58162	J	UJ	3428-CMS-148DIL+
^{13}C-1234-TCDD	12344	14541-58162	J	UJ	3428-CMS-149DIL+
^{13}C-1234-TCDD	14350	14541-58162	J	UJ	3428-CMS-239DIL+
^{13}C-1234-TCDD	3483	14541-58162	J	UJ	3428-CMS-240DIL+

* For those compounds associated with the recovery standard referenced.
\# 2378-TCDD values were reported from a 1:100 dilution.
& OCDD values were reported from a 1:100 dilution.
$ 1234678-HpCDD values were reported from a 1:100 dilution.
\+ TCDD only
= OCDD only
@ OCDD and 1234678-HpCDD only
^ TCDD, 1234678-HpCDD and OCDD only

Sample Quantitation

Positive results reported below the reporting limits were flagged as estimated (J) on the Data Summary Table.

Samples 3428-CMS-091, 3428-CMS-099, and 3428-CMS-107 had percent solids less than 30% but greater than 10%.

The table below summarizes the samples with percent solids less than 30%:

Sample Number	% Solids	Action	
		Positive Detects	NDs
3428-CMS-091	26.1	J	UJ
3428-CMS-099	27.3	J	UJ
3428-CMS-107	27.3	J	UJ

Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10 g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively and the non-detects were not rejected.

The laboratory reported several values which were above the upper calibration range. Since quantitative accuracy is questionable above the upper range of calibration, the ESAT validator reported the following values from 1:100 dilutions:

Congener	Affected Samples
2378-TCDD OCDD Total TCDD	3428-CMS-091, 3428-CMS-098, 3428-CMS-149, 3428-CMS-239, 3428-CMS-242
OCDD	3428-CMS-085
2378-TCDD 1234678-HpCDD OCDD Total TCDD Total HpCDD	3428-CMS-099, 3428-CMS-107, 3428-CMS-135, 3428-CMS-142
1234678-HpCDD OCDD Total HpCDD	3428-CMS-108, 3428-CMS-115, 3428-CMS-121

Congener	Affected Samples
2378-TCDD 1234678-HpCDD OCDD 2378-TCDF Total TCDD Total HpCDD Total TCDF	3428-CMS-148
2378-TCDD Total TCDD	3428-CMS-123, 3428-CMS-240, 3428-CMS-242

Toxicity Equivalency Factor (TEF) and Isomer Specificity

All TEQ values were calculated by the ESAT data validator. The data were reported in accordance with standard Region I validation procedures which take into account the observed blank contamination, dilutions, and EMPC values. These calculated values are reported on the Data Summary Tables on a dry weight basis, where applicable. The TEF values are published in EPA/625/3-89/016, "Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs)" and 1989 Update, Part II, page 13.

System Performance

One or both of the recovery standards did not meet area count criteria for several samples. This could be related to congener loss during analysis, improperly capped sample vials, interferences, and/or degradation of the recovery standard spiking solution.

Sample number 3428-CMS-085 exceeded extraction holding times by 4 days.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Janine Bartels
Principal Scientist

Louis Macri
ESAT Team Manager

Attachments: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Data Summary Tables
Data Validation Worksheets
Support Documentation
PE Score Results
Field Notes
Analytical Method

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 3428/SDG No. 3428-CMS-085

Sample Nos.	3428-CMS-085	3428-CMS-090	3428-CMS-091	3428-CMS-098	3428-CMS-099	3428-CMS-100	3428-CMS-107	3428-CMS-108	3428-CMS-114
Compound									
2378-TCDD	J[3,7]	A	J[2]	J[4]	J[2,4]	A	J[2]	A	A
12378-PeCDD	J[3,7]	A	J[2]	J[4]	J[2,3,4]	A	J[2]	A	A
123478-HxCDD	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
123678-HxCDD	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
123789-HxCDD	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
1234678-HpCDD	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3,5]	A	A
OCDD	J[7]	A	J[2,3,5]	J[3,4,5]	J[2,3,4,5]	J[3]	J[2,3,5]	J[5]	A
2378-TCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	A	J[2]	A	A
12378-PeCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	A	J[2]	A	A
23478-PeCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	A	J[2]	A	A
123478-HxCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
123678-HxCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
123789-HxCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
234678-HxCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
1234678-HpCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
1234789-HpCDF	J[3,7]	A	J[2]	J[4]	J[2,3,4]	J[3]	J[2,3]	J[3]	A
OCDF	J[1,3,7]	J[1]	J[1,2]	J[1,4]	J[1,2,3,4]	J[1,3]	J[1,2,3]	J[1,3]	J[1]

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 3428/SDG No. 3428-CMS-085

Sample Nos.	3428-CMS-114DUP	3428-CMS-115	3428-CMS-116	3428-CMS-121	3428-CMS-123	3428-CMS-130	3428-CMS-135	3428-CMS-136	3428-CMS-137
Compound									
2378-TCDD	A	A	A	A	J[4]	J[3]	J[4]	A	A
12378-PeCDD	A	A	A	A	J[4]	J[3]	J[4]	A	A
123478-HxCDD	A	A	A	A	J[4]	J[3]	J[4]	A	A
123678-HxCDD	A	A	A	A	J[4]	J[3]	J[4]	A	A
123789-HxCDD	A	A	A	A	J[4]	J[3]	J[4]	A	A
1234678-HpCDD	A	A	A	J[5]	J[4]	J[3]	J[4]	A	A
OCDD	A	J[5]	A	J[5]	J[4]	J[3]	J[4]	A	A
2378-TCDF	A	A	A	A	J[4]	J[3]	J[4]	A	J[6]
12378-PeCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
23478-PeCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
123478-HxCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
123678-HxCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
123789-HxCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
234678-HxCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
1234678-HpCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
1234789-HpCDF	A	A	A	A	J[4]	J[3]	J[4]	A	A
OCDF	J[1]	J[1]	J[1]	J[1]	J[1,4]	J[1,3]	J[1,4]	J[1]	J[1]

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 3428/SDG No. 3428-CMS-085

Sample Nos.	3428-CMS-142	3428-CMS-143	3428-CMS-144	3428-CMS-148	3428-CMS-149	3428-CMS-239	3428-CMS-240	3428-CMS-241	3428-CMS-242
Compound									
2378-TCDD	J[3,4]	A	A	J[3,4]	J[3,4]	J[3]	J[3,4]	J[4]	J[4]
12378-PeCDD	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
123478-HxCDD	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
123678-HxCDD	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
123789-HxCDD	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
1234678-HpCDD	J[3,4,5]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
OCDD	J[3,4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
2378-TCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
12378-PeCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
23478-PeCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
123478-HxCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
123678-HxCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
123789-HxCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
234678-HxCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
1234678-HpCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
1234789-HpCDF	J[4]	A	A	J[4]	J[4]	A	J[4]	J[4]	J[4]
OCDF	J[1,4]	J[1]	J[1]	J[1,4]	J[1,4]	J[1]	J[1,4]	J[1,4]	J[1,4]

Table I
Recommendation Summary Table for Dioxins/Furans

J[1]	-	Field duplicate RPD >50%; J detects; UJ non-detects.
J[2]	-	% solids < 30%; J detects; UJ non-detects.
J[3]	-	Recovery standard area counts outside criteria; J detects; UJ non-detects.
J[4]	-	Clean-up standard % recovery outside criteria; J detects; UJ non-detects.
J[5]	-	Internal standard % recovery outside criteria; J detects; UJ non-detects.
J[6]	-	Method blank contamination report concentration; UJ detects
J[7]	-	Holding times exceeded; J detects; UJ non-detects

EPA-NE - Data Validation Worksheet
Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error		
To determine the nature and extent of soil dioxin/furan contamination along/near the Woonasquatucket River and at Centredale Manor To determine potential sources of dioxin/furan contamination These data will be used to determine potential health effects based upon a dry weight 2378-TCDD TEQ action limit of 1 ppb.	No, Samples 3428-CMS-091, 3428-CMS-099, and 3428-CMS-107 had percent solids less than 30% but greater than 10%. Since the laboratory increased the sample size to compensate for low percent solids to a dry weight equivalent of 10 g and the quantitation limits were met, positive detects and non-detects were estimated, J and UJ, respectively and the non-detects were not rejected. Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: J[A5,A7]	Refer to qualification in R/S Key on Table I: J[3]	**	TEQs were derived almost solely from 2378-TCDD concentrations for all samples with reported TEQs greater than 0.500 ppb. Two single blind performance evaluation (PE) samples (fortified native soils PC00539 and PC00543) were evaluated for this SDG. All congeners and homologue groups were scored acceptable. The majority of the sampling and analysis quality control met acceptance criteria and the sample data can be used for the site objectives.

* The evaluation of "sampling error" cannot be completely assessed in the data validation.

** Sampling variability is not assessed in data validation.

Validator: _____

Date: 6/3/99

Data Summary Table
Dioxin/Furan Analysis — Samples

E: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
E NO.: 3428 SDG NO.: 3428-CMS-085

SAMPLE NUMBER:	3428-CMS-085 #		3428-CMS-090 #		3428-CMS-091 #		3428-CMS-098 #		3428-CMS-099 #		3428-CMS-100 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
,8-TCDD	284 J		7.5		181 $J		28040 $J		616 $J		8.8	
3,7,8-PeCDD	7.4 J		3.9 J		7.7 J		19.5 J		29.1 J		U	1.2
3,4,7,8-HxCDD	17.2 J		1.9 J		20.3 J		26.5 J		85.3 J		UJ	2.5
3,6,7,8-HxCDD	48.1 J		3.8 J		51.7 J		54.9 J		221 J			3.1 *
3,7,8,9-HxCDD	40.7 J		13.6		38.9 J		55.2 J		175 J		UJ	1.9
3,4,6,7,8-HpCDD	980 J		53.7		1060 J		1070 J		2840 $J		56.7 J	
DD	10350 $J		1380		5400 $J		15060 $J		22840 $J		330 J	
,8-TCDF	12.1 J		U	0.3	16.7 J		124 J		21.9 J		4.4	
3,7,8-PeCDF	3.3 J		U	0.4	5.3 J		28.2 J		10.4 J			1.2 *
3,7,8-PeCDF	6.2 J		U	0.4	7.4 J		50.6 J		16.3 J		1.8 J	
),4,7,8-HxCDF	16.9 J		U	0.5	21.8 J		86.8 J		59.2 J		3.6 J	
),6,7,8-HxCDF	9.9 J		U	0.4	12.7 J		29.3 J		45.9 J		1.9 J	
),6,7,8-HxCDF	15.2 J		U	0.4	16.8 J		28.7 J		57.5 J		2.9 J	
),7,8,9-HxCDF	0.60 J		U	0.5	UJ	0.4	1.1 J		1.3 J		UJ	1.4
),4,6,7,8-HpCDF	138 J		2.8 J		194 J		207 J		810 J		16.4 J	
),4,7,8,9-HpCDF	8.5 J		U	0.9	10.5 J		13.5 J		42.1 J		UJ	3.9
)F	277 J		6.3 J		365 J		448 J		1370 J		19.5 J	
AL TCDD	289 J	292 *	UJ	33.4	181 $J		28370 $J		616 $J		UJ	13.9
AL PeCDD	UJ	40.9	UJ	45.9	UJ	43.6	UJ	198	UJ	159	UJ	3.5
AL HxCDD	300 J		UJ	100	322 J	327 *	582 J		1370 J		UJ	20.3
AL HpCDD	1750 J		140 J		1910 J		2000 J		4860 $J		112 J	
AL TCDF	87.2 J	90.5 *	UJ	0.3	120 J	121 *	713 J	714 *	236 J		29.4 J	32.3 *
AL PeCDF	116 J		2.8 J		181 J	182 *	838 J	865 *	513 J	515 *	45.3 J	47.8 *
AL HxCDF	277 J		6.3 J		321 J		976 J		1210 J		41.7 J	
AL HpCDF	338 J		6.5 J		465 J		385 J		1880 J		35.8 J	
TOXICITY EQUIVALENCY:	329 J		13.3 J		225 J		28146 J		767 J		12.4 J	
% SOLIDS:	52.5		94.4		26.1		48.3		27.3		72.8	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
DATE OF RECEIPT:	02/18/99		02/18/99		02/18/99		02/18/99		02/18/99		02/18/99	
SAMPLE EXTRACTION DATE:	03/23/99		03/11/99		03/11/99		03/11/99		03/11/99		03/11/99	
ANALYSIS DATE:	04/03/99		03/21/99		03/21/99		03/21/99		03/21/99		03/21/99	
LAB SAMPLE ID:	U991464		T991906		T991907		T991908		T991909		T991910	

hese values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
hese values are reported on a dry weight basis.
/alue reported from a 1:100 dilution analysis.

Data Summary Table
Dioxin/Furan Analysis - Samples

: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
E NO.: 3428 SDG NO.: 3428-CMS-085

SAMPLE NUMBER:	3428-CMS-107 #		3428-CMS-108 #		3428-CMS-114 #		3428-CMS-114DUP #		3428-CMS-115 #		3428-CMS-116 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
,8-TCDD	1660 $J			4.7 *	10.7		12.8		215		98 0	
,7,8-PeCDD	28.0 J		9.6		6.5		5.4		37.4		4.8 J	
,4,7,8-HxCDD	73.4 J		41.7 J		4.5 J		3.8 J		103		3.8 J	
,6,7,8-HxCDD	189 J		156 J		9.0		7.1		291		8.9	
,7,8,9-HxCDD	151 J		77.4 J		25.1		23.8		220		9.2	
,4,6,7,8-HpCDD		3420 *$	2400 $J		174		111		8140 $		201	
D	25230 $J		14890 $J		2330		1600		43740 $J		1680	
,8-TCDF	21.8 J		2.6		2.5		2.2		23.3		90.5	
,7,8-PeCDF	10.1 J		5.5		0.76 J		0.75 J		14.7		15.9	
,7,8-PeCDF	14.7 J		5.3		1.1 J		1.1 J		19.2		19.7	
,4,7,8-HxCDF	48.6 J		27.9 J		2.7 J		2.6 J		62.7		28.0	
,6,7,8-HxCDF	41.1 J		26.5 J		1.6 J		1.4 J		62.7		11.1	
,6,7,8-HxCDF	51.4 J		39.0 J		2.3 J		2.0 J		76.6		14.2	
,7,8,9-HxCDF	UJ	2.7	UJ	1.3	U	0.1	U	0.2	1.8 J		0.99 J	
,4,6,7,8-HpCDF	667 J		521 J		13.2		9.8		782		49.0	
,4,7,8,9-HpCDF	37.1 J		37.0 J			1.1 *		0.72 *	44.1		2.9 J	
F	1160 J		973 J		24.3 J		13.1 J		1090 J		42.7 J	
AL TCDD	1660 $J		UJ	6.0	UJ	42.8	UJ	42.1	259 J	260 *	226 J	228 *
AL PeCDD	UJ	136	UJ	41.2	UJ	66.0	UJ	60.7	UJ	233	UJ	135
AL HxCDD	1200 J		754 J		147 J		135 J		1940 J		124 J	125 *
AL HpCDD	2800 $J	6220 *	3840 $J		362 J		245 J		14020 $J		391 J	
AL TCDF	326 J	330 *	35.1 J		16.6 J	16.8 *	14.7 J	15.2 *	261 J	265 *	557 J	
AL PeCDF	553 J	572 *	240 J		23.6 J	23.7 *	22.1 J	22.9 *	793 J		316 J	316 *
AL HxCDF	1080 J	1080 *	794 J	801 *	45.6 J		48.0 J	48.7 *	1520 J		192 J	
AL HpCDF	1560 J		1580 J		30.9 J	32.0 *	19.0 J	20.4 *	1740 J		90 4 J	
TOXICITY EQUIVALENCY:	1807 J		95.0 J		23.5 J		23.2 J		463 J		132 J	
% SOLIDS:	27.3		89.9		81.4		84.7		32.1		51.4	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
DATE OF RECEIPT:	02/18/99		02/18/99		02/18/99		02/18/99		02/18/99		02/18/99	
SAMPLE EXTRACTION DATE:	03/11/99		03/11/99		03/11/99		03/11/99		03/11/99		03/11/99	
ANALYSIS DATE:	03/21/99		03/21/99		03/21/99		03/21/99		03/21/99		03/21/99	
LAB SAMPLE ID:	T991911		T991912		U991177		U991178		U991179		U991180	

These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
These values are reported on a dry weight basis.
Value reported from a 1:100 dilution analysis.

Data Summa[illegible]ble
Dioxin/Furan Analysis [illegible] Samples

: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
E NO.: 3428 SDG NO.: 3428-CMS-085

SAMPLE NUMBER:	3428-CMS-121 #		3428-CMS-123 #		3428-CMS-130 #		3428-CMS-135 #		3428-CMS-136 #		3428-CMS-137 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
,8-TCDD	186		2080 $J		63.1 J		20420 $J		5.5		1.6	
,7,8-PeCDD	31.9		6.2 J		1.3 J		43.6 J		1.3 J		U	0.4
,4,7,8-HxCDD	72.7		6.3 J		1.5 J		76.8 J		2.8 J		1.1 J	
,6,7,8-HxCDD	129		16.5 J		2.8 J		152 J		6.2			2.3 *
,7,8,9-HxCDD	163		14.3 J		3.4 J		184 J		7.0		2.6 J	
,4,6,7,8-HpCDD	2360 $J		337 J		46.0 J		4770 $J		167		52.2	
D	9570 $J		1880 J		307 J		20980 $J		1230		305	
,8-TCDF	18.8		18.0 J		15.5 J		127 J		3.5		UJ	0.98
,7,8-PeCDF	2.5 J		4.2 J		4.1 J		18.8 J		0.98 J			0.51 *
,7,8-PeCDF	6.1		7.0 J		6.1 J		63.5 J		1.9 J			0.78 *
,4,7,8-HxCDF	9.1		12.9 J		7.8 J		125 J		5.2		1.7 J	
,6,7,8-HxCDF	6.7		6.8 J		3.6 J		43.4 J		3.4 J		1.3 J	
,6,7,8-HxCDF	9.6		10.9 J		5.0 J		47.2 J		5.1		2.0 J	
,7,8,9-HxCDF	U	0.3		0.34 *	UJ	0.2	1.8 J		U	0.3	U	0.5
,4,6,7,8-HpCDF	93.6		59.2 J		17.2 J		274 J		57.4		14.9	
,4,7,8,9-HpCDF	3.5 J		4.1 J			0.99 *	31.4 J		5.3		U	1.2
F	77.8 J		85.5 J		15.6 J		393 J		198 J		33.3 J	
AL TCDD	207 J		2080 $J	2110 *	87.4 J		20810 $J	20860 *	UJ	10.6	UJ	2.1
AL PeCDD	UJ	138	UJ	61.5	UJ	30.4	217 J	228 *	UJ	12.7	UJ	2.1
AL HxCDD	1100 J		131 J		UJ	38.7	1470 J		UJ	56.4	UJ	22.5
AL HpCDD	4140 $J		612 J		99.0 J		8170 $J		329 J		107 J	
AL TCDF	142 J		126 J		89.3 J		788 J	791 *	28.6 J	31.2 *	8.4 J	11.1 *
AL PeCDF	141 J	141 *	142 J	148 *	108 J	108 *	1060 J	1080 *	57.3 J	62.1 *	21.8 J	25.4 *
AL HxCDF	175 J	176 *	330 J	331 *	74.3 J	74.8 *	1970 J	1970 *	89.1 J	90.3 *	28.9 J	30.2 *
AL HpCDF	166 J		128 J		30.4 J	31.4 *	657 J		178 J	180 *	37.2 J	
TOXICITY EQUIVALENCY:	280 J		2101 J		71.9 J		20622 J		14.2 J		4.13 J	
% SOLIDS:	84.0		31.8		62.3		49.8		76.2		77.2	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
DATE OF RECEIPT:	02/18/99		02/18/99		02/18/99		02/18/99		02/18/99		02/18/99	
SAMPLE EXTRACTION DATE:	03/11/99		03/11/99		03/12/99		03/12/99		03/12/99		03/12/99	
ANALYSIS DATE:	03/21/99		03/22/99		03/29/99		03/29/99		03/29/99		03/29/99	
LAB SAMPLE ID:	U991181		U991187		S991693		T992108		T992109		T992110	

hese values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
These values are reported on a dry weight basis.
/alue reported from a 1:100 dilution analysis.

Data Summ[illegible]able
Dioxin/Furan Analys[illegible]l Samples

E: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
SE NO.: 3428 SDG NO.: 3428-CMS-085

SAMPLE NUMBER:	3428-CMS-142 #		3428-CMS-143 #		3428-CMS-144 #		3428-CMS-148 #		3428-CMS-149 #		3428-CMS-239 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
7,8-TCDD	7900 $J		181		52.8		14790 $J		22650 $J		3430 $J	
3,7,8-PeCDD	30.2 J		U	0.6	3.1 J		75.1 J		24.7 J		6.0	
3,4,7,8-HxCDD	47.7 J		2.6 J		3.3 J		95.0 J		44.2 J		6.8	
3,6,7,8-HxCDD	100 J		6.0		8.5		252 J		90.1 J		13.3	
3,7,8,9-HxCDD	118 J			5.3 *	7.7		266 J		95.2 J		16.5	
3,4,6,7,8-HpCDD	3380 $J		114		105		6530 $J		1770 J		433	
DD	20290 $J		592		587		38950 $J		11890 $J		11350 $	
7,8-TCDF	164 J		3.3		35.3		742 $J		58.3 J		67.4	
3,7,8-PeCDF	32.2 J		U	0.4	7.7		135 J		14.3 J		18.2	
4,7,8-PeCDF	60.8 J		1.6 J		14.7		208 J		27.0 J		27.0	
3,4,7,8-HxCDF	138 J		3.3 J		19.8		807 J		57.1 J		70.6	
3,6,7,8-HxCDF	52.4 J		2.0 J		12.3		236 J		24.3 J		22.5	
4,6,7,8-HxCDF	59.9 J		2.2 J		19.7		266 J		22.3 J		28.4	
3,7,8,9-HxCDF	1.9 J		U	0.7	U	0.5	13.3 J		1.1 J		U	1.7
3,4,6,7,8-HpCDF	344 J		21.1		71.9		1350 J		210 J		155	
3,4,7,8,9-HpCDF	26.5 J		U	1.4	3.8 J		134 J		13.7 J		15.6	
DF	459 J		36.7 J		81.1 J		1710 J		279 J		254 J	
TAL TCDD	8390 $J	8420 *	184 J	185 *	120 J	125 *	16600 $J		23060 $J		3530 $J	
TAL PeCDD	212 J	219 *	UJ	2.4	UJ	41.4	984 J	1010 *	UJ	134	UJ	55.4
TAL HxCDD	984 J	996 *	UJ	48.1	UJ	96.4	3110 J		821 J		170 J	174 *
TAL HpCDD	5840 $J		216 J		230 J		11750 $J		3310 J		959 J	
TAL TCDF	963 J		32.0 J	34.0 *	289 J		3760 $J	3780 $*	363 J		396 J	398 *
TAL PeCDF	1110 J		46.1 J	50.7 *	520 J	522 *	2930 J		609 J		506 J	508 *
TAL HxCDF	1290 J		58.0 J		362 J		3180 J		725 J	726 *	550 J	
TAL HpCDF	657 J		45.2 J		138 J		2520 J		402 J		320 J	
TOXICITY EQUIVALENCY:	8074 J		186 J		75.2 J		15327 J		22748 J		3488 J	
% SOLIDS:	35.6		70.5		72.4		40.0		32.9		76.2	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	02/17/99		02/17/99		02/17/99		02/17/99		02/17/99		02/17/99	
DATE OF RECEIPT:	02/18/99		02/18/99		02/18/99		02/18/99		02/18/99		02/18/99	
SAMPLE EXTRACTION DATE:	03/12/99		03/12/99		03/12/99		03/12/99		03/12/99		03/12/99	
ANALYSIS DATE:	03/29/99		03/29/99		03/29/99		03/30/99		03/30/99		03/30/99	
LAB SAMPLE ID:	T992111		T992117		T992118		T992122		T992123		T992124	

These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
These values are reported on a dry weight basis.
Value reported from a 1:100 dilution analysis.

Data Summary Table
Dioxin/Furan Analysis - Soil Samples

E: WOONASQUATUCKET RIVER/CENTREDALE MANOR - N. PROVIDENCE, RI
SE NO.: 3428 SDG NO.: 3428-CMS-085

SAMPLE NUMBER:	3428-CMS-240 #		3428-CMS-241 #		3428-CMS-242 #	
STATION LOCATION:	AREA 1		AREA 1		AREA 1	
MATRIX:	SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
7,8-TCDD	5100 $J		6600 $J		20270 $J	
3,7,8-PeCDD	2.5 J		6.4 J		10.2 J	
3,4,7,8-HxCDD		2.8 *	11.0 J		5.7 J	
3,6,7,8-HxCDD	7.2 J		31.9 J		17.0 J	
3,7,8,9-HxCDD	6.9 J		27.9 J		20.3 J	
3,4,6,7,8-HpCDD	138 J		703 J		328 J	
DD	1020 J		7090 $J		3200 J	
7,8-TCDF	7.5 J		20.4 J		38.9 J	
3,7,8-PeCDF	2.1 J			6.2 *	11.2 J	
4,7,8-PeCDF	3.7 J		11.3 J		19.8 J	
3,4,7,8-HxCDF	9.3 J		40.3 J		48.5 J	
3,6,7,8-HxCDF	4.9 J		18.2 J		18.3 J	
4,6,7,8-HxCDF	5.8 J		17.0 J		26.6 J	
3,7,8,9-HxCDF	UJ	1.3		0.73 *		1.0 *
3,4,6,7,8-HpCDF	44.2 J		198 J		136 J	
3,4,7,8,9-HpCDF	4.2 J		14.9 J		12.5 J	
DF	86.7 J		331 J		226 J	
TAL TCDD	5230 $J		6790 $J	6830 *	20910 $J	
TAL PeCDD	UJ	15.3	UJ	45.1	UJ	88.0
TAL HxCDD	UJ	62.8	248 J	252 *	180 J	182 *
TAL HpCDD	261 J		1340 J		668 J	
TAL TCDF	68.0 J	71.6 *	154 J		285 J	310 *
TAL PeCDF	121 J	129 *	255 J	277 *	417 J	441 *
TAL HxCDF	171 J		428 J	429 *	523 J	524 *
TAL HpCDF	104 J		430 J		309 J	
TOXICITY EQUIVALENCY:	5111 J		6642 J		20311 J	
% SOLIDS:	70.6		48.8		61.2	
DILUTION FACTOR:	1.0		1.0		1.0	
DATE SAMPLED:	02/17/99		02/17/99		02/17/99	
DATE OF RECEIPT:	02/18/99		02/18/99		02/18/99	
SAMPLE EXTRACTION DATE:	03/12/99		03/12/99		03/12/99	
ANALYSIS DATE:	03/30/99		03/30/99		03/30/99	
LAB SAMPLE ID:	T992125		T992126		U991371	

These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
These values are reported on a dry weight basis.
Value reported from a 1:100 dilution analysis.

RW copy

Reference 88

DATE: 13 May 1999

TO: Joanne Comacho, U.S. EPA/ERTC Work Assignment Manager

THROUGH: Amanda Daly, REAC Task Leader

FROM: John Williams, WESTON

SUBJECT: FOLLOW-UP GEOPHYSICAL INVESTIGATION, CENTREDALE MANOR SITE, and PROVIDENCE, RHODE ISLAND for (EPA REGION II, EDISON, and NEW JERSEY) WORK ASSIGNMENT 3-428-TRIP REPORT

INTRODUCTION

In February 1999 REAC performed a comprehensive geophysical investigation for the EPA, Region II, at the Centredale Manor Facility in Providence, Rhode Island. Results of that investigation (submitted to EPA 12 March 1999) provided information related to the substructure of the site and identified several anomalous areas potentially associated with (reported) buried materials. In April 1999 a "follow-up" geophysical survey was undertaken to help further define the extent of those anomalies and to complete surveying at other portions of the facility not covered during the initial investigation. The follow-up surveys were performed to scan the North, Central and South parking lots, as well as portions of the property, west along the Woonasquatucket River and the wooded area south of the southernmost parking lot. The follow-up surveys were conducted using a complement of Electromagnetic (EM) Terrain Conductivity Methods (EM-31 and EM-61) and Ground Penetrating Radar (GPR).

This report documents the results of the investigation, applied geophysical techniques, and a review of the data collected by WESTON during the survey periods. A site index map showing the locations of the respective survey areas, contour plots for the EM-31 and 61 data and representative GPR plots are included in the Attachment.

METHODOLOGY

Surveys Grids

Prior to conducting the surveys, reference grids were established at the site in order to provide a means of surface control during the data collection. The survey grids, shown in plate 1, were established using the existing coordinate system used during the previous investigation conducted in February 1999. The field data obtained at the site, along with existing monuments and surface features, were referenced to the grid coordinate system.

Metallic surface debris and other cultural features that potentially affected the EM survey were noted and later compared to the geophysical results.

Electromagnetic (EM) Surveys

Two EM techniques, time-domain (TDEM) and frequency-domain (FEM), were preformed at the four areas described above. TDEM was conducted using a Geonics, Ltd. EM-61™ metal detector and FEM was conducted using a Geonics, Ltd. EM-61™ terrain conductivity meter. The TD EM-61 instrument transmits a pulse (instead of a fixed frequency like the EM-31). In general, the instruments measure a radiated signal from conductive materials or object after a transmitted pulse has been induced. Output from the EM-61 and EM-31 is used to provide information regarding the location and approximate mass and depth of buried metallic conductors. In addition, the EM-31 provides information regarding the soil conductivity, which was used to interpret the composition and structure of the subsurface at the Centredale Manor Site. The EM surveys methods were performed using the following methods.

Prior to conducting the surveys, the instrument was calibrated in accordance with the instrument-operating manual. The EM-61 survey was performed in the "wheel" mode, while the EM-31 survey was performed in the walking mode along the same pre-established grid lines (transects) using constant line spacing.

For each instrument the measurements were digitally recorded and stored in memory in an Omni Data Logger™ as the operator traversed each line. Data were collected at approximate 0.5 to 1.5-foot intervals for the EM-61 and 2.5 to 5-foot intervals for the EM-31. Data sets form both instruments were downloaded from the data logger to a field computer. The computer-generated output files were formatted, then compared against the random QA/QC readings recorded in the field logbook.

Conductivity contour plots were prepared from the field data using Oasis montaj™ contour plotting software. Prior to evaluating potential subsurface features, the cultural features identified on the surface (e.g., surface debris) were plotted. This process allowed the geophysicist to note anomalous readings coincident with these surface features. Intense EM anomalies coincident with the cultural features may occasionally interfere or mask buried features. As a result, at these locations, buried features may go undetected. The contour plots were interpreted with regard to site soil characteristics, site-specific geology, and the suspected presence of buried waste materials. The results of the EM surveys are presented and discussed below.

Ground Penetrating Radar (GPR) Surveys

The GPR survey was conducted at the four areas of the Centredale Site between 6 and 9 April 1999. The surveys were preformed using a Geophysical Surveys Systems, Inc. Subsurface Interface Radar™ (SIR) System 10A model. The System 10A consists of a control/display unit, mainframe/data storage unit, microcomputer, thermal printer, and a 300 or 500 megahertz (MHz) antenna. The System 10A automatically displays, processes, and records cross sectional profiles of the subsurface. Depth of penetration is site-specific and is dependent upon the electrical characteristics of the site materials and the frequency of the transmitter, therefore a site-specific calibration was conducted.

Prior to conducting the surveys, the instrument was calibrated in accordance with the instrument-operating manual. The GPR was field-calibrated using an averaged dielectric constant for the survey medium. Surveying was accomplished by traversing each area with a 500 MHz antenna along the pre-established grid lines at 10 to 25-foot intervals. The product of the GPR survey was a series of real-time subsurface field profiles (provided in Attachment B). The profile plots were interpreted with regard to site soil characteristics, site-specific geology, and the suspected presence of buried waste materials. The results of the EM surveys are presented and discussed below.

RESULTS

Anomalies (subsurface conductors) identified by the EM-31 are characterized by negative and positive excursions in the background measurements. In the EM-61, these features are detected by variable metallic responses in the upper and lower instrument sensors and are expressed in terms of milli-volts (mV). Information provided by both EM instruments (along with the ground penetrating radar scans) was used to provide the following interpretation of the subsurface characteristics in each of the four surveyed areas.

North Parking Lot

The EM contour plots for the North Parking Lot are shown in figures 1 through 4. Figure 1 is provided to show the apparent conductivity of the underlying soils. Annotations are provided in figures 2 and 4 for the EM-31 in-phase and EM-61 differential channel, respectively, which yielded the best representations of potential buried anomalies. The anomalies are numbered from *A1* to *A6* and are summarized along with the EM interpretations in Table 1. Ten significant EM anomalies were identified in the EM-31 and EM-61 data collected at the North Parking Lot. Four anomalies were attributed to known cultural features including an underground storage tank, reinforced concrete

slabs, "staged" surface drums (containing drill materials) and a vehicle. The six remaining anomalies identified in figures 2 and 4 appear as highs or lows at various levels from background. These anomalies are attributed to highly conductive materials in the subsoil or on the ground surface and are described in further detail in Table 1.

Figure 5 represents cross sectional subsurface profiles of the North Parking Lot as scanned by the GPR. The profiles were collected traversing the area along grid lines 70W and 80W extending from 0N to 250N. The X-axis represents horizontal distance (in feet) along the ground surface. The Y-axis represents the travel-time (from 0 to 60 nanoseconds -ns) of the pulsed radar signal. This later parameter equates to depth below ground surface (bgs).

Consistent with the boring logs, the profiles show a sequence of well-defined or stratified layers. The upper zone (layer 1) is interpreted to represent the asphalt sub-grade and shallow mixed fill materials. The base of this layer appears in the profiles as an undulating surface, and varies in thickness across the radar scan from 2.5 to approximately 7 feet bgs. Underlying the shallow layer is a zone of reflective materials characterized in the profile by high amplitude (blue and white), spiky (chaotic) signatures This deeper zone (identified as layer 2) extends from 20 to 45 ns or 4.5 to >10 feet bgs. Variations in the boring descriptions precluded definitive identification of layer 2 however a cursory look at the site-wide structural trend suggests that layer 2 may in fact be the buried remnants (alluvial deposits) of a paleo-channel.

Central Parking Lot

The EM-61 contour plots for the Central Parking Lot are shown in figures 6 and 7. Annotations are provided on figure7 for the differential channel, which yielded the best representations of potential buried anomalies. The features numbered from *A7* to *A9* were grouped into clusters for easier identification. As shown in figure 7, several anomalies were associated with known cultural features including several buried utilities (confirmed by utility plans), a reinforced concrete walkway, a fire hydrant and several light poles. The remaining anomalies appear as highs or lows at various levels from background. They are summarized along with the EM interpretations in Table 2.

Figure 8 represents cross sectional subsurface profiles of the Central Parking Lot as scanned by the GPR. The profiles were collected traversing the area along grid lines 100E and 90E extending from 50S to 200S.

In contrast to the North Parking Lot, no boring logs were available for the area to provide a baseline for the GPR interpretation. The profiles show a dipping structure with well-defined lateral and vertical boundaries. This feature closely correlates with the northernmost anomaly of cluster *A9* that is located at 150S by 90E. The upper shallow layer is interpreted to represent the asphalt sub-grade and the shallow mixed fill materials. The zone of reflective materials observed beneath grid node 150S is characterized in the profile by high amplitude (blue and white), chaotic signatures. Similar to the profiles collected in the North Parking Lot, this zone extends from 20 to 45 ns or 4.5 to >10 feet bgs. The deposition of this structure is undetermined: it may be alluvial or anthropogenic (i.e. fill or construction related).

South Parking Lot

The EM-61 contour plots for the South Parking Lot are shown in figures 9 and 10. Annotations are provided on figure 10 for the bottom channel, which yielded the best representations of potential buried anomalies. The features are numbered from *A10* to *A12* for easy identification. Also shown in figure 10 are several other buried conductors which were associated to known cultural features including buried electric and water utilities (confirmed by utility plans), a fire hydrant and several light poles. The three significant anomalies (*A10* to *A12)* appear as highs or lows at various levels from background. They are summarized along with the EM interpretations in Table 3. Anomalies *A10* and *A11* depict two small clusters of individual or localized anomalies. *A12* represents the most dramatic anomaly identified across the entire site. Peak signals response range from 75 mV to greater than 800 mV. The

source of the anomaly appears diffuse and widespread and the approximate lateral extent is 80 feet N/S by 120 feet E/W.

The GPR profiles show a well-defined layer of reflective buried materials that correlate with the lateral boundaries of EM anomaly *A12*. Similar to the profiles collected in the Central Parking Lot, the radar signatures appear as high amplitude (blue and white), chaotic signatures. The layer extends vertically from approximately 3.5 to >10 feet bgs. The deposition of this layer is undetermined. The high intensities of the peak EM signals and the GPR signature characteristics indicate that it is probably anthropogenic (i.e. mixed metallic fill or construction debris). Based on these findings this area is deemed to have the highest potential for containing buried *bulk* metallic materials.

South Grid Area

The EM-31 conductivity and in-phase contour plots for the South Grid Area, located south of the South Parking Lot are shown in figures 11 and 12. Annotations are provided on figure 12 for the in-phase, which yielded the best representations of potential buried anomalies. The most significant feature identified in this area (*A13)* is depicted on figure 12 as a strong negative in-phase response (>-25 ppt). The location and orientation of *A13* suggest that the source is an extension of anomaly *A12*. GPR signature characteristics are consistent with those identified in the adjacent South Parking Lot. It is highly probable that the underlying source is consistent with those described above.

TABLE 1
CENTREDALE MANOR SITE
GEOPHYSICAL SURVEY RESULTS SUMMARY
North Parking Lot Survey Results

SURVEY COVERAGE: Approx. 40,000 sq. ft.-actual coverage
Sample Density:
EM-31 5ft/station x 10 ft/transect
EM-61 0.5-1 ft/station x 5 ft/transect
Number of GPR Transects: 16

SIGNIFICANT EM ANOMALIES IDENTIFIED

Anomaly	Coordinates (Grid node)	Interpreted Anomaly Identity	Comments
A1	135N to 215N/ 15 W to 35W	Indicative of buried conductor. Possible utility or extents of mixed fill. Consistent with ferrous "rusty" band and ash described in borings B3 and B5	Linear conductive feature trending N to S between 25W and 30 W lines. Rapid excursions in the EM31 (conductivity >75 mS/m) and (in-phase >10 ppt) response define linear anomaly. Minimal response in EM-61 does not suggest bulk metallic fill material.
A2	15N/35W	Localized Anomaly, moderate potential of small buried metallic source.	Well-defined negative in-phase response EM-31.
A3	25S/20W	Localized Anomaly; moderate potential of small buried metallic source.	Well-defined strong negative in-phase response EM31.
A4	100S/85W	Localized Anomaly; moderate potential of small buried metallic source.	Moderate response on EM31 in-phase measurement
A5	50W trending N 110S to 10S	Anomaly symmetrical along the survey line; trend suggest buried utility	Linear conductive feature trending N to S between 45W and 50W lines. Rapid excursions in the EM61 (>100 mV) and (in-phase >10 ppt) response define linear anomaly.
A6	10N/55W	Conductive materials. Possible extents of mixed fill. Ferrous "rusty" band and ash described in soil borings B3 and B5	Defuse conductive feature. Moderate EM61 response (differential >50 mV) and slight EM-31 response (in-phase >2 ppt) defines anomaly.

TABLE 1
CENTREDALE MANOR SITE
Geophysical Survey Results Summary
(Continued)

Central Parking Lot Survey Results

SURVEY COVERAGE: Approx. 37,500 sq. ft.-actual coverage
Sample Density:
EM-61 2.5 ft/station x 10 ft/transect
Number of GPR Transects: 15

SIGNIFICANT EM ANOMALIES IDENTIFIED

Anomaly	Coordinates (Grid node)	Interpreted Anomaly Identity	Comments
A7	See fig 7 plot	Localized clustered anomalies moderate potential of small buried metallic source.	Well-defined discriminate targets with peak EM-61 signal responses in excess of 180 mV.
A8		Localized clustered anomalies moderate potential of small buried metallic source.	Well-defined discriminate targets with peak EM-61 signal responses ranging from 50 to 180 mV.
A9		Localized clustered anomalies moderate potential of small buried metallic source.	Well-defined discriminate targets with peak EM-61 signal responses ranging from 50 to 180 mV. Northern most anomaly defined by GPR. Southernmost anomaly diffuse.

TABLE 1
CENTREDALE MANOR SITE
Geophysical Survey Results Summary
(Continued)

South Parking Lot Survey Results

SURVEY COVERAGE: Approx. 37,800 sq. ft.-actual coverage
Sample Density:
EM-61 0.5-1.0 ft/station x 5 ft/transect
Number of GPR Transects: 21

SIGNIFICANT EM ANOMALIES IDENTIFIED

Anomaly	Coordinates (Grid node)	Interpreted Anomaly Identity	Comments
A10	281540N/ 331765E	Localized discrete anomaly; moderate potential of small buried metallic source.	Well-defined discriminate target with peak EM-61 signal responses in excess of 800 mV.
A11	281545N/ 331730E	Localized clustered anomalies; moderate potential of small buried metallic source.	Well-defined discriminate targets with peak EM-61 signal responses in excess of 200 mV.
A12	(See fig.10) (Approx. lateral extent is 80 feet N/S by 120 feet E/W.)	Deposition undetermined. Probably anthropogenic (i.e. mixed metallic fill or construction debris). Deemed to have the highest potential for buried *bulk* metallic materials	Peak EM signals response range from 75 mV to greater than 800 mV. The source of the anomaly appears diffuse and widespread. GPR profiles show well-defined layer of reflective materials that correlate with the lateral boundaries of EM anomaly.

TABLE 1
CENTREDALE MANOR SITE
Geophysical Survey Results Summary
(Continued)

South Grid Wooded Area
Survey Results

SURVEY COVERAGE: Approx. 3,500 linear ft.
Sample Density:
EM-61 5 ft/station x 25 ft/transect
Number of GPR Transects: 9

SIGNIFICANT EM ANOMALIES IDENTIFIED

Anomaly	Coordinates (Grid node)	Interpreted Anomaly Identity	Comments
A13	Extension of anomaly *A12*	Probable that the underlying source is consistent with *A12*. Anthropogenic (i.e. mixed metallic fill or construction debris). Deemed to have high potential for buried *bulk* metallic materials	Strong negative in-phase response >-25 ppt. GPR signature characteristics are consistent with those identified at anomaly *A12* in the adjacent South Parking Lot

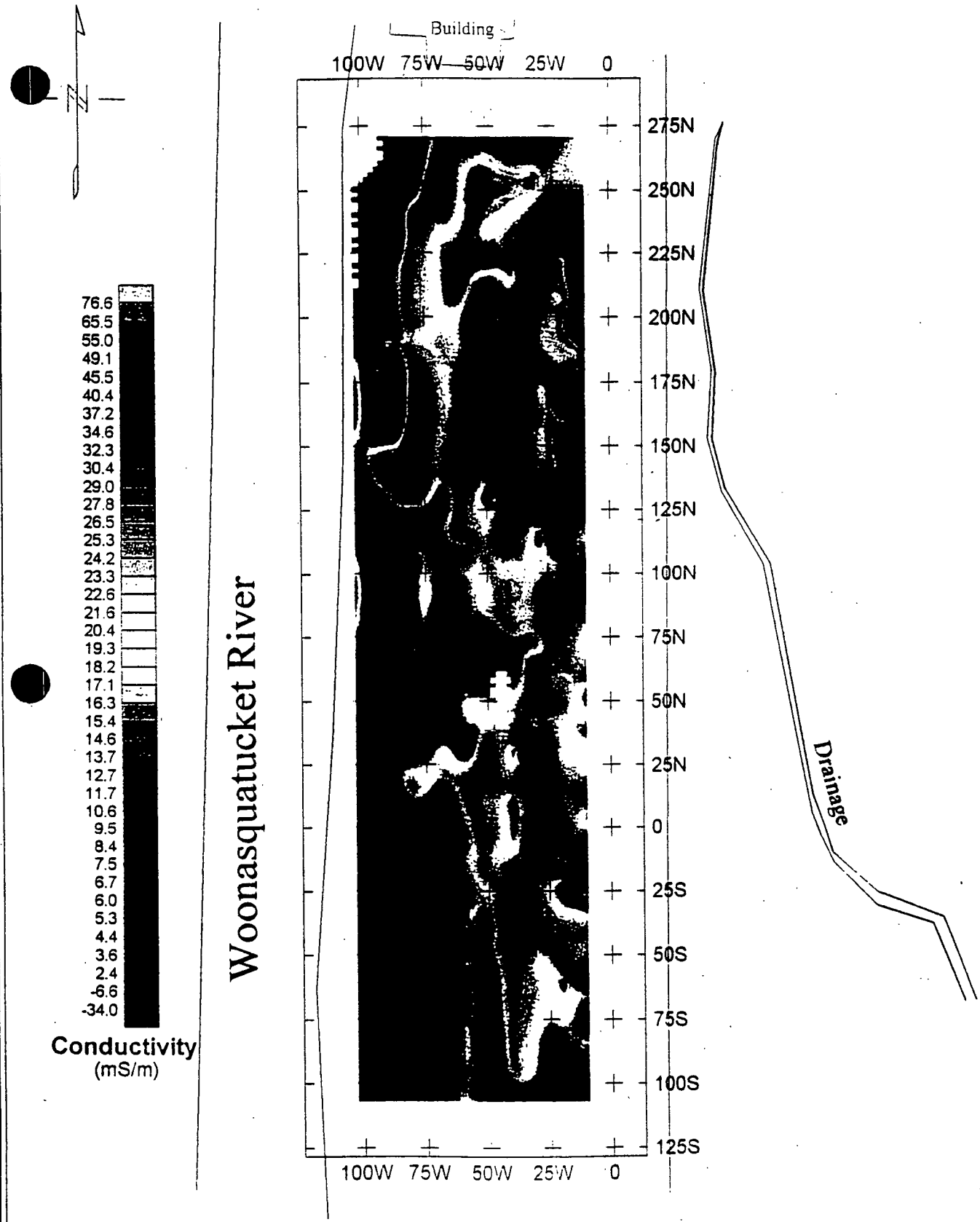
Conclusions and Recommendations

Several buried cultural features (i.e. subsurface utilities) were identified across the four surveyed areas. These features were confirmed by utility drawings or associated surface features such as fire hydrants or electrical appurtenances. In addition, a total of 13 significant undetermined EM anomalies were identified. Based on the EM anomaly and the GPR signature characteristics, it is probable that these features are anthropogenic (i.e. mixed metallic fill or construction debris). Anomalies *A12* and *A13,* located in the South Parking Lot, are deemed to have the highest potential for containing buried *bulk* metallic materials. Depending upon the findings of soil and water chemistry sampling, further consideration should be given to physically characterizing the anomalies.

Although a comprehensive geologic analysis of the GPR data was not scoped some stratigraphic trends were identified. The GPR cross sectional profiles collected in the North Parking Lot depicted a sequence of stratified materials reflecting a meandering lateral trend. The trend identified on the GPR profiles, (coupled with the EM data and soil boring information) suggest a natural layer, possibly the buried remnants (alluvial deposits) of a paleo-channel. Depending upon the findings of the water chemistry sampling, further consideration should be given to mapping/modeling the radar data, as these zones may reflect preferred groundwater pathways.

ATTACHMENT

EM AND GPR FIGURES
CENTREDALE MANOR SITE
PROVIDENCE, RI
ARPIL 1999



Scale 1:720

25 0 25 50

feet

Figure 1 - EM-31 Survey (Conductivity Plot)

Centredale Manor Site
Providence, R.I.

U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O.# 03347-143-001-3428

North Parking Lot
EM-31 Survey
Quadrature Component - 99-05-06

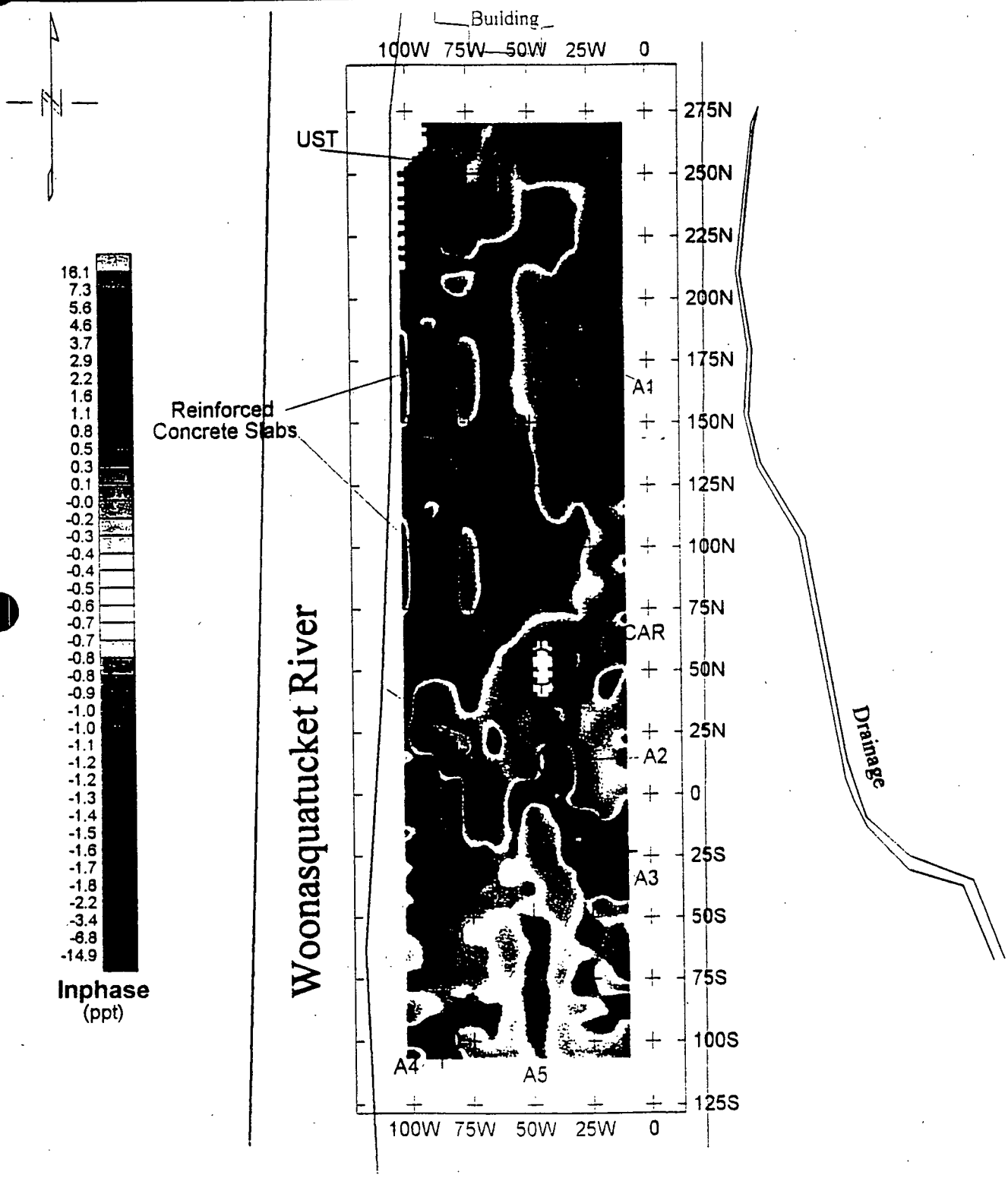
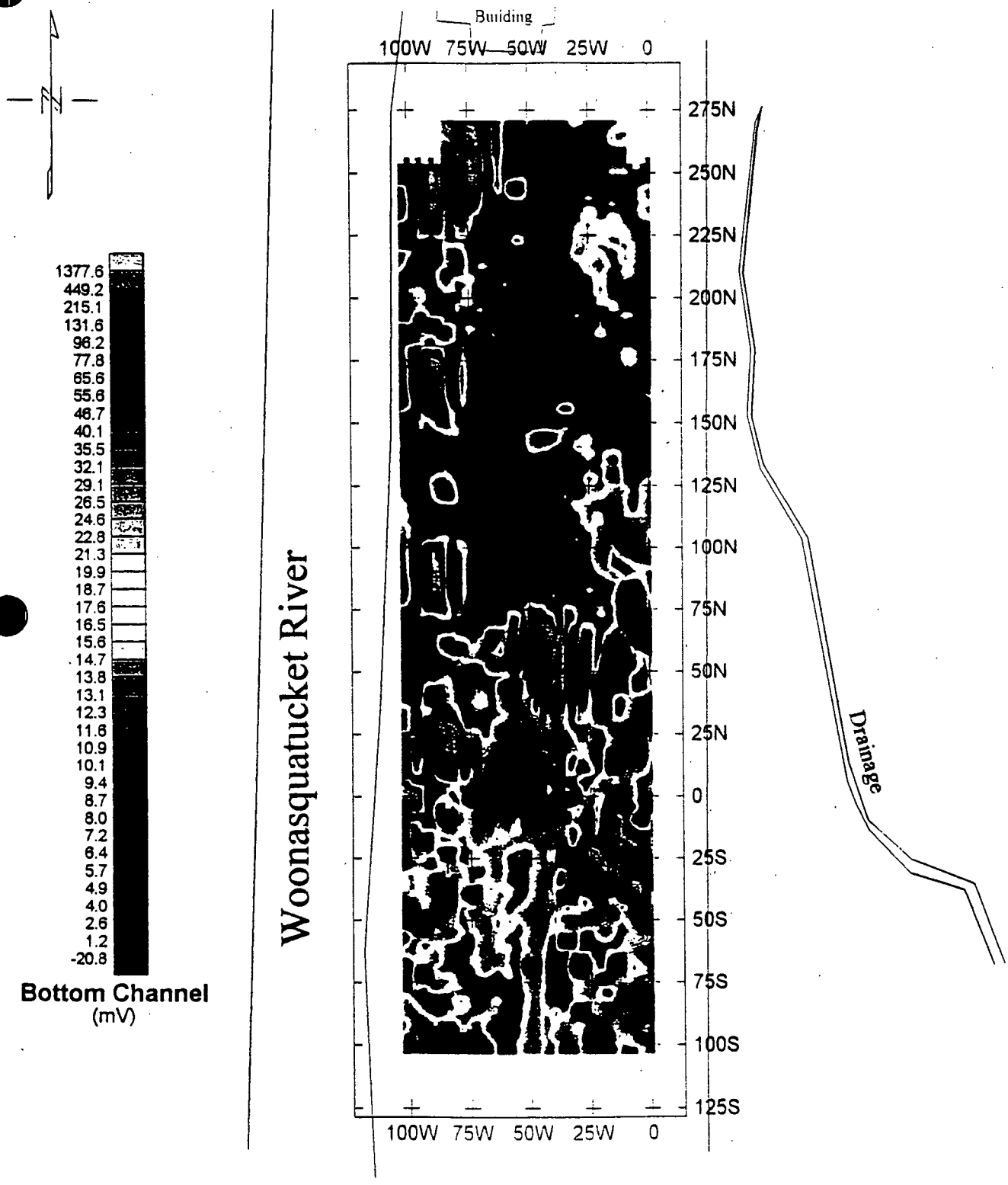


Figure 2 - EM-31 Survey (In-phase Plot)

Centerdale Manor Site
Providence, R.I.

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O # 03347-143-001-3428

North Parking Lot
EM-31 Survey
Inphase Component - 99-05-06



Scale 1:720

25 0 25 50

feet

Figure 3 - EM-61 Survey (Bottom Sensor)

Centerdale Manor Site
Providence, R.I.

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O.# 03347-143-001-3428

North Parking Lot
EM-61 Survey
Bottom Channel - 99-05-06

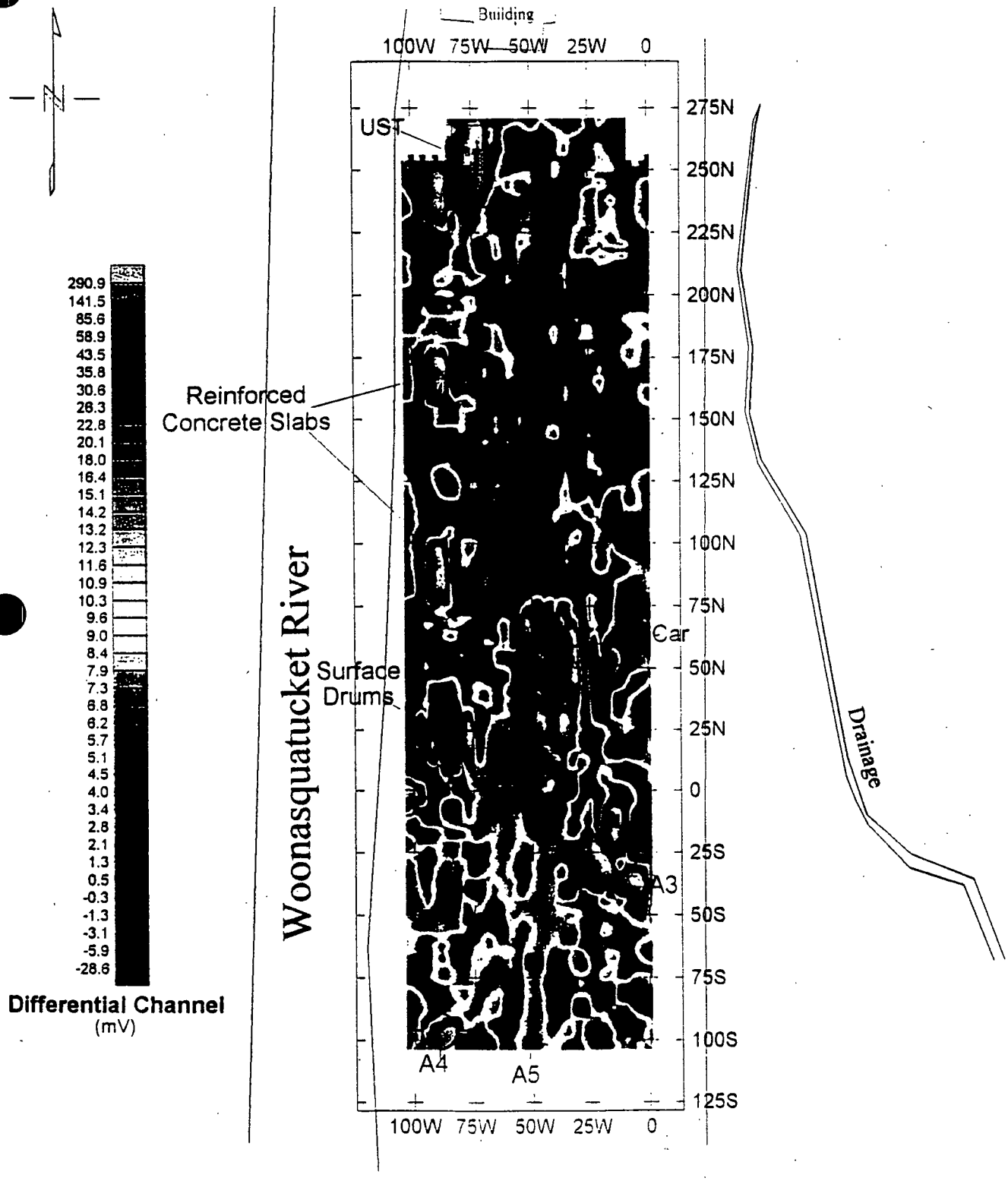


Figure 4 - EM-61 Survey (Differential Sensor)

Centerdale Manor Site
Providence, R.I.

North Parking Lot
EM-61 Survey
Differential Channel - 99-05-06

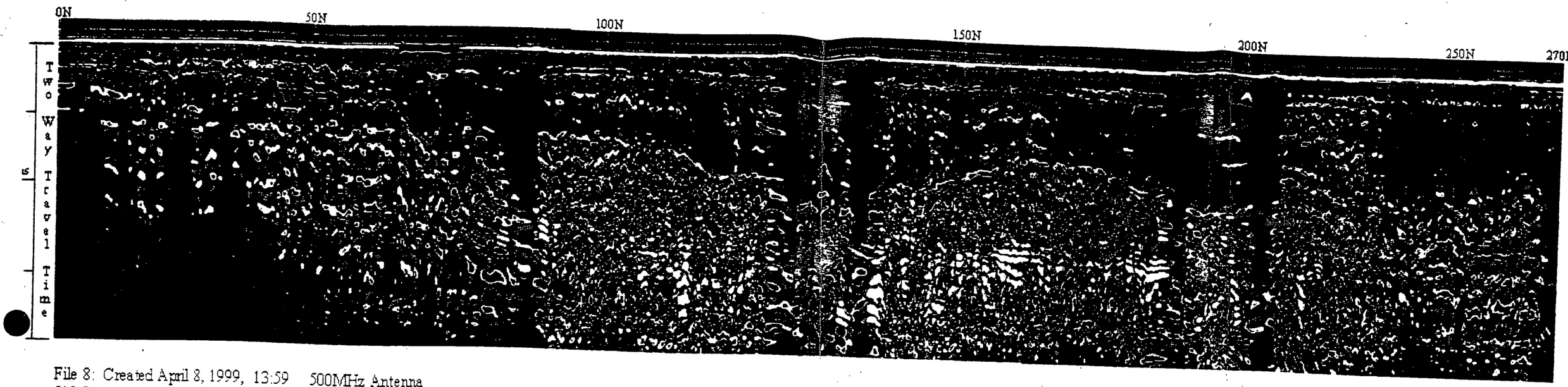
U.S. EPA ENVORINMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W O.# 03347-143-001-3428

Figure 5

Representative Radar Profiles from the North Parking Lot
Line 70W (File7) and Line 80W (File8)

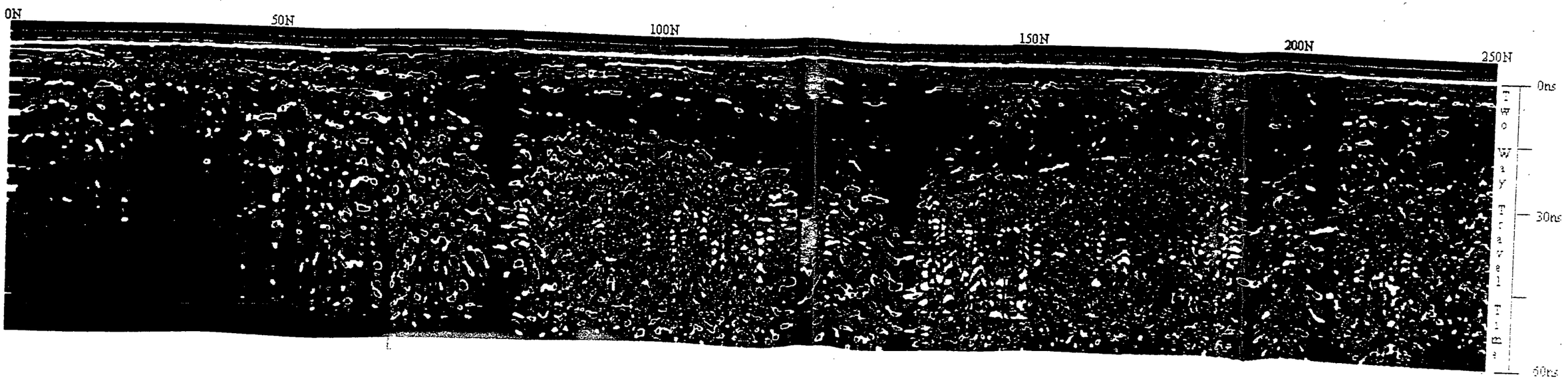
File 7: Created April 8, 1999, 13:54 500MHz Antenna
512 Samples / Scan 8 Bits / Sample
26.0027 Scans / Second Position: -5ns Range: 60ns

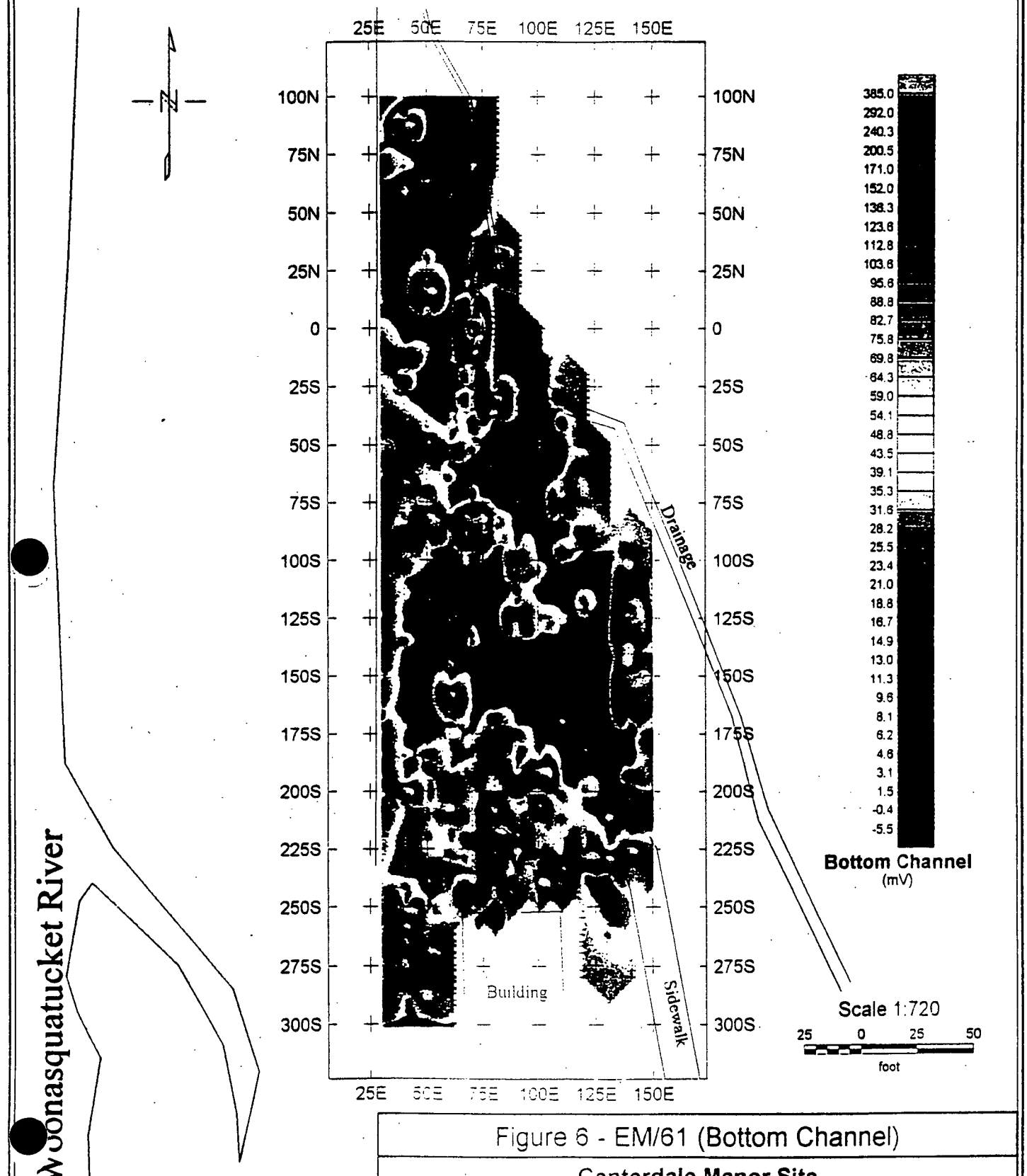
REAC / EPA Region II: Centerdale Manor, RI
Line: 70 W



File 8: Created April 8, 1999, 13:59 500MHz Antenna
512 Samples / Scan 8 Bits / Sample
26.0027 Scans / Second Position: -5ns Range: 60ns

REAC / EPA Region II: Centerdale Manor, RI
Line: 80 W





Woonasquatucket River

Figure 6 - EM/61 (Bottom Channel)

Centerdale Manor Site
Providence, R.I.

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O.# 03347-143-001-3428

Central Parking Lot
EM-61 Survey
Bottom Channnel - 99-05-06

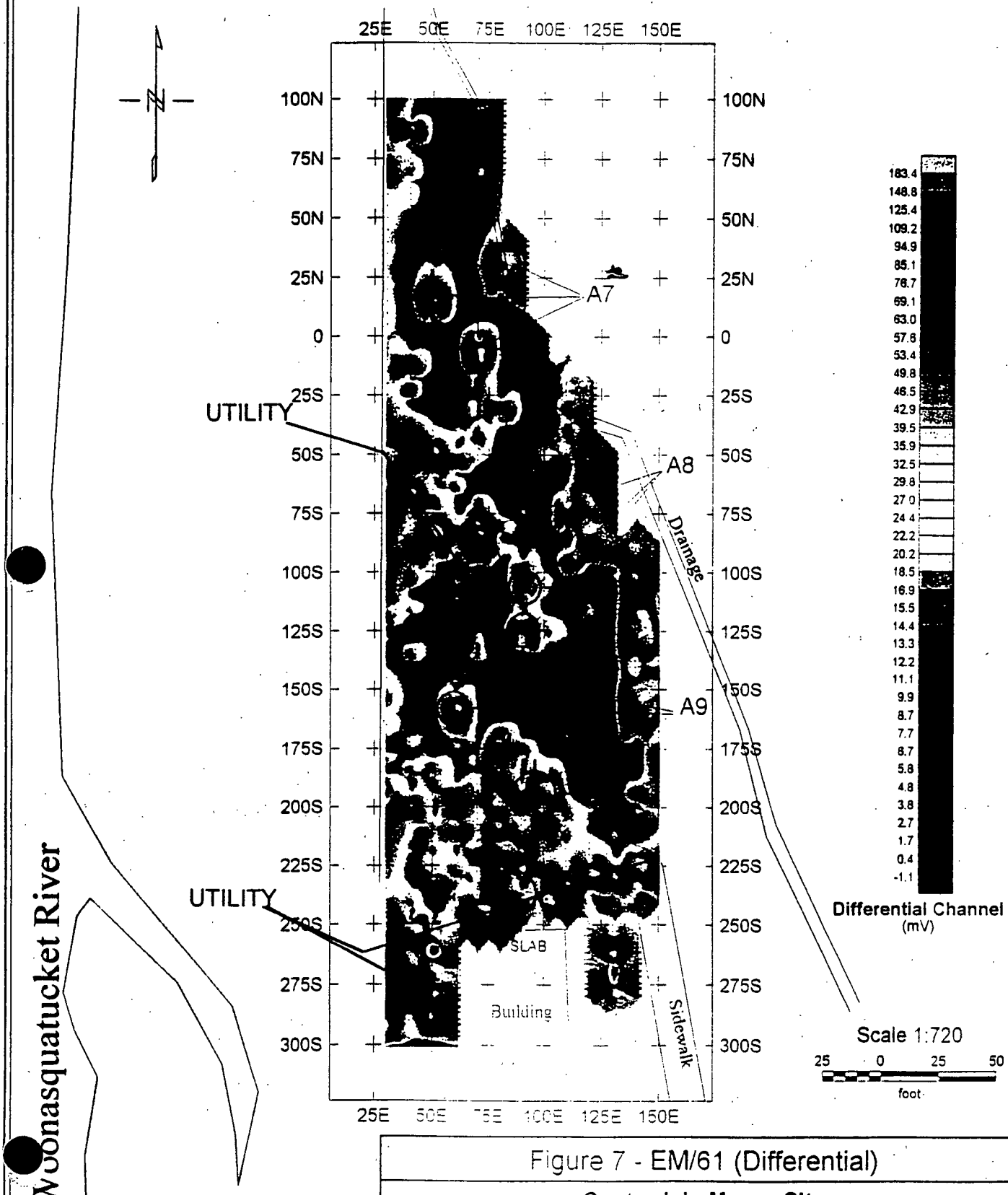


Figure 7 - EM/61 (Differential)

Centerdale Manor Site
Providence, R.I.

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O.# 03247.142.001.3428

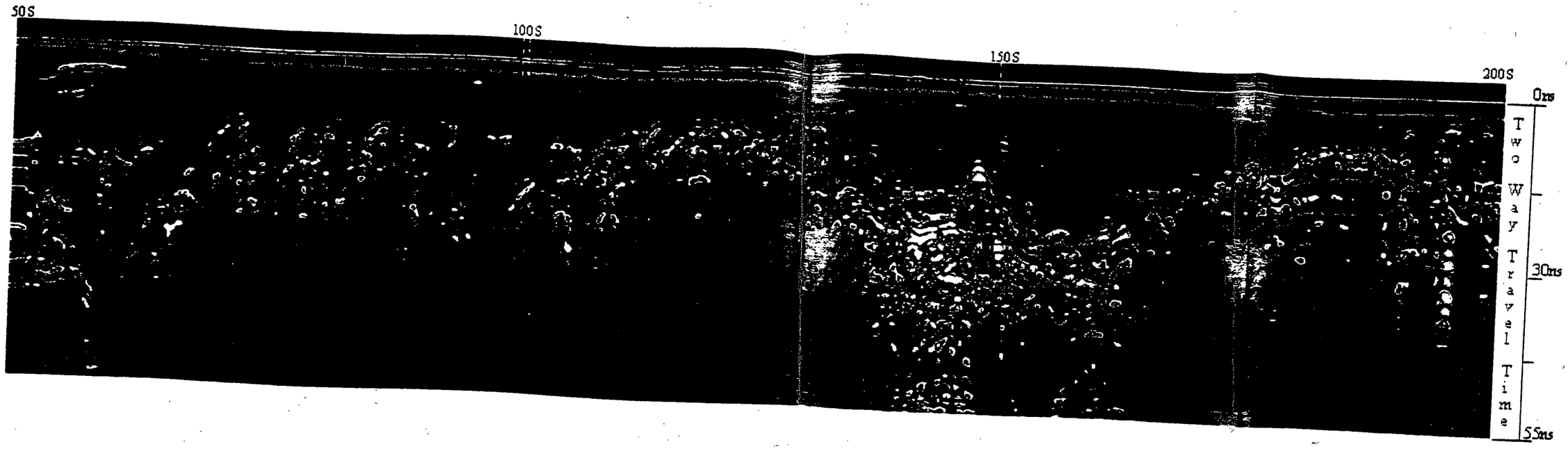
Central Parking Lot
EM-61 Survey
Differential Channnel - 99-05-06

Figure 8

Representative Radar Profiles from the Center Parking Lot
Line 100E (File17) and 90E (File18)

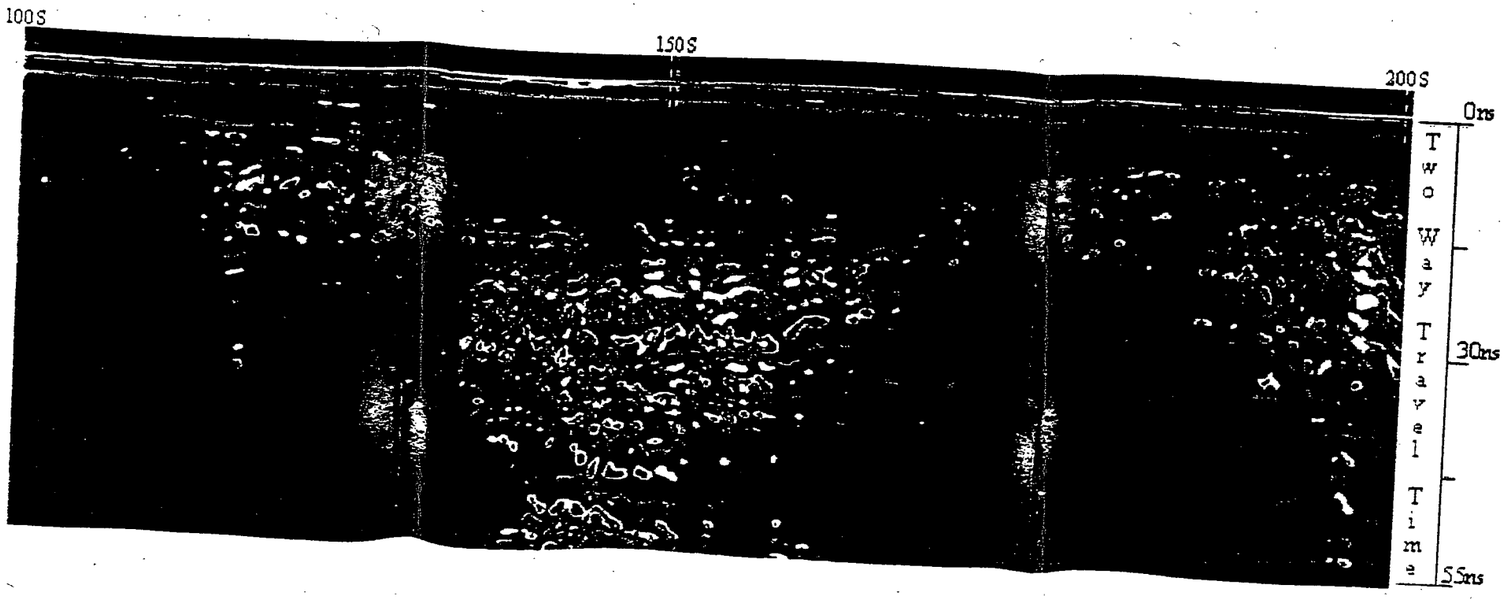
File 17: Created April 9,1999, 11:47 500MHz Antenna
512 Samples / Scan 8 Bits / Sample
26.0027 Scans / Second Position: -5ns Range: 55.296ns

REAC / EPA Region II: Centerdale Manor, R.I.
Line: 100E



File 18: Created April 9,1999, 11:51 500MHz Antenna
512 Samples / Scan 8 Bits / Sample
26.0027 Scans / Second Position: -5ns Range: 55.296ns

REAC / EPA Region II: Centerdale Manor, R.I.
Line: 90E



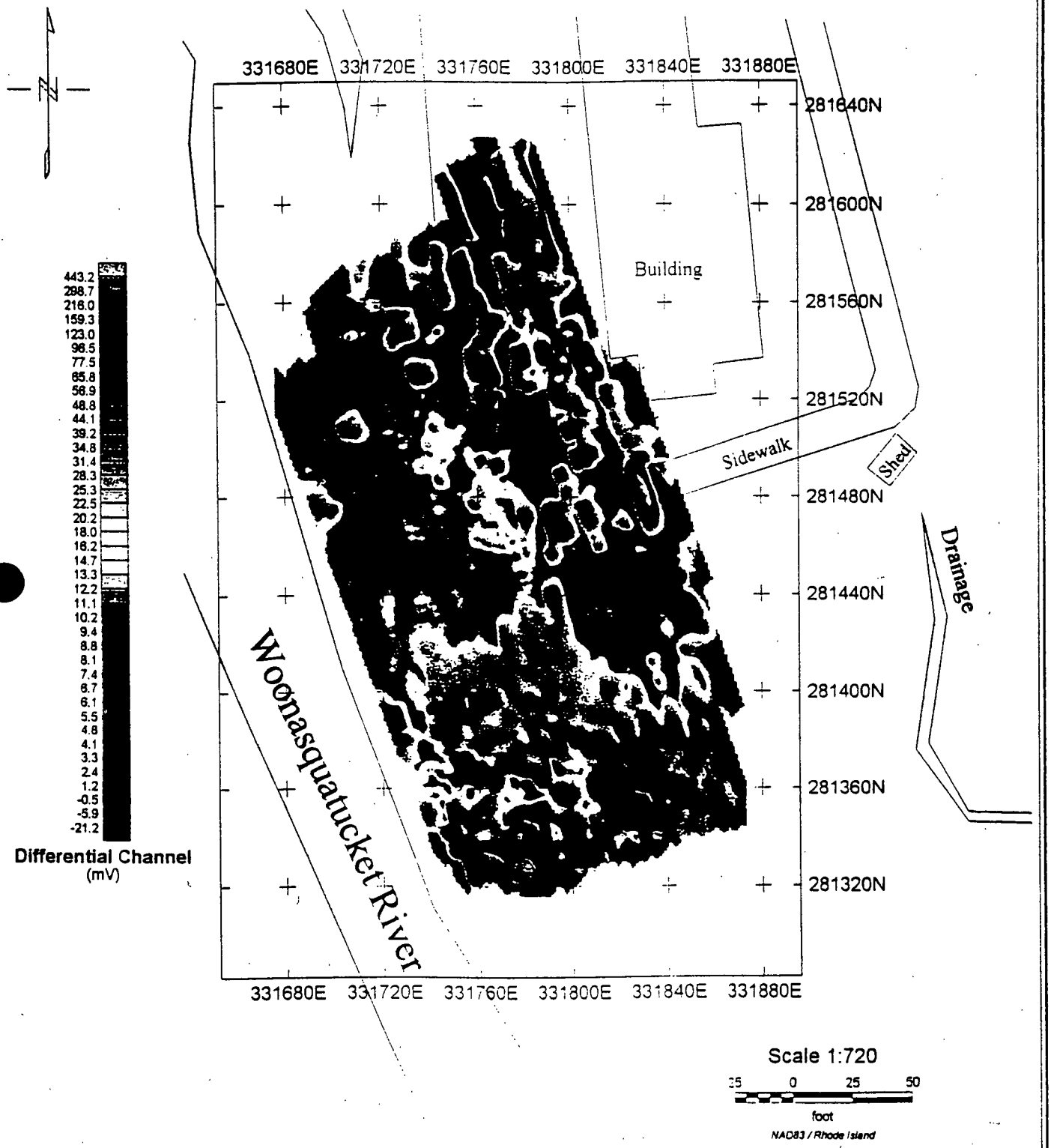


Figure 9 - EM/61 (Differential)

Centerdale Manor
Providence, R.I.

South Parking Lot
EM-61 Survey
Differential Channel - 99-05-12

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O.# 03347-143-001-3428

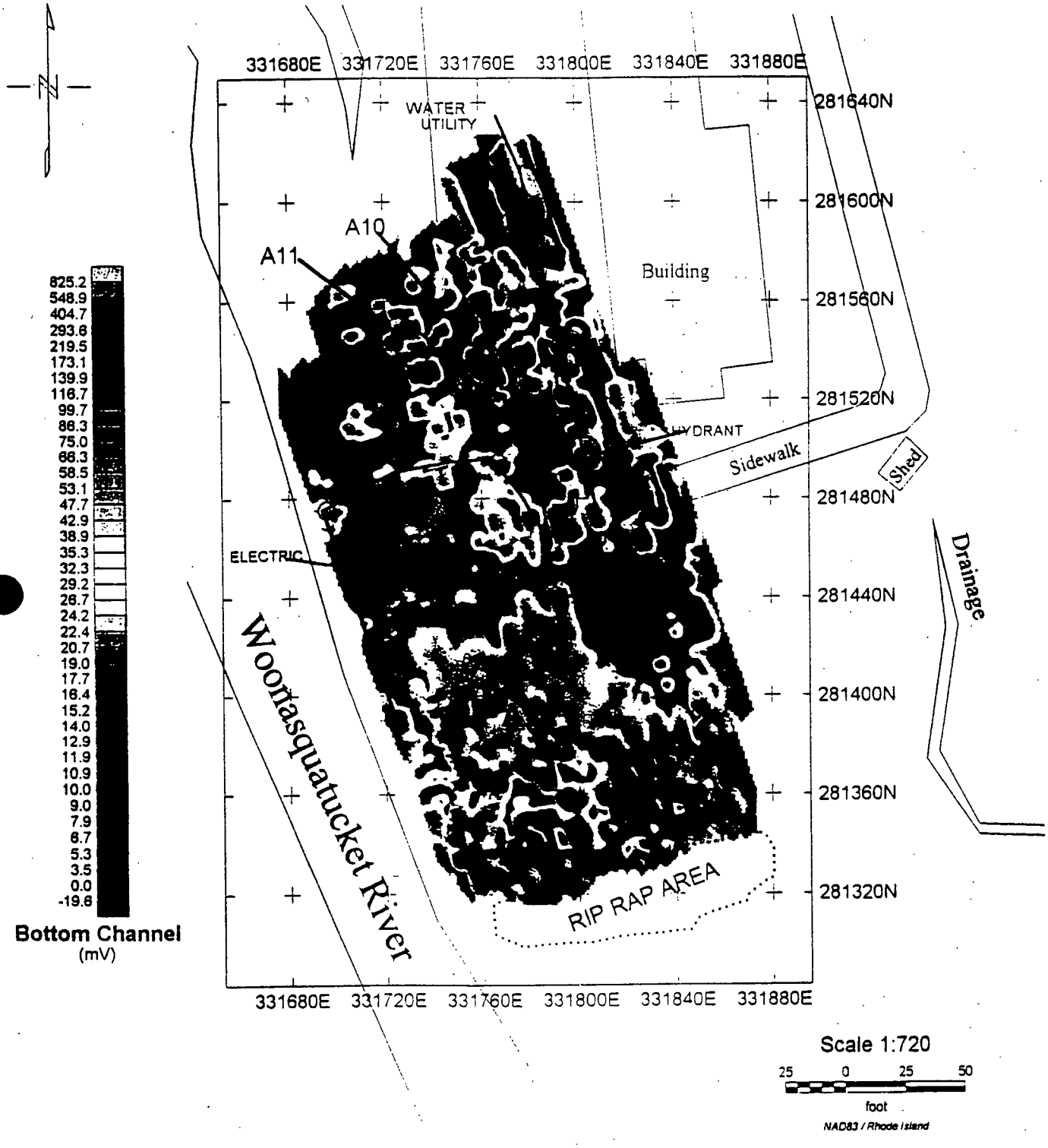


Figure 10 - EM/61 (Bottom Sensor)

Centerdale Manor
Providence, R.I.

South Parking Lot
EM-61 Survey
Bottom Channel - 99-05-12

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O.# 03347-143-001-3428

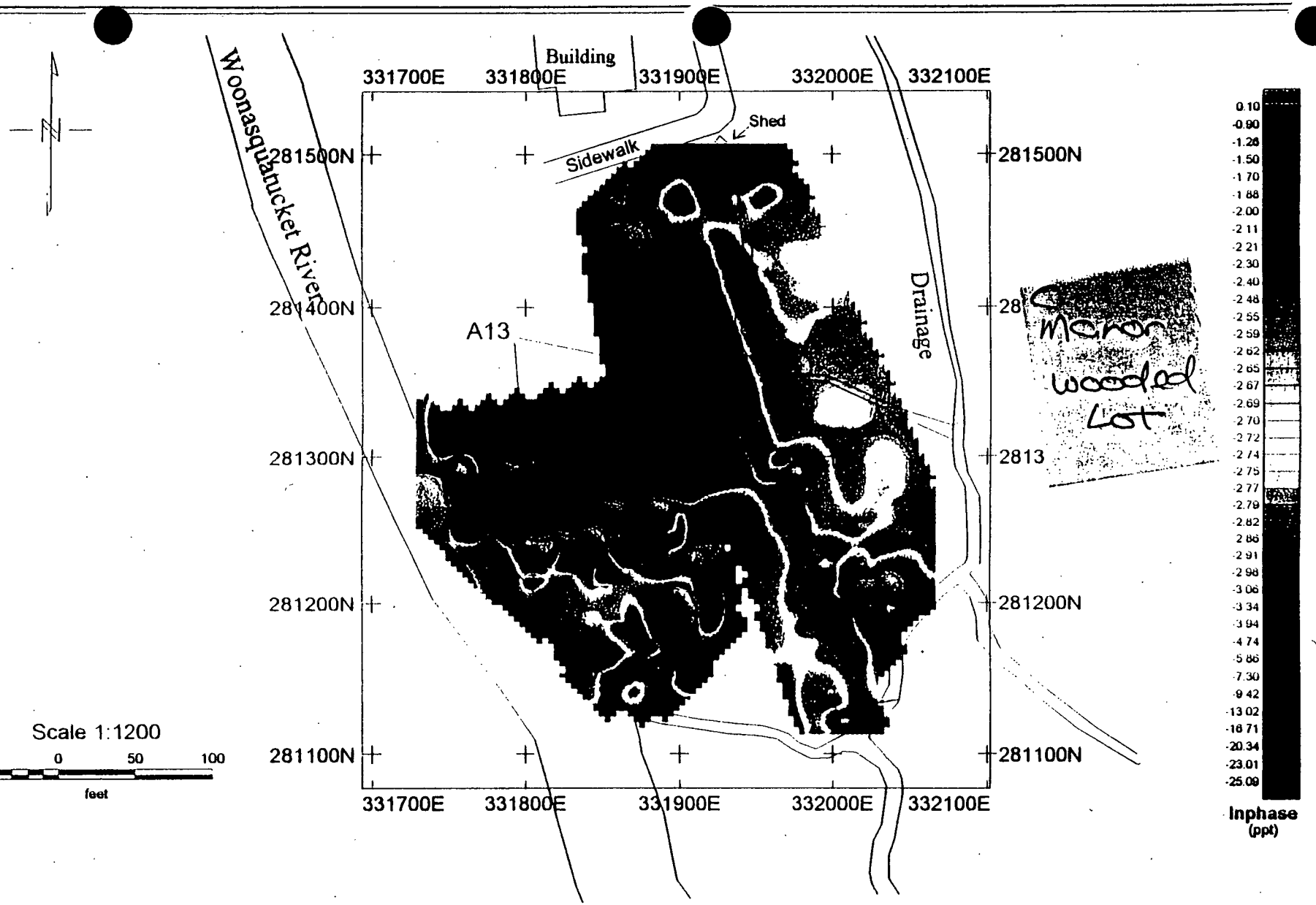


Figure 12 - EM/31 (Inphase)

Centerdale Manor Site
Providence, R.I.

Area South of South Parking Lot
EM-31 Survey
Inphase Component - 99-05-06

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0222
W.O.# 03347-143-001-3428

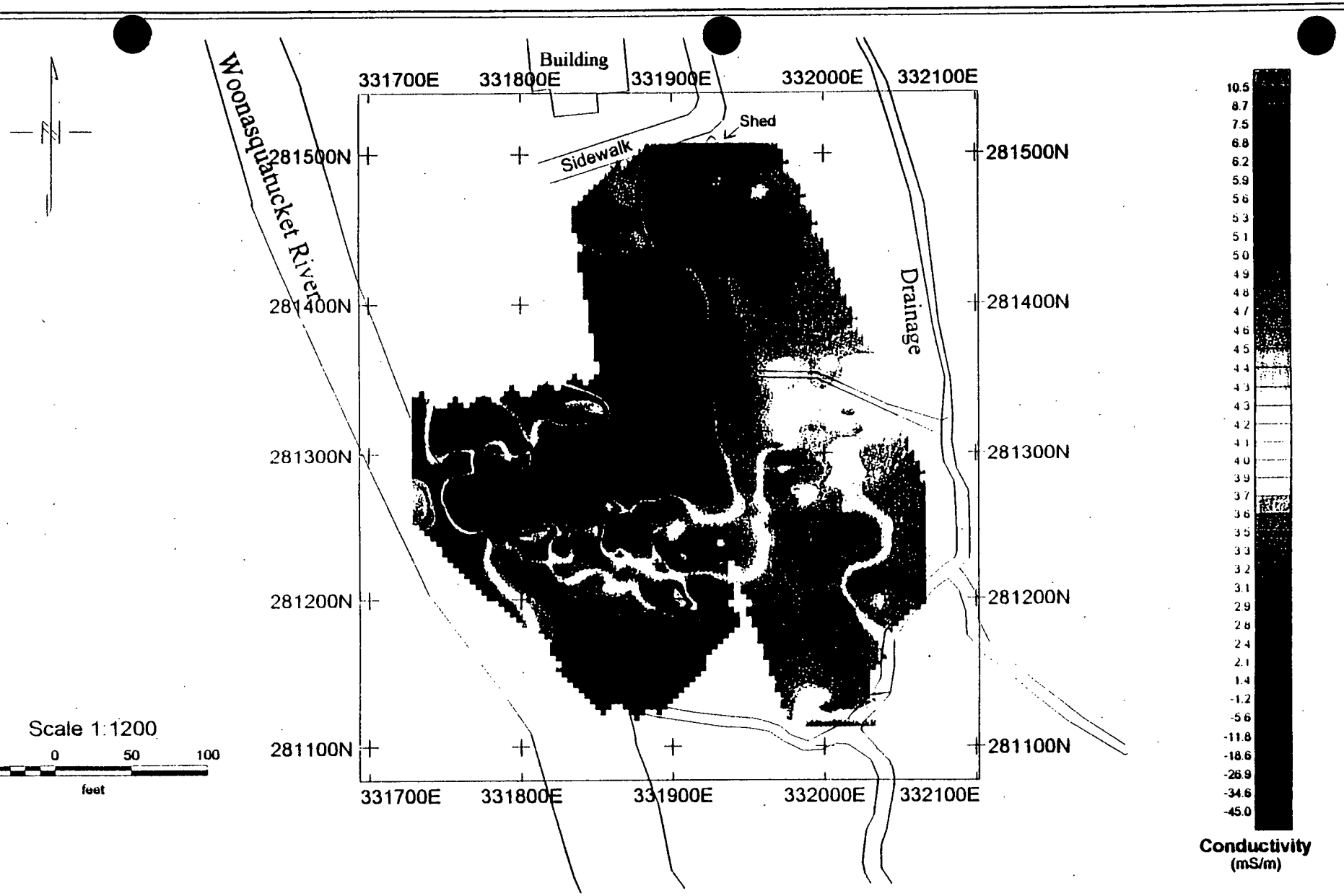


Figure 11 - EM/31 (Conductivity Plot)

Centerdale Manor Site
Providence, R.I.

Area South of South Parking Lot
EM-31 Survey
Quadrature Component - 99-05-06

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ANALYTICAL AND ENGINEERING CONTRACT
68-CA-0222
W.O.# 03347-143-001-3428

WESTON

Reference 89

Paul Killam
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Steve Stodola
Company EPA Region I
Address Lexington, MA
Phone 781-860-4634

Date 8/9/99
Time 8:45 (AM)/PM

☑ Originator Placed Call
☐ Originator Received Call

W.O. No. 7045-50

Subject Centredale Manor Dioxin Data

Notes:

Called Ms Stodola concerning the Dioxin data generated by Triangle laboratory. I was trying to determine sample Detection Limit (SDL) for 2,3,7,8-TCDD results.

Since SDLs are base on noise ration, and are not always available for positive results Mr Stodola suggested using the lowest calibration Standerd as the Method detection Limit.

For these samples that is 1.0 ng/kg

Each Sample will need to have the Method Detection limit adjust for actual dry weight used and any dilution factors used. See the next page for an example calculation.

☐ File _____
☐ Tickle File ___/___/___
☐ Follow-Up By: _____
☐ Copy/Route To: _____

Follow-Up-Action: _____

Originator's Initials FFK

WESTON® MANAGERS DESIGNERS/CONSULTANTS

SHEET 1 of 1

CLIENT/SUBJECT Centredale Manor W.O. NO. _____

TASK DESCRIPTION SQL for Sample 3428-CMS-026 TASK NO. 7045-50

PREPARED BY P. Killian DEPT RFW/SI DATE 8/9/99

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY

DEPT _____ DATE _____

Sample 3428-CMS-026

wet weight	14.10 g
% Solids	71.0
Dry weight	10.011g
Dilution Factor	1

MDL = 1.0 ng/kg

SQL = 1.0 ng/kg × $\frac{10.0\,g}{10.011\,g}$ × 1 = **SQL** 0.999 ng/kg

PFK 8/9/99

WESTON MANAGERS DESIGNERS/CONSULTANTS

SHEI

Reference 90

CLIENT/SUBJECT Centredale Manor W.O. NO. _____

TASK DESCRIPTION SQL for shallow soil samples TASK NO. 7045-50

PREPARED BY S. Kennedy DEPT _____ DATE 8/9/99

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY

DEPT _____ DATE _____

CMS-026 1.0 ng/Kg (Method Detection Limit) × 10.0 g / 10.011 g (Dry weight) × 1 (dilution factor) = 0.999 ng/Kg ÷ 1000 for ng/Kg

CMS-030 1.0 ng/Kg × 10.0 g / 10.113 g × 1 = 0.989 ng/Kg

CMS-031 1.0 ng/Kg × 10.0 g / 10.138 g × 1 = 0.986 ng/Kg

CMS-050 1.0 ng/Kg × 10.0 g / 10.053 g × 1 = 0.995 ng/Kg

CMS-060 1.0 ng/Kg × 10.0 g / 10.002 g × 100 = 99.98 ng/Kg

CMS-061 (DUP) 1.0 ng/Kg × 10.0 g / 10.125 g × 1 = 0.988 ng/Kg

1.0 ng/Kg × 10.0 g / 10.125 g × 100 = 98.77 ng/Kg (Dup.)

CMS-067 1.0 ng/Kg × 10.0 g / 10.108 g × 1 = 0.989 ng/Kg

CMS-098 1.0 ng/Kg × 10.0 g / 10.046 g × 100 = 99.54 ng/Kg

CMS-131 1.0 ng/Kg × 10.0 g / 10.032 g × 100 = 96.90 ng/Kg

CMS-134 1.0 ng/Kg × 10.0 g / 10.028 g × 100 = 99.72 ng/Kg

CMS-152 1.0 ng/Kg × 10.0 g / 10.067 g × 100 = 99.33 ng/Kg

CMS-242 1.0 ng/Kg × 10.0 g / 10.037 g × 100 = 99.63 ng/Kg

TLI Project: 47966Ar1 — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-026 — Analysis File: T991578

Client Project:	#3347-143-001-3428/Centredale			ICal:	TF5N118
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT22S
TLI ID:	230-64-1	Date Extracted:	02/28/1999	1st CCal:	T991575
		Date Analyzed:	03/08/1999	End CCal:	T991589
Sample Size:	14.100 g	Dilution Factor:	n/a	% Moisture:	29.0
Dry Weight:	10.011 g	Blank File:	T991577	% Lipid:	n/a
GC Column:	DB-5	Analyst:	ML	% Solids:	71.0

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	4.7 UJ			0.88	26:31	
1,2,3,7,8-PeCDD	3.3			1.74	30:37	J
1,2,3,4,7,8-HxCDD	EMPC		7.5			
1,2,3,6,7,8-HxCDD	15.5			1.28	33:48	
1,2,3,7,8,9-HxCDD	15.3			1.35	34:08	
1,2,3,4,6,7,8-HpCDD	402			1.01	37:13	
1,2,3,4,6,7,8,9-OCDD	2770			0.88	41:07	
2,3,7,8-TCDF	1.8			0.70	25:51	
1,2,3,7,8-PeCDF	ND	1.1				
2,3,4,7,8-PeCDF	ND	1.1				
1,2,3,4,7,8-HxCDF	5.7			1.37	33:00	
1,2,3,6,7,8-HxCDF	4.8			1.22	33:06	J
1,2,3,4,6,7,8-HxCDF	6.6			1.33	33:35	
1,2,3,7,8,9-HxCDF	ND	1.8				
1,2,3,4,6,7,8-HpCDF	99.4			1.04	36:07	
1,2,3,4,7,8,9-HpCDF	6.2			0.97	37:45	
1,2,3,4,6,7,8,9-OCDF	229			0.89	41:20	

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	4.7 UJ	1			
Total PeCDD	6.9 UJ	2			
Total HxCDD	105	5		113	
Total HpCDD	758	2			
Total TCDF	12.1	4		15.2	
Total PeCDF	45.0	3		48.9	
Total HxCDF	127	7			
Total HpCDF	246	3			

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 12:59 03/16/1999

Roy F. Weston, Inc. - REAC Project

TLI Project: 47966A — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-030 — Analysis File: U097105

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT22S
TLI ID:	230-64-5	Date Extracted:	02/27/1999	ICal:	UF5N148
		Date Analyzed:	03/08/1999	ConCal:	U990969
Sample Size:	12.500 g	Dilution Factor:	n/a	% Moisture:	19.1
Dry Weight:	10.113 g	Blank File:	S991319	% Lipid:	n/a
GC Column:	DB-5	Analyst:	WK	% Solids:	80.9

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	94.3			0.74	25:22	
1,2,3,7,8-PeCDD	1.00			1.54	29:39	J
1,2,3,4,7,8-HxCDD	1.5			1.31	32:46	J
1,2,3,6,7,8-HxCDD	6.2			1.19	32:51	
1,2,3,7,8,9-HxCDD	4.0			1.30	33:10	J
1,2,3,4,6,7,8-HpCDD	119			1.03	36:07	
1,2,3,4,6,7,8,9-OCDD	912			0.85	39:41	
2,3,7,8-TCDF	4.8			0.78	24:41	
1,2,3,7,8-PeCDF	1.5			1.61	28:36	J
2,3,4,7,8-PeCDF	2.1			1.48	29:18	J
1,2,3,4,7,8-HxCDF	4.0			1.30	32:05	J
1,2,3,6,7,8-HxCDF	2.4			1.22	32:11	J
2,3,4,6,7,8-HxCDF	3.8			1.17	32:40	J
1,2,3,7,8,9-HxCDF	ND	0.3				
1,2,3,4,6,7,8-HpCDF	28.4			1.05	35:05	
1,2,3,4,7,8,9-HpCDF	2.0			0.96	36:37	J
1,2,3,4,6,7,8,9-OCDF	47.8			0.88	39:54	

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	99.3	4			
Total PeCDD	7.0	8		7.6	
Total HxCDD	38.4	6			
Total HpCDD	219	2			
Total TCDF	33.9	13			
Total PeCDF	54.2	12			
Total HxCDF	98.8	8		99.8	
Total HpCDF	68.6	3		69.8	

MIT2_PSR v1.04, LARS 6.13.01

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 11:08 03/16/1999

Roy F. Weston, Inc. - REAC Project

TLI Project: 47966A — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-031 — Analysis File: U097106

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT22S
TLI ID:	230-64-6	Date Extracted:	02/27/1999	ICal:	UF5N148
		Date Analyzed:	03/08/1999	ConCal:	U990969
Sample Size:	13.200 g	Dilution Factor:	n/a	% Moisture:	23.2
Dry Weight:	10.138 g	Blank File:	S991319	% Lipid:	n/a
GC Column:	DB-5	Analyst:	WK	% Solids:	76.8

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	103			0.77	25:22	
1,2,3,7,8-PeCDD	0.75			1.58	29:38	J
1,2,3,4,7,8-HxCDD	0.93			1.35	32:47	J
1,2,3,6,7,8-HxCDD	3.1			1.26	32:51	J
1,2,3,7,8,9-HxCDD	2.9			1.36	33:10	J
1,2,3,4,6,7,8-HpCDD	48.8			1.03	36:07	
1,2,3,4,6,7,8,9-OCDD	318			0.86	39:41	
2,3,7,8-TCDF	3.6			0.83	24:39	
1,2,3,7,8-PeCDF	1.3			1.66	28:36	J
2,3,4,7,8-PeCDF	1.3			1.48	29:17	J
1,2,3,4,7,8-HxCDF	2.8			1.26	32:05	J
1,2,3,6,7,8-HxCDF	1.4			1.22	32:11	J
2,3,4,6,7,8-HxCDF	2.6			1.26	32:39	J
1,2,3,7,8,9-HxCDF	ND	0.3				
1,2,3,4,6,7,8-HpCDF	15.2			1.10	35:05	
1,2,3,4,7,8,9-HpCDF	0.95			1.00	36:37	J
1,2,3,4,6,7,8,9-OCDF	27.4			0.88	39:54	

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	106	3		107	
Total PeCDD	4.1 VJ	5		4.7	
Total HxCDD	22.6	6			
Total HpCDD	93.3	2			
Total TCDF	21.3	13			
Total PeCDF	32.7	12		33.0	
Total HxCDF	35.0	8		35.7	
Total HpCDF	36.0	4			

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 11:09 03/16/1999

TLI Project: 47968A — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-050 — Analysis File: T991741

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT22S
TLI ID:	230-66-3	Date Extracted:	02/28/1999	ICal:	TF53139
		Date Analyzed:	03/15/1999	ConCal:	T991733
Sample Size:	11.424 g	Dilution Factor:	n/a	% Moisture:	12.0
Dry Weight:	10.053 g	Blank File:	T991738	% Lipid:	n/a
GC Column:	DB-5	Analyst:	JM	% Solids:	88.0

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	53.0			0.80	26:23	
1,2,3,7,8-PeCDD	ND	0.6				
1,2,3,4,7,8-HxCDD	ND	0.7				
1,2,3,6,7,8-HxCDD	EMPC		1.2 UJ			J
1,2,3,7,8,9-HxCDD	2.6			1.12	33:58	J
1,2,3,4,6,7,8-HpCDD	28.0			0.98	37:02	
1,2,3,4,6,7,8,9-OCDD	481			0.88	40:54	
2,3,7,8-TCDF	EMPC		1.2 UJ			
1,2,3,7,8-PeCDF	ND	0.3				
2,3,4,7,8-PeCDF	ND	0.3				
1,2,3,4,7,8-HxCDF	1.7			1.25	32:50	J
1,2,3,6,7,8-HxCDF	0.84			1.30	32:58	J
2,3,4,6,7,8-HxCDF	0.88			1.23	33:27	J
1,2,3,7,8,9-HxCDF	ND	0.5				
1,2,3,4,6,7,8-HpCDF	7.2			1.01	35:56	
1,2,3,4,7,8,9-HpCDF	ND	0.8				
1,2,3,4,6,7,8,9-OCDF	17.6			0.89	41:06	

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	54.3	2		55.1	
Total PeCDD	ND		0.6		
Total HxCDD	14.5 UJ	3		17.2 UJ	
Total HpCDD	55.6	2			
Total TCDF	2.7 UJ	3		6.3 UJ	
Total PeCDF	6.6	2			
Total HxCDF	12.1	5		15.3	
Total HpCDF	16.0	2			

MIT2_PSR v1.04, LARS 6.13.01

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 12:39 03/22/1999

TLI Project: 47968A
Client Sample: 3428-CMS-060

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: U991382

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT2AB
TLI ID:	230-66-9	Date Extracted:	02/28/1999	ICal:	UF5N148
		Date Analyzed:	03/31/1999	ConCal:	U991379
Sample Size:	14.167 g	Dilution Factor:	100X	% Moisture:	29.4
Dry Weight:	10.002 g	Blank File:	U991375	% Lipid:	n/a
GC Column:	DB-5	Analyst:	JM	% Solids:	70.6

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	115820			0.77	25:46	DE_
1,2,3,7,8-PeCDD	ND	80.3				__
1,2,3,4,7,8-HxCDD	ND	83.6				__
1,2,3,6,7,8-HxCDD	EMPC		137			DJ_
1,2,3,7,8,9-HxCDD	ND	84.8				__
1,2,3,4,6,7,8-HpCDD	559			1.11	36:28	D__
1,2,3,4,6,7,8,9-OCDD	4160			0.87	40:07	D__
2,3,7,8-TCDF	166			0.67	25:06	D__
1,2,3,7,8-PeCDF	ND	47.9				__
2,3,4,7,8-PeCDF	EMPC		98.5			DJ_
1,2,3,4,7,8-HxCDF	EMPC		86.5			DJ_
1,2,3,6,7,8-HxCDF	ND	48.7				__
2,3,4,6,7,8-HxCDF	ND	56.7				__
1,2,3,7,8,9-HxCDF	ND	63.3				__
1,2,3,4,6,7,8-HpCDF	214			1.16	35:26	DJ_
1,2,3,4,7,8,9-HpCDF	ND	126				__
1,2,3,4,6,7,8,9-OCDF	371			0.99	40:21	DJ_

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	118450	3		118560	E__
Total PeCDD	192 VJ -	1			__
Total HxCDD	368	1		1250	__
Total HpCDD	1250	2			__
Total TCDF	908	8		1180	__
Total PeCDF	3810	2		4140	__
Total HxCDF	6150	2		6740	__
Total HpCDF	408	2			__

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 23:17 04/01/1999

TLI Project: 47968A — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-061 — Analysis File: T991880

Client Project:	#3347-143-001-3428/Centredale			ICal:	TF53139
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT22S
TLI ID:	230-66-10A	Date Extracted:	02/28/1999	1st CCal:	T991872
		Date Analyzed:	03/20/1999	End CCal:	T991885
Sample Size:	13.985 g	Dilution Factor:	n/a	% Moisture:	27.6
Dry Weight:	10.125 g	Blank File:	T991738	% Lipid:	n/a
GC Column:	DB-5	Analyst:	KH	% Solids:	72.4

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	111			0.80	26:04	
1,2,3,7,8-PeCDD	16.0			1.66	30:12	
1,2,3,4,7,8-HxCDD	34.5			1.30	33:16	
1,2,3,6,7,8-HxCDD	56.9			1.20	33:22	
1,2,3,7,8,9-HxCDD	72.5			1.20	33:41	
1,2,3,4,6,7,8-HpCDD	1540			1.03	36:41	
1,2,3,4,6,7,8,9-OCDD	~~12760~~			0.84	40:27	E
2,3,7,8-TCDF	10.5			0.85	25:25	
1,2,3,7,8-PeCDF	3.9			1.52	29:14	J
2,3,4,7,8-PeCDF	6.9			1.53	29:52	
1,2,3,4,7,8-HxCDF	24.1			1.25	32:34	
1,2,3,6,7,8-HxCDF	14.8			1.27	32:40	
2,3,4,6,7,8-HxCDF	18.4			1.25	33:09	
1,2,3,7,8,9-HxCDF	ND	2.6				
1,2,3,4,6,7,8-HpCDF	275			1.05	35:37	
1,2,3,4,7,8,9-HpCDF	15.7			1.01	37:13	
1,2,3,4,6,7,8,9-OCDF	495			0.87	40:39	

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	165	9		182	
Total PeCDD	122 UJ	8		149 UJ	
Total HxCDD	538	7			
Total HpCDD	2740	2			
Total TCDF	70.5	12		74.2	
Total PeCDF	150	11			
Total HxCDF	372	8			
Total HpCDF	631	3		638	

MIT2_PSR v1.04, LARS 6.13.01

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 12:44 03/22/1999

TLI Project: 47968B
Client Sample: 3428-CMS-067

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: T991725

Client Project:	#3347-143-001-3428/Centredale			Spike File:	SPMIT22S
Sample Matrix:	SOIL	Date Received:	02/17/1999	ICal:	TF53139
TLI ID:	230-66-16	Date Extracted:	02/28/1999	ConCal:	T991718
		Date Analyzed:	03/14/1999		
Sample Size:	12.572 g	Dilution Factor:	n/a	% Moisture:	19.6
Dry Weight:	10.108 g	Blank File:	T991719	% Lipid:	n/a
GC Column:	DB-5	Analyst:	KAS	% Solids:	80.4

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	115			0.78	26:22	—
1,2,3,7,8-PeCDD	0.58 UJ			1.55	30:29	J
1,2,3,4,7,8-HxCDD	ND	0.5				—
1,2,3,6,7,8-HxCDD	1.4			1.29	33:39	J
1,2,3,7,8,9-HxCDD	1.5			1.28	33:59	J
1,2,3,4,6,7,8-HpCDD	29.9			1.04	37:02	—
1,2,3,4,6,7,8,9-OCDD	756			0.85	40:53	—
2,3,7,8-TCDF	3.0 UJ			0.85	25:42	—
1,2,3,7,8-PeCDF	EMPC		0.89			J
2,3,4,7,8-PeCDF	1.5			1.61	30:09	J
1,2,3,4,7,8-HxCDF	4.2			1.36	32:52	J
1,2,3,6,7,8-HxCDF	1.6			1.42	32:58	J
2,3,4,6,7,8-HxCDF	1.7			1.08	33:27	J
1,2,3,7,8,9-HxCDF	ND	0.3				—
1,2,3,4,6,7,8-HpCDF	10.0			1.07	35:57	—
1,2,3,4,7,8,9-HpCDF	EMPC		1.1			J
1,2,3,4,6,7,8,9-OCDF	38.1			0.90	41:06	—

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	118	3		119	—
Total PeCDD	1.4 UJ	2		3.0 UJ	—
Total HxCDD	14.1 UJ	5			—
Total HpCDD	63.9	2			—
Total TCDF	17.2	13		17.9	—
Total PeCDF	21.3	8		24.6	—
Total HxCDF	27.7	7		28.7	—
Total HpCDF	24.3	2		26.0	—

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 20:25 03/14/1999

Roy F. Weston, Inc. - REAC Project

TLI Project: 47982A — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-098 — Analysis File: T992290

Client Project:	#3347-143-001-3428/Centredale			ICal:	TF53139
Sample Matrix:	SOIL	Date Received:	02/18/1999	Spike File:	SPMIT2AB
TLI ID:	230-80-4	Date Extracted:	03/11/1999	1st CCal:	T992282
		Date Analyzed:	04/05/1999	End CCal:	T992294
Sample Size:	20.800 g	Dilution Factor:	100X	% Moisture:	51.7
Dry Weight:	10.046 g	Blank File:	T992288	% Lipid:	n/a
GC Column:	DB-5	Analyst:	JV	% Solids:	48.3

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	28040			0.79	25:53	D__
1,2,3,7,8-PeCDD	ND	75.5				__
1,2,3,4,7,8-HxCDD	ND	86.5				__
1,2,3,6,7,8-HxCDD	ND	64.2				__
1,2,3,7,8,9-HxCDD	ND	67.2				__
1,2,3,4,6,7,8-HpCDD	1430			1.12	36:33	D__
1,2,3,4,6,7,8,9-OCDD	15060			0.88	40:13	D__
2,3,7,8-TCDF	132			0.81	25:12	D__
1,2,3,7,8-PeCDF	ND	60.5				__
2,3,4,7,8-PeCDF	ND	64.2				__
1,2,3,4,7,8-HxCDF	ND	54.8				__
1,2,3,6,7,8-HxCDF	ND	43.4				__
2,3,4,6,7,8-HxCDF	ND	50.6				__
1,2,3,7,8,9-HxCDF	ND	64.7				__
1,2,3,4,6,7,8-HpCDF	EMPC		247			DJ_
1,2,3,4,7,8,9-HpCDF	ND	140				__
1,2,3,4,6,7,8,9-OCDF	1180			0.84	40:27	D__

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	28370	2			__
Total PeCDD	ND		75.5		__
Total HxCDD	ND		71.4		__
Total HpCDD	2460	2			__
Total TCDF	132	1			__
Total PeCDF	310	1		560	__
Total HxCDF	456	1		584	__
Total HpCDF	324	1		571	__

MIT2_PSR v1.04, LARS 6.15.00

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 12:45 04/14/1999

TLI Project: 47965A
Client Sample: 3428-CMS-131

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: T992077

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT2AB
TLI ID:	230-63-9	Date Extracted:	03/04/1999	ICal:	TF53139
		Date Analyzed:	03/28/1999	ConCal:	T992065
Sample Size:	15.200 g	Dilution Factor:	100	% Moisture:	34.0
Dry Weight:	10.032 g	Blank File:	T992003	% Lipid:	n/a
GC Column:	DB-5	Analyst:	MS	% Solids:	66.0

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	3300			0.82	26:00	
1,2,3,7,8-PeCDD	ND	51.2				
1,2,3,4,7,8-HxCDD	ND	91.2				
1,2,3,6,7,8-HxCDD	ND	80.8				
1,2,3,7,8,9-HxCDD	ND	87.5				
1,2,3,4,6,7,8-HpCDD	246			0.93	36:40	J
1,2,3,4,6,7,8,9-OCDD	2520			0.95	40:23	
2,3,7,8-TCDF	ND	21.4				
1,2,3,7,8-PeCDF	ND	30.9				
2,3,4,7,8-PeCDF	ND	31.7				
2,3,4,7,8-HxCDF	ND	51.5				
1,2,3,6,7,8-HxCDF	ND	45.2				
2,3,4,6,7,8-HxCDF	ND	51.8				
1,2,3,7,8,9-HxCDF	ND	60.8				
1,2,3,4,6,7,8-HpCDF	237			0.88	35:37	J
1,2,3,4,7,8,9-HpCDF	ND	150				
1,2,3,4,6,7,8,9-OCDF	ND	453				

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	3360	2			
Total PeCDD	ND		51.2		
Total HxCDD	ND		86.3		
Total HpCDD	246	1		541	
Total TCDF	ND		15.0		
Total PeCDF	276	2			
Total HxCDF	261	2			
Total HpCDF	441	2			

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 10:13 03/29/1999

TLI Project: 47965B
Client Sample: 3428-CMS-134

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: T992019

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT2AB
TLI ID:	230-63-12	Date Extracted:	03/07/1999	ICal:	TF53139
		Date Analyzed:	03/26/1999	ConCal:	T992012
Sample Size:	17.200 g	Dilution Factor:	100X	% Moisture:	41.7
Dry Weight:	10.028 g	Blank File:	T992017	% Lipid:	n/a
GC Column:	DB-5	Analyst:	JM	% Solids:	58.3

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	15520			0.78	25:59	
1,2,3,7,8-PeCDD	ND	91.5				
1,2,3,4,7,8-HxCDD	ND	85.9				
1,2,3,6,7,8-HxCDD	85.3			1.33	33:22	J
1,2,3,7,8,9-HxCDD	97.0			1.35	33:41	J
1,2,3,4,6,7,8-HpCDD	2170			0.96	36:40	
1,2,3,4,6,7,8,9-OCDD	13540			0.85	40:22	
2,3,7,8-TCDF	102			0.88	25:18	
1,2,3,7,8-PeCDF	ND	67.0				
2,3,4,7,8-PeCDF	ND	68.9				
1,2,3,4,7,8-HxCDF	89.5			1.09	32:36	J
1,2,3,6,7,8-HxCDF	ND	53.5				
2,3,4,6,7,8-HxCDF	ND	61.3				
1,2,3,7,8,9-HxCDF	ND	72.0				
1,2,3,4,6,7,8-HpCDF	431			1.00	35:37	J
1,2,3,4,7,8,9-HpCDF	ND	169				
1,2,3,4,6,7,8,9-OCDF	458			0.90	40:35	J

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	15690	2		15780	
Total PeCDD	ND		91.5		
Total HxCDD	500	4		621	
Total HpCDD	3810	2			
Total TCDF	209	3			
Total PeCDF	341	2			
Total HxCDF	414	5			
Total HpCDF	815	2			

MIT2_PSR v1.04, LARS 6.14.00

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 22:45 03/26/1999

TLI Project: 47965B — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-152 — Analysis File: T992023

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/17/1999	Spike File:	SPMIT2AB
TLI ID:	230-63-17	Date Extracted:	03/07/1999	ICal:	TF53139
		Date Analyzed:	03/26/1999	ConCal:	T992012
Sample Size:	15.300 g	Dilution Factor:	100X	% Moisture:	34.2
Dry Weight:	10.067 g	Blank File:	T992017	% Lipid:	n/a
GC Column:	DB-5	Analyst:	JM	% Solids:	65.8

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	1300			0.78	25:59	
1,2,3,7,8-PeCDD	ND	30.6				
1,2,3,4,7,8-HxCDD	ND	37.8				
1,2,3,6,7,8-HxCDD	ND	33.5				
1,2,3,7,8,9-HxCDD	ND	36.3				
1,2,3,4,6,7,8-HpCDD	472			1.00	36:38	J
1,2,3,4,6,7,8,9-OCDD	3920			0.84	40:20	
2,3,7,8-TCDF	180			0.84	25:17	
1,2,3,7,8-PeCDF	EMPC		43.5			J
2,3,4,7,8-PeCDF	83.0			1.47	29:53	J
1,2,3,4,7,8-HxCDF	212			1.35	32:35	J
1,2,3,6,7,8-HxCDF	90.1			1.26	32:40	J
1,2,3,4,6,7,8-HxCDF	69.2			1.16	33:11	J
1,2,3,7,8,9-HxCDF	ND	29.3				
1,2,3,4,6,7,8-HpCDF	282			1.08	35:35	J
1,2,3,4,7,8,9-HpCDF	ND	57.9				
1,2,3,4,6,7,8,9-OCDF	284			0.80	40:32	J

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	1400	3		1430	
Total PeCDD	EMPC			87.3	
Total HxCDD	124	2		160	
Total HpCDD	884	2			
Total TCDF	469	6		834	
Total PeCDF	573	4		779	
Total HxCDF	635	5		664	
Total HpCDF	480	2			

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 22:47 03/26/1999

TLI Project: 47982B — Method 8290 PCDD/PCDF Analysis (b)
Client Sample: 3428-CMS-242 — Analysis File: U991537

Client Project:	#3347-143-001-3428/Centredale				
Sample Matrix:	SOIL	Date Received:	02/18/1999	Spike File:	SPMIT2AB
TLI ID:	230-80-27	Date Extracted:	03/12/1999	ICal:	UF5N148
		Date Analyzed:	04/06/1999	ConCal:	U991533
Sample Size:	16.400 g	Dilution Factor:	100X	% Moisture:	38.8
Dry Weight:	10.037 g	Blank File:	U991515	% Lipid:	n/a
GC Column:	DB-5	Analyst:	MS	% Solids:	61.2

Analytes	Conc. (ppt)	DL	EMPC	Ratio	RT	Flags
2,3,7,8-TCDD	20270			0.76	25:40	D__
1,2,3,7,8-PeCDD	32.1			1.61	29:53	DJ_
1,2,3,4,7,8-HxCDD	ND	25.1				___
1,2,3,6,7,8-HxCDD	ND	23.2				___
1,2,3,7,8,9-HxCDD	ND	25.5				___
1,2,3,4,6,7,8-HpCDD	398			1.04	36:21	DJ_
1,2,3,4,6,7,8,9-OCDD	4160			0.85	39:58	D__
2,3,7,8-TCDF	61.6			0.85	24:58	DJ_
1,2,3,7,8-PeCDF	EMPC		20.5			DJ_
2,3,4,7,8-PeCDF	36.0			1.51	29:33	DJ_
1,2,3,4,7,8-HxCDF	69.0			1.24	32:18	DJ_
1,2,3,6,7,8-HxCDF	27.7			1.23	32:25	DJ_
2,3,4,6,7,8-HxCDF	39.2			1.34	32:53	DJ_
1,2,3,7,8,9-HxCDF	ND	19.9				___
1,2,3,4,6,7,8-HpCDF	165			1.07	35:19	DJ_
1,2,3,4,7,8,9-HpCDF	EMPC		13.6			DJ_
1,2,3,4,6,7,8,9-OCDF	301			0.86	40:11	DJ_

Totals	Conc. (ppt)	Number	DL	EMPC	Flags
Total TCDD	20910	6			___
Total PeCDD	88.1	2		128	___
Total HxCDD	106	2		192	___
Total HpCDD	815	2			___
Total TCDF	326	8		364	___
Total PeCDF	545	4		642	___
Total HxCDF	733	8			___
Total HpCDF	357	2		371	___

MIT2_PSR v1.04, LARS 6.15.00

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 07:22 04/13/1999

SAMPLING PLAN

PHASE ONE - SOIL SAMPLING

CENTREDALE MANOR SITE

NORTH PROVIDENCE, RHODE ISLAND

February 5, 1990

Prepared by:

U.S. Environmental Protection Agency
Environmental Response Team
Edison, NJ

In conjunction with:

U.S. EPA Region I
and
Centredale Manor Management Action Team

Centredale Manor Sampling Plan Approval

Date

JoAnn M. Camacho
ERT, Project Manager

2/2/99
Date

Tom Condon
U.S. EPA Region I, Project Manager

2-10-99
Date

Mayor A. Ralph Mollis
Town of North Providence
Co-Chairman, Management Acton Team

2/10/99
Date

Richard Boynton
U.S. EPA, Region I
Co-Chair Management Action Team

2/10/99
Date

Senator John A. Celona
District 36 - North Providence
Management Action Team

2/10/99
Date

Anthony Phillips Geri Granato
Deputy Director Municipal Affairs Chief of Staff
Governor of Rhode Island
Management Action Team

2/10/99
Date

Louise House
ATSDR, Region I
Management Action Team

2/10/99
Date

Robert Vanderslice, Ph.D.
Rhode Island Department of Health
Management Action Team

2/10/99
Date

Eugenia S. Marks, Director for Policy
Audubon Society of Rhode Island
Management Action Team

2/10/99
Date

Mayor William R. Macera
City of Johnston
Management Action Team

Date

2/10/99

TERRENCE GRAY, Chief
Office of Waste Management
RI Department of Environmental Mgmt

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Reference 92

S. Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:

Name Ann Vaccaro

Company Manager of Centredale Manor

Address 2074 Smith Street
N. Providence, RI

Phone (401) 232-3770

Date 8/12/99

Time 1200 AM/PM

☒ Originator Placed Call

☐ Originator Received Call

W.O. No. 20098041001 7045

Subject Drainage Channel fishery information

Notes:

I asked Ms. Vaccaro if she has ever seen anyone fishing from the drainage channel located just east of the Centredale Manor building and she responded that she has not.

☒ File Centredale Manor HRS

☐ Tickle File ____/____/____

☐ Follow-Up By: _____

☐ Copy/Route To: _____

Follow-Up-Action: _____

Originator's Initials SK

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Reference 93

S. Kennedy
Originator

PHONE CONVERSATION RECORD

Conversation with:
Name Mr. Alan Libby - Freshwater Biologist
Company RI Dept of Fish and Wildlife
Address P.O. Box 218
W. Kingston, RI 02892
Phone (401) 789-3094

Date 5/12/99
Time 1345 AM/PM

☒ Originator Placed Call
☐ Originator Received Call

W.O. No. 20098041001 7045

Subject Woonasquatucket River Information

Notes:

I asked Mr Libby if there is recreational fishing along the Woonasquatucket River and he stated that there is.

Mr. Libby stated that the following species of fish are located within the Woonasquatucket River:

Blue gill
White sucker
Darter
Pumkinseed
Large Mouth bass
American eel
Golden shiner
Redfin pickerel
Creek chubsucker
Chain pickerel
Yellow bull head
Rainbow trout (stocked)

☒ File Centredale Manor HRS
☐ Tickle File ___/___/___
☐ Follow-Up By: ___
☐ Copy/Route To: ___

Follow-Up-Action: ___

Originator's Initials SK