Superfund Records Center
SITE: Centredale
BREAK: 2.3
OTHER: 35798

ENVIRONMENTAL
Data Services, Inc.

DIOXIN DATA VALIDATION REPORT
USEPA REGION I - TIER III

SDG No.: G2G240279
Laboratory: Severn Trent Laboratories, Inc., West Sacramento, CA
Site: Centredale Manor
Date: September 13, 2002
Samples:
Dioxin: 17/Soil/2108324, 2108325, 2108326, 2108327, 2108328, 2108329, 2108330, 2108331, 2108332, 2108333, 2108334, 2108335, 2108336, 2108337, 2108338, 2108339, 2108340
1/PE Soil/2108342
1/Aqueous/2108323

A Tier III validation was performed on the dioxin/furan analytical data for seventeen soil samples, one soil PE sample and one aqueous blank sample collected by Loureiro Engineering Associates at the Centredale Manor Site in North Providence, Rhode Island. The samples were analyzed under EPA Method 8290 for high resolution dioxin/furans. The data were evaluated as a Tier III level in accordance with the "Region I EPA-NE Data Validation Functional Guidelines for Evaluating Dioxin/Furan Analyses", dated November 1998 and the "Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996 and were based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- * Data Completeness.
- * Preservation and Technical Holding Times.
- * PE Samples/Accuracy Check.
- * Window Defining Solution.
- * Initial & Continuing Calibrations.
- * Chromatographic Resolution.
- * Instrument Sensitivity Check.
- * Blanks.
- Matrix Spike Analysis.
- * Laboratory & Field Duplicate Analysis.
- Internal/Clean-up/Recovery Standards.
- * Sample Analysis & Identification.
- Sample Quantitation & Total Homologues.
- * Estimated Detection Limits (EDL) & Estimated Maximum Possible Concentration (EMPC).
- * Toxicity Equivalency (TEF) and Isomer Specificity.
- * Required Sample Reruns & Second Column Confirmation.
- * Dilutions.

SDMS DocID 35798

6B Hills Avenue · Concord, NH 03301 · Telephone: 603-226-0118 · Fax: 603-226-0128 · www.env-data.com

* = All criteria were met for this parameter.
NA = Not Applicable.

Overall Evaluation of Data and Potential Usability Issues

Dioxin/Furans:

Dioxin/furan sample results were qualified as follows:

- 1234678-HpCDF and OCDF have been qualified (J) in sample 2108336 due to low MS/MSD recoveries.
- 123478-HxCDF has been qualified as estimated (UJ) in sample 2108326 due to a low internal standard recovery.

Matrix Spike Analysis

MS/MSD Sample ID: 2108336

Compound	MS %R	MSD %R	RPD	Action
1234678-HpCDF	2.1%	0%	Ok	J/R
OCDF	21%	24%	Ok	J/UJ

- 1234678-HpCDF and OCDF have been qualified (J) in sample 2108336.

Internal/Clean-up/Recovery Standards

Sample	Internal Standard	%R	Action
2108326	$^{13}C_{12}$-123478-HxCDF	37%	J/UJ

- 123478-HxCDF has been qualified as estimated (UJ) in sample 2108326.

Additional Comments

- Several samples exhibited several analytes that exceeded the linear range of the initial calibration curve and were flagged (E) by the laboratory. The reviewer further qualified these results as estimated (J).
- The samples were received at 0°C but were not frozen.
- An aqueous PE sample (2108401) and two soil PE samples (2108342/2108402) were analyzed with this project. According to the client, Cambridge Analytical Isotopes did not provide a range of values for the aqueous PE sample. A range of expected values was provided for the soil PE samples and all results were acceptable and within the range. No action was taken by the reviewer on the basis of the PE samples. A copy of the Form Is for all PE samples, as well as Table 1 - Summary of Quality Assurance/Quality Control Sample Results is attached to this report.

Please contact the undersigned at (603) 226-0118 if you have any questions or need further information.

Very truly yours,
Environmental Data Services, Inc.

Nancy Weaver
Senior Chemist

Attachments: Data Validation Worksheets
Annotated Form Is

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 detected in aqueous equipment blank associated soil/sediment samples.

Region I
Data Review Worksheets

Site Name: Centredale Manor
Reference Number: —

DIOXIN DATA REVIEW WORKSHEET
(LOW or HIGH RESOLUTION)

The following data package has been validated:

Lab Name: SevernTrent- West Sacramento CA
DAS/Project No. Centredale Manor
SDG No. G2G240279
No. of Samples/Matrix 18 soil / 1 water

Tech. Spec./Method No. 8290 High Res. Dioxin/f
Sampling Date(s) 7/22/02
Shipping Date(s) 7/23/02
Date(s) Rec'd by Lab 7/24/02

Traffic Report Sample Nos. 2108324, 2108325, 2108326, 2108327, 2108328, 2108329, 2108330, 2108331, 2108332, 2108333, 2108334, 2108335, 2108336, 2108337, 2108338, 2108339, 2108340, 21083 210832
Equipment Blank Nos. 2108323
Field Duplicate Nos. 2108334 / 2108335
PES Nos. 2108342 (soil)

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Dioxin/Furan Analyses, November 1998 and Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 were used to evaluate the data and/or approved modifications to the Functional Guidelines were used to evaluate the data. (Attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

The general criteria used to determine the performance were based on an examination of:

- Overall Evaluation of Data
- Data Completeness
- Preservation/Technical Holding Times
- PE Samples/Accuracy Check
- Window Defining Mix
- Initial & Continuing Calibrations
- Chromatographic Resolution
- Instrument Sensitivity Check
- Blanks
- Matrix Spike Analysis
- Laboratory & Field Duplicate Analysis
- Internal/Clean-up/Recovery Standards
- Sample Analysis & Identification
- Sample Quantitation & Total Homologues
- Estimated Detection Limit (EDL) & Estimated Maximum Possible Concentration (EMPC)
- Toxicity Equivalency Factor (TEF) & Isomer Specificity
- Required Sample Reruns & Second Column Confirmation
- Dilutions

Definition of Qualifiers:

A - Acceptable data
J - Approximate data due to quality control criteria
R - Reject data due to quality control criteria
U - Result not detected
EB - Compound detected in aqueous equipment blank associated with soil/sediment samples

Validator: Nancy Weaver

Date: 9/13/02

Region I
Data Review Worksheet - (Low and High Resolution)

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE RECEIVED
All criteria were met.		

Addl. comments: The samples were received at 0°C, but were not frozen.

Several samples exhibited compounds which exceeded the linear range of the instrument and were flagged (E) by the laboratory. The reviewer further qualified these results as estimated (J).

Reviewer: Nancy Weaver

Date: 9/13/02

Region I
Data Review Worksheet - (Low and High Resolution)

II. PRESERVATION AND HOLDING TIMES

Sampler: JM Company: Loureiro ENG Contacted Yes No Date:

1. Circle sample numbers with exceeded contract holding times or omitted preservation.

Sample Number	Matrix	Preserved Y/N	Date Sampled	Date Extracted	Date Analyzed	Action
2108324	Soil	N	7/22/02	7/31/02	8/8/02	None
2108325						
2108326						
2108327						
2108328						
2108329						
2108330						
2108331						
2108332				7/31/02	8/11/02	
2108333						
2108334						
2108335						
2108336						
2108337						
2108338						
2108339						
2108340						
(PE) 2108342						
2108323	water			7/26/02	8/1/02	

Validator: [illegible]

Date: 9/13/02

11/98

Region I
Data Review Worksheet - (Low and High Resolution)

III. ACCURACY CHECK (Performance Evaluation Results) - List all analytes that are outside criteria.

SDG No: G2G240279 CASE/PROJECT No: Centredale Manor

Are more than one-half of the PES analytes within criteria for each parameter. (Y) N

PE Sample Number	Ampule Number	Type of PES	Matrix	Analyte	Conc	Region I EPA PES Scores*	Non-EPA PES Scores**	Samples Affected	Action
E5NQVIAC	—	LCS	Soil	all analytes	% R all pass	(60-140)	—	all Soils	None
E5E421AC	—	LCS	Water	all analytes	"	(60-140)	—	all water	None

* For Region I PESs indicate the Region I PES Score Report Results: Action Low; Action High; TCL MISS; TCL CONTAMINANT

** For Non-EPA PESs indicate the Non-EPA PES Score: PES COMPOUND MISS; PES COMPOUND CONTAMINANT; PES COMPOUND HIT (% Recovery Limits)

Validator: Linleaver

Date: 9/13/02

Region I
Data Review Worksheets - (Low or High Resolution)

V. INITIAL AND CONTINUING CALIBRATIONS

Va. INITIAL CALIBRATION

Date of ICAL	Instrument File Name	Compound	%RSD	Ion Ratio	S/N	RT	Resolution	Samples Affected	Action
			All						
8/13/02	13A4021D2	all analytes	PASS	All	All	all	PASS	all Samples	None
8/12/02	10A4026D5			PASS	PASS				
8/11/02	10 A4026D5								
8/13/02	13 A4027D5								
8/7/02	05A4028D5								
8/6/02	06A4021D2								
8/8/02	07A4026D5								
8/01/02	14MY0280D5								
8/5/02	05A4028D5								

Comments: all criteria were met.

Validator: DWeaver

Date: 9/13/02

Region I
Data Review Worksheets - (Low or High Resolution)

V. INITIAL AND CONTINUING CALIBRATIONS Continued

Vb. CONTINUING CALIBRATION

Date of CCAL	Instrument File Name	Compound	%D	Ion Ratio	S/N	RT	Resolution	Samples Affected	Action
8/13/02	13A4021D2	all analytes	PASS	—	—	—	—	all samples	None
8/14/02	"								
8/13/02	13A4027D5								
8/8/02	07A4024D5								
8/27/02	26A4029D5								
8/1/02	31JL028D5								

Comments: all criteria were met.

Validator: Wleaver

Date: 9/13/02

11/98

VI. COLUMN PERFORMANCE RESOLUTION CHECK

Date:_____ ID:_____

Was the chromatographic resolution of the TCDD/TCDF isomers and the in the CC3 solution for DB-5 columns calculated for each 12 hour period?

% Valley _____-TCDD/_____-TCDD_____ (QC Limit ≤ 25%)

% Valley _____-TCDF/_____-TCDF_____ (QC Limit ≤ 50%)

All PASS

For DB-225 columns:

% Valley _____-TCDD/_____-TCDD_____ (QC Limit ≤ 25%)

% Valley _____-TCDF/_____-TCDF_____ (QC Limit ≤ 50%)

ACTIONS:

A. If the GC resolution criteria do not meet specifications, the positive hits will be qualified as "J". All tetras and hexas (for both dioxin and furans) will be qualified. The heptas are not believed to be affected. OCDD and OCDF are not affected as there is only one isomer in each group. No action is taken for non-detects.

B. The criteria for chromatographic resolution must be met for all standards and the reviewer must use professional judgement on the severity of the problem and its effect on the final results.

Validator: LWeaver Date: 9/13/02

Region I
Data Review Worksheets - (Low and High Resolution)

VIIa. BLANKS ANALYSIS

Was a method blank prepared and analyzed for each matrix prior to analysis of sample? Yes [✓] No [ ]

List the blank contamination below.

Sampler: JM Company: Lourenco Eng. Contacted: Yes No Date:_____

1. Laboratory: Method and Instrument Blanks

Date Extracted	Date Analyzed	Matrix	Sample No. (Blank Type)	Instrument	Compound	Conc. (units)
7/31/02	8/8/02	Soil	E5NQV1AA	HRGC/HRMS	all ND	—
7/26/02	8/1/02	water	E5E421AA	" "	all ND	—

2. Field: Equipment (Rinsate) Blanks

Date Extracted	Date Analyzed	Matrix	Sample No. (Blank Type)	Instrument	Compound	Conc. (units)
7/26/02	8/1/02	water	2108323	HRGC/HRMS	all	—
		ER			ND	

Validator: Lulleaver Date: 9/13/02

11/98

Data Review Worksheets - (Low and High Resolution) Continued

VIIb. BLANKS ANALYSIS

Compound	Type of Blank	Date Blank Sample/Originated	Max Conc. (units)	Action Level (units)	Samples Affected	Action

No action required

ACTIONS:

A. If no blank is run with a particular matrix, the non-detected results should be accepted without qualifying the data and the positive hits should be flagged "J". If all samples have the same hits with similar concentrati and no blank is run, professional judgment should be used to determine if all results should be rejected "R".

B. If a blank is contaminated above the specified limits, any sample hits reported as below the action level are to be reported as non-detected, and not included in the TEF calculations. All data that are not greater tha times the blank action level are to be reported as non-detected. If the detected analyte is OCDD/OCDF or a Total Homologue all data that are not greater than 10 times the blank are to be reported as non-detects.

C. If positive results are detected in aqueous equipment (rinsate) blanks and the associated non-aqueous samples, then the validator should flag (EB) those detected compounds in the associated non-aqueous sample: indicate an indeterminate amount of sampling error has potentially affected the sample results.

Validator: Blubeaver

Date: 9/13/02

Region I
Data Review Worksheet - (Low and High Resolution)

VIII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

List all MS/MSD analytes that are outside method QC acceptance criteria. 2108336

Compound	MS % Rec	MSD % Rec	RPD	Method QC Limits		Concentration			%RSD	Action
				% Rec	RPD	Unspiked Sample	MS	MSD		
2378-TCDD	NC	NC								
2378-TCDF										
12378-PeCDF										
12378-PeCDD										
23478-PeCDF										
123478-HxCDF										
123678-HxCDF										
123478-HxCDD										
123678-HxCDD										
123789-HxCDD										
234678-HxCDF										
123789-HxCDF										
1234678-HpCDF	2.1	0.0	ok	60-140	0-30					(J/R)
1234678-HpCDD	NC	NC								
1234789-HpCDF										
OCDD	NC	NC								
OCDF	21	24	ok	60-140	0-30					(J/UJ)

Default Limits: % Recovery (50-150%), RPD (50%)

ACTIONS:

NC = Recovery and/or RPD were not calculated - 4X rule - No action

If recoveries are beyond 50-150%, recheck all calculations. Professional judgment should be used to flag sample data.

Validator: L Weaver

Date: 9/13/02

Region I
Data Review Worksheets - (Low or High Resolution)

IX. LABORATORY AND FIELD DUPLICATES

Was a duplicate run for each matrix? Yes [✓] No [ ]

The RPD of each analyte detected must be within the 30% of the acceptance range for aqueous and 50% for solids.

SAMPLE ID: 2108334 DUPLICATE ID: 2108335

Compound	Sample Conc. pg/g	Sample EDL		Duplicate Conc. pg/g	Duplicate EDL		%RPD	Action
		EDL	2xEDL		EDL	2xEDL		
2378-TCDD	13	1.1	2.2	11	1.1	2.2	17	None
2378-TCDF	3.8	1.1	2.2	3.2	1.1	2.2	17	"
12378-PeCDF								
12378-PeCDD								
23478-PeCDF	2.8	5.3	10.6	ND	2.0	4.0	NC	None
123478-HxCDF	2.8	5.3	10.6	ND	2.4	4.8	NC	"
123678-HxCDF								
123478-HxCDD								
123678-HxCDD								
123789-HxCDD								
234678-HxCDF								
123789-HxCDF								
1234678-HpCDF	7.1	5.3	10.6	6.2	5.6	11.2	14	None
1234678-HpCDD	14	5.3	10.6	11	5.6	11.2	24	"
1234789-HpCDF								
OCDD	94	11	22	81	11	22	15	None
OCDF	8.4	11	22	7.1	11	22	17	"

ACTIONS:

If RPD is greater than 30% for aqueous or 50% for solids, flag all positive results "J" and non-detects "UJ". Recheck all calculations if the duplicate precision is beyond the specified range. Professional judgement should be used to ascertain effect on the final data despite sample concentration.

idator: Lee Weaver Date: 9/13/02

Region I
Data Review Worksheets - (High Resolution)

Xb. INTERNAL STANDARD RECOVERY

Recovery Acceptance Criteria per Table 10 in Dioxin Validation SOP:

Sample Nos.	2108327				2108326							
Internal Standard	% Rec.	S/N	QC Range (%)	Action	% Rec.	S/N	QC Range (%)	Action	% Rec.	S/N	QC Range (%)	Action
$^{13}C_{12}$-2378-TCDD												
$^{13}C_{12}$-2378-TCDF												
$^{13}C_{12}$-12378-PeCDD												
$^{13}C_{12}$-12378-PeCDF												
$^{13}C_{12}$-23478-PeCDF												
$^{13}C_{12}$-123478-HxCDD												
$^{13}C_{12}$-123678-HxCDD												
$^{13}C_{12}$-123789-HxCDD												
$^{13}C_{12}$-123478-HxCDF	140%	ok	(40-135)	(J)	37%	ok	(40-135)	(J/UJ)				
$^{13}C_{12}$-123678-HxCDF												
$^{13}C_{12}$-123789-HxCDF				No action								
$^{13}C_{12}$-234678-HxCDF												
$^{13}C_{12}$-1234678-HpCDD												
$^{13}C_{12}$-1234678-HpCDF												
$^{13}C_{12}$-1234789-HpCDF												
$^{13}C_{12}$-OCDD												
$^{37}Cl_4$-2378-TCDD												

Validator: M Weaver

Date: 9/13/02

Region I
Data Review Worksheet - (High Resolution)

XI. Sample Analysis and Identification

List any sample and analytes which did not meet identification criteria:

SAMPLE Nos.						
NATIVE ANALYTES	RT	S/N	Ion Ratio	RT	S/N	Ion Ratio
2378-TCDD						
2378-TCDF						
12378-PeCDF						
12378-PeCDD						
23478-PeCDF						
123478-HxCDF						
123678-HxCDF						
123478-HxCDD						
123678-HxCDD						
123789-HxCDD						
234678-HxCDF						
123789-HxCDF						
1234678-HpCDF						
1234678-HpCDD						
1234789-HpCDF						
OCDD						
OCDF						
INTERNAL STANDARDS VS. RECOVERY STANDARDS						
13C-2378-TCDD						
13C-2378-TCDF						
13C-12378-PeCDD						
13C-12378-PeCDF						
13C-123478-HxCDD						
13C-123678-HxCDD						
13C-123478-HxCDF						
13C-123678-HxCDF						
13C-123789-HxCDF						
13C-234678-HxCDF						
13C-1234678-HpCDD						
13C-1234678-HpCDF						
13C-1234789-HpCDF						
13C-OCDD						
37Cl-2378-TCDD						
RECOVERY STANDARDS						
13C-1234-TCDD						
13C-123789-HxCDD						

PASS

Validator: D. Weaver

Date: 9/13/02

11/98

XII. SAMPLE CALCULATION

2108327

2378-TCDD

$$\frac{78230700 \times 2000}{151314200 \times 0.82 \times 10 \times 1.05} = 120 \text{ pg/g}$$

12378-PeCDD

$$\frac{1261768 \times 2000}{114245000 \times 0.82 \times 10 \times 1.05} = 2.1 \text{ pg/g}$$

$$\text{Concentration (ng/g)} = \frac{Q_{is} \times (A_{x1} + A_{x2}) \times D}{(W \text{ or } V) \times (A_{is1} + A_{is2}) \times RRF_x}$$

$$EDL = \frac{2.5 \times Q_{is} \times (H_{x1} + H_{x2}) \times D}{(W \text{ or } V) \times (H_{is1} + H_{is2}) \times RRF_x}$$

$$EMPC = \frac{Q_{is} \times (A_{x1} + A_{x2}) \times D}{(W \text{ or } V) \times (A_{is1} + A_{is2}) \times RRF_x}$$

where:

Q_{is}	=	Quantity (ng) of appropriate internal standard added to sample before extraction.
A_x^1/A_x^2	=	Integrated areas of the two quantitation ions.
A_{is}^1/A_{is}^2	=	Integrated areas of the internal standard quantitation ions
W	=	Weight (g) of sample extracted.
V	=	Volume (L) of sample extracted.
RRF_x	=	Calculated relative response factor from the continuing calibration.
$H_x^1 + H_x^2$	=	Peak heights of the noise for the quantitation ions.
$H_{is}^1 + H_{is}^2$	=	Peak heights of the internal standard quantitation ions.
D	=	Dilution.

Validator: Nancy N Weaver

Date: 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108324

Lot-Sample #...:	G2G240279 - 004	Work Order #...:	E48R01AC	Matrix.....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	8D5
Prep Date.....:	07/31/02	Analysis Date..:	08/08/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	16

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	370		1.2	1	370.000000
Total TCDD	390		1.2		
1,2,3,7,8-PeCDD	4.1	J	5.9	1	4.100000
Total PeCDD	11		5.9		
1,2,3,4,7,8-HxCDD	4.1	J	5.9	0.1	0.410000
1,2,3,6,7,8-HxCDD	13		5.9	0.1	1.300000
1,2,3,7,8,9-HxCDD	12		5.9	0.1	1.200000
Total HxCDD	98		5.9		
1,2,3,4,6,7,8-HpCDD	250		5.9	0.01	2.500000
Total HpCDD	460		5.9		
OCDD	1500		12	0.0001	0.150000
2,3,7,8-TCDF	5.8	CON	1.2	0.1	0.580000
Total TCDF	49		1.2		
1,2,3,7,8-PeCDF	ND		2.5	0.05	0
2,3,4,7,8-PeCDF	4.5	J	5.9	0.5	2.200000
Total PeCDF	55		5.9		
1,2,3,4,7,8-HxCDF	6.4		5.9	0.1	0.640000
1,2,3,6,7,8-HxCDF	5.3	J	5.9	0.1	0.530000
2,3,4,6,7,8-HxCDF	4.3	J	5.9	0.1	0.430000
1,2,3,7,8,9-HxCDF	ND		0.18	0.1	0
Total HxCDF	140		5.9		
1,2,3,4,6,7,8-HpCDF	39		5.9	0.01	0.390000
1,2,3,4,7,8,9-HpCDF	ND		2.6	0.01	0
Total HpCDF	86		5.9		
OCDF	74		12	0.0001	0.007400
Total TEQ Concentration					384.437400

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	67	40 - 135
13C-1,2,3,7,8-PeCDD	58	40 - 135
13C-1,2,3,6,7,8-HxCDD	55	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	55	40 - 135
13C-OCDD	48	40 - 135
13C-2,3,7,8-TCDF	60	40 - 135
13C-1,2,3,7,8-PeCDF	61	40 - 135
13C-1,2,3,4,7,8-HxCDF	53	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	57	40 - 135

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108324

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

9/13/12

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108325

Lot-Sample #...:	G2G240279 - 005	**Work Order #...:**	E48R31AC	**Matrix.....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	8D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/08/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	6.1

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**15**		**1.1**	**1**	**15.000000**
Total TCDD	**19**		**1.1**		
1,2,3,7,8-PeCDD	ND		1.2	1	0
Total PeCDD	ND		2.6		0
1,2,3,4,7,8-HxCDD	ND		2.2	0.1	0
1,2,3,6,7,8-HxCDD	**12**		**5.3**	**0.1**	**1.200000**
1,2,3,7,8,9-HxCDD	**6.0**		**5.3**	**0.1**	**0.600000**
Total HxCDD	**60**		**5.3**		
1,2,3,4,6,7,8-HpCDD	**450**		**5.3**	**0.01**	**4.500000**
Total HpCDD	**820**		**5.3**		
OCDD	**3700**		**11**	**0.0001**	**0.370000**
2,3,7,8-TCDF	**3.4**	**CON**	**1.1**	**0.1**	**0.340000**
Total TCDF	**27**		**1.1**		
1,2,3,7,8-PeCDF	ND		1.6	0.05	0
2,3,4,7,8-PeCDF	ND		2.3	0.5	0
Total PeCDF	**45**		**5.3**		
1,2,3,4,7,8-HxCDF	**3.1**	**J**	**5.3**	**0.1**	**0.310000**
1,2,3,6,7,8-HxCDF	**3.5**	**J**	**5.3**	**0.1**	**0.350000**
2,3,4,6,7,8-HxCDF	**3.7**	**J**	**5.3**	**0.1**	**0.370000**
1,2,3,7,8,9-HxCDF	ND		0.13	0.1	0
Total HxCDF	**90**		**5.3**		
1,2,3,4,6,7,8-HpCDF	**62**		**5.3**	**0.01**	**0.620000**
1,2,3,4,7,8,9-HpCDF	**3.1**	**J**	**5.3**	**0.01**	**0.031000**
Total HpCDF	**200**		**5.3**		
OCDF	**180**		**11**	**0.0001**	**0.018000**
Total TEQ Concentration					**23.709000**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	78	40 - 135
13C-1,2,3,7,8-PeCDD	68	40 - 135
13C-1,2,3,6,7,8-HxCDD	69	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	73	40 - 135
13C-OCDD	78	40 - 135
13C-2,3,7,8-TCDF	76	40 - 135
13C-1,2,3,7,8-PeCDF	70	40 - 135
13C-1,2,3,4,7,8-HxCDF	64	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	69	40 - 135

klw 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108325

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108326

Lot-Sample #...:	G2G240279 - 006	Work Order #...:	E48TA1AC	Matrix.....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	8D5
Prep Date.....:	07/31/02	Analysis Date..:	08/08/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	9.0

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**4.3**		**1.1**	**1**	**4.300000**
Total TCDD	**4.3**		**1.1**		
1,2,3,7,8-PeCDD	ND		0.37	1	0
Total PeCDD	ND		0.45		0
1,2,3,4,7,8-HxCDD	ND		0.38	0.1	0
1,2,3,6,7,8-HxCDD	ND		2.7	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.6	0.1	0
Total HxCDD	**5.1**		**5.5**		
1,2,3,4,6,7,8-HpCDD	**48**		**5.5**	**0.01**	**0.480000**
Total HpCDD	**88**		**5.5**		
OCDD	**290**		**11**	**0.0001**	**0.029000**
2,3,7,8-TCDF	ND	CON	0.44	0.1	0
Total TCDF	**3.0**		**1.1**		
1,2,3,7,8-PeCDF	ND		0.35	0.05	0
2,3,4,7,8-PeCDF	ND		0.73	0.5	0
Total PeCDF	**15**		**5.5**		
1,2,3,4,7,8-HxCDF	~~ND~~ UJ		1.2	0.1	0
1,2,3,6,7,8-HxCDF	ND		1.2	0.1	0
2,3,4,6,7,8-HxCDF	ND		1.4	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.14	0.1	0
Total HxCDF	**17**		**5.5**		
1,2,3,4,6,7,8-HpCDF	**6.6**		**5.5**	**0.01**	**0.066000**
1,2,3,4,7,8,9-HpCDF	ND		0.53	0.01	0
Total HpCDF	**16**		**5.5**		
OCDF	**7.2**	**J**	**11**	**0.0001**	**0.000720**
Total TEQ Concentration					**4.875720**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	55	40 - 135
13C-1,2,3,7,8-PeCDD	56	40 - 135
13C-1,2,3,6,7,8-HxCDD	46	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	60	40 - 135
13C-OCDD	70	40 - 135
13C-2,3,7,8-TCDF	51	40 - 135
13C-1,2,3,7,8-PeCDF	56	40 - 135
13C-1,2,3,4,7,8-HxCDF	37 *	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	48	40 - 135

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108326

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

*	Surrogate recovery is outside stated control limits.
CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

lew
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108327

Lot-Sample #...:	G2G240279 - 001	**Work Order #...:**	E48RF1AC	**Matrix....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	8D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/08/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	21

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**4.4**		**1.3**	**1**	**4.400000**
Total TCDD	**6.3**		**1.3**		
1,2,3,7,8-PeCDD	ND		0.41	1	0
Total PeCDD	ND		1.0		0
1,2,3,4,7,8-HxCDD	ND		0.24	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.46	0.1	0
1,2,3,7,8,9-HxCDD	ND		0.44	0.1	0
Total HxCDD	ND		2.4		0
1,2,3,4,6,7,8-HpCDD	**5.3**	**J**	**6.4**	**0.01**	**0.053000**
Total HpCDD	**10**		**6.4**		
OCDD	**33**		**13**	**0.0001**	**0.003300**
2,3,7,8-TCDF	**1.0**	**CON J**	**1.3**	**0.1**	**0.100000**
Total TCDF	**9.3**		**1.3**		
1,2,3,7,8-PeCDF	ND		0.66	0.05	0
2,3,4,7,8-PeCDF	ND		0.89	0.5	0
Total PeCDF	**8.2**		**6.4**		
1,2,3,4,7,8-HxCDF	ND		1.4	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.90	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.74	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.14	0.1	0
Total HxCDF	**3.8**		**6.4**		
1,2,3,4,6,7,8-HpCDF	ND		2.9	0.01	0
1,2,3,4,7,8,9-HpCDF	ND		0.61	0.01	0
Total HpCDF	ND		2.9		0
OCDF	ND		2.8	0.0001	0
Total TEQ Concentration					**4.556300**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	74	40 - 135
13C-1,2,3,7,8-PeCDD	66	40 - 135
13C-1,2,3,6,7,8-HxCDD	97	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	79	40 - 135
13C-OCDD	108	40 - 135
13C-2,3,7,8-TCDF	71	40 - 135
13C-1,2,3,7,8-PeCDF	65	40 - 135
13C-1,2,3,4,7,8-HxCDF	140 *	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	72	40 - 135

lW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108327

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

*	Surrogate recovery is outside stated control limits.
CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108328

Lot-Sample #...:	G2G240279 - 002	Work Order #...:	E48RQ1AC	Matrix.....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	8D5
Prep Date.....:	07/31/02	Analysis Date..:	08/08/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	18

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**120**		**1.2**	**1**	**120.000000**
Total TCDD	**140**		**1.2**		
1,2,3,7,8-PeCDD	ND		2.6	1	0
Total PeCDD	**13**		**6.1**		
1,2,3,4,7,8-HxCDD	ND		1.8	0.1	0
1,2,3,6,7,8-HxCDD	**4.1**	**J**	**6.1**	**0.1**	**0.410000**
1,2,3,7,8,9-HxCDD	ND		2.8	0.1	0
Total HxCDD	**42**		**6.1**		
1,2,3,4,6,7,8-HpCDD	**40**		**6.1**	**0.01**	**0.400000**
Total HpCDD	**77**		**6.1**		
OCDD	**220**		**12**	**0.0001**	**0.022000**
2,3,7,8-TCDF	**10**	**CON**	**1.2**	**0.1**	**1.000000**
Total TCDF	**100**		**6.1**		
1,2,3,7,8-PeCDF	**6.0**	**J**	**6.1**	**0.05**	**0.300000**
2,3,4,7,8-PeCDF	**12**		**6.1**	**0.5**	**6.000000**
Total PeCDF	**160**		**6.1**		
1,2,3,4,7,8-HxCDF	**9.5**		**6.1**	**0.1**	**0.950000**
1,2,3,6,7,8-HxCDF	**9.2**		**6.1**	**0.1**	**0.920000**
2,3,4,6,7,8-HxCDF	**11**		**6.1**	**0.1**	**1.100000**
1,2,3,7,8,9-HxCDF	ND		0.51	0.1	0
Total HxCDF	**130**		**6.1**		
1,2,3,4,6,7,8-HpCDF	**32**		**6.1**	**0.01**	**0.320000**
1,2,3,4,7,8,9-HpCDF	ND		3.0	0.01	0
Total HpCDF	**48**		**6.1**		
OCDF	**21**		**12**	**0.0001**	**0.002100**
Total TEQ Concentration					**131.424100**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	82	40 - 135
13C-1,2,3,7,8-PeCDD	71	40 - 135
13C-1,2,3,6,7,8-HxCDD	79	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	76	40 - 135
13C-OCDD	78	40 - 135
13C-2,3,7,8-TCDF	81	40 - 135
13C-1,2,3,7,8-PeCDF	59	40 - 135
13C-1,2,3,4,7,8-HxCDF	70	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	70	40 - 135

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108328

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

JLW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108329

Lot-Sample #...:	G2G240279 - 003	Work Order #...:	E48RX1AC	Matrix....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	8D5
Prep Date.....:	07/31/02	Analysis Date..:	08/08/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	20

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	630 J	~~E~~	1.2	1	630.000000
Total TCDD	640		1.2		
1,2,3,7,8-PeCDD	5.1	J	6.2	1	5.100000
Total PeCDD	22		6.2		
1,2,3,4,7,8-HxCDD	4.1	J	6.2	0.1	0.410000
1,2,3,6,7,8-HxCDD	9.8		6.2	0.1	0.980000
1,2,3,7,8,9-HxCDD	12		6.2	0.1	1.200000
Total HxCDD	110		6.2		
1,2,3,4,6,7,8-HpCDD	320		6.2	0.01	3.200000
Total HpCDD	520		6.2		
OCDD	2200		12	0.0001	0.220000
2,3,7,8-TCDF	5.7	CON	1.2	0.1	0.570000
Total TCDF	54		1.2		
1,2,3,7,8-PeCDF	ND		2.4	0.05	0
2,3,4,7,8-PeCDF	4.2	J	6.2	0.5	2.100000
Total PeCDF	35		6.2		
1,2,3,4,7,8-HxCDF	5.8	J	6.2	0.1	0.580000
1,2,3,6,7,8-HxCDF	3.9	J	6.2	0.1	0.390000
2,3,4,6,7,8-HxCDF	4.2	J	6.2	0.1	0.420000
1,2,3,7,8,9-HxCDF	ND		0.21	0.1	0
Total HxCDF	71		6.2		
1,2,3,4,6,7,8-HpCDF	21		6.2	0.01	0.210000
1,2,3,4,7,8,9-HpCDF	ND		1.7	0.01	0
Total HpCDF	37		6.2		
OCDF	24		12	0.0001	0.002400
Total TEQ Concentration					645.382400

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	40 - 135
13C-1,2,3,7,8-PeCDD	68	40 - 135
13C-1,2,3,6,7,8-HxCDD	73	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	80	40 - 135
13C-OCDD	85	40 - 135
13C-2,3,7,8-TCDF	74	40 - 135
13C-1,2,3,7,8-PeCDF	68	40 - 135
13C-1,2,3,4,7,8-HxCDF	66	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	70	40 - 135

RW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108329

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
E	Estimated result. Result concentration exceeds the calibration range.
J	Estimated result. Result is less than the reporting limit.

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108330

Lot-Sample #...:	G2G240279 - 008	**Work Order #...:**	E48TK1AC	**Matrix....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	8D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/08/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	5.7

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**29**		**1.1**	**1**	**29.000000**
Total TCDD	**33**		**1.1**		
1,2,3,7,8-PeCDD	ND		0.29	1	0
Total PeCDD	ND		1.7		0
1,2,3,4,7,8-HxCDD	ND		0.31	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.72	0.1	0
1,2,3,7,8,9-HxCDD	ND		0.75	0.1	0
Total HxCDD	ND		2.5		0
1,2,3,4,6,7,8-HpCDD	**9.3**		**5.3**	**0.01**	**0.093000**
Total HpCDD	**19**		**5.3**		
OCDD	**64**		**11**	**0.0001**	**0.006400**
2,3,7,8-TCDF	**3.5**	**CON**	**1.1**	**0.1**	**0.350000**
Total TCDF	**18**		**1.1**		
1,2,3,7,8-PeCDF	ND		1.2	0.05	0
2,3,4,7,8-PeCDF	ND		1.2	0.5	0
Total PeCDF	**5.3**		**5.3**		
1,2,3,4,7,8-HxCDF	ND		1.8	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.82	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.75	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.078	0.1	0
Total HxCDF	**6.8**		**5.3**		
1,2,3,4,6,7,8-HpCDF	**3.7**	**J**	**5.3**	**0.01**	**0.037000**
1,2,3,4,7,8,9-HpCDF	ND		0.33	0.01	0
Total HpCDF	**3.7**		**5.3**		
OCDF	ND		4.2	0.0001	0
Total TEQ Concentration					**29.486400**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	68	40 - 135
13C-1,2,3,7,8-PeCDD	62	40 - 135
13C-1,2,3,6,7,8-HxCDD	69	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	72	40 - 135
13C-OCDD	72	40 - 135
13C-2,3,7,8-TCDF	62	40 - 135
13C-1,2,3,7,8-PeCDF	62	40 - 135
13C-1,2,3,4,7,8-HxCDF	63	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	68	40 - 135

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108330

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

MW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108331

Lot-Sample #...:	G2G240279 - 009	**Work Order #...:**	E48TT1AC	**Matrix....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	8D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/08/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	16

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**41**		**1.2**	**1**	**41.000000**
Total TCDD	**44**		**1.2**		
1,2,3,7,8-PeCDD	ND		0.36	1	0
Total PeCDD	ND		1.0		0
1,2,3,4,7,8-HxCDD	ND		0.30	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.77	0.1	0
1,2,3,7,8,9-HxCDD	ND		0.88	0.1	0
Total HxCDD	ND		2.5		0
1,2,3,4,6,7,8-HpCDD	**13**		**5.9**	**0.01**	**0.130000**
Total HpCDD	**25**		**5.9**		
OCDD	**220**		**12**	**0.0001**	**0.022000**
2,3,7,8-TCDF	**2.5**	**CON**	**1.2**	**0.1**	**0.250000**
Total TCDF	**14**		**1.2**		
1,2,3,7,8-PeCDF	ND		0.83	0.05	0
2,3,4,7,8-PeCDF	ND		1.0	0.5	0
Total PeCDF	**4.1**		**5.9**		
1,2,3,4,7,8-HxCDF	ND		1.4	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.72	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.76	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.055	0.1	0
Total HxCDF	**7.1**		**5.9**		
1,2,3,4,6,7,8-HpCDF	**3.9**	**J**	**5.9**	**0.01**	**0.039000**
1,2,3,4,7,8,9-HpCDF	ND		0.34	0.01	0
Total HpCDF	**4.0**		**5.9**		
OCDF	ND		4.8	0.0001	0
Total TEQ Concentration					**41.441000**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	40 - 135
13C-1,2,3,7,8-PeCDD	76	40 - 135
13C-1,2,3,6,7,8-HxCDD	79	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	81	40 - 135
13C-OCDD	82	40 - 135
13C-2,3,7,8-TCDF	77	40 - 135
13C-1,2,3,7,8-PeCDF	75	40 - 135
13C-1,2,3,4,7,8-HxCDF	67	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	73	40 - 135

JW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108331

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et al., 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108332

Lot-Sample #...:	G2G240279 - 010	**Work Order #...:**	E48T01AC	**Matrix....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/11/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	9.6

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**43**	**D**	**5.5**	**1**	**43.000000**
Total TCDD	**43**		**5.5**		
1,2,3,7,8-PeCDD	ND	D	4.4	1	0
Total PeCDD	ND	D	4.4		0
1,2,3,4,7,8-HxCDD	ND		1.1	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.90	0.1	0
1,2,3,7,8,9-HxCDD	ND		2.2	0.1	0
Total HxCDD	**8.4**		**5.5**		
1,2,3,4,6,7,8-HpCDD	**12**		**5.5**	**0.01**	**0.120000**
Total HpCDD	**27**		**5.5**		
OCDD	**72**		**11**	**0.0001**	**0.007200**
2,3,7,8-TCDF	**3.3**	**CON**	**1.1**	**0.1**	**0.330000**
Total TCDF	**18**		**1.1**		
1,2,3,7,8-PeCDF	ND		1.1	0.05	0
2,3,4,7,8-PeCDF	**3.8**	**J**	**5.5**	**0.5**	**1.900000**
Total PeCDF	**12**		**5.5**		
1,2,3,4,7,8-HxCDF	ND		2.2	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.84	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.84	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.22	0.1	0
Total HxCDF	**10**		**5.5**		
1,2,3,4,6,7,8-HpCDF	**5.1**	**J**	**5.5**	**0.01**	**0.051000**
1,2,3,4,7,8,9-HpCDF	ND		0.74	0.01	0
Total HpCDF	**8.2**		**5.5**		
OCDF	ND		5.5	0.0001	0
Total TEQ Concentration					**45.408200**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	40 - 135
13C-1,2,3,7,8-PeCDD	91	40 - 135
13C-1,2,3,6,7,8-HxCDD	45	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	66	40 - 135
13C-OCDD	82	40 - 135
13C-2,3,7,8-TCDF	71	40 - 135
13C-1,2,3,7,8-PeCDF	88	40 - 135
13C-1,2,3,4,7,8-HxCDF	97	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	68	40 - 135

lw 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108332

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et al., 1998).

CON	Confirmation analysis.
D	Result was obtained from the analysis of a dilution.
J	Estimated result. Result is less than the reporting limit.

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108333

Lot-Sample #...:	G2G240279 - 011	**Work Order #...:**	E48T51AC	**Matrix....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/11/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	8.4

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**13**		**1.1**	**1**	**13.000000**
Total TCDD	**17**		**1.1**		
1,2,3,7,8-PeCDD	ND		0.59	1	0
Total PeCDD	ND		1.9		0
1,2,3,4,7,8-HxCDD	ND		0.47	0.1	0
1,2,3,6,7,8-HxCDD	ND		1.1	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.3	0.1	0
Total HxCDD	**3.5**		**5.5**		
1,2,3,4,6,7,8-HpCDD	**8.4**		**5.5**	**0.01**	**0.084000**
Total HpCDD	**16**		**5.5**		
OCDD	**51**		**11**	**0.0001**	**0.005100**
2,3,7,8-TCDF	**3.4**	**CON**	**1.1**	**0.1**	**0.340000**
Total TCDF	**22**		**1.1**		
1,2,3,7,8-PeCDF	ND		1.6	0.05	0
2,3,4,7,8-PeCDF	ND		2.4	0.5	0
Total PeCDF	**34**		**5.5**		
1,2,3,4,7,8-HxCDF	ND		2.7	0.1	0
1,2,3,6,7,8-HxCDF	**2.8**	**J**	**5.5**	**0.1**	**0.280000**
2,3,4,6,7,8-HxCDF	**2.8**	**J**	**5.5**	**0.1**	**0.280000**
1,2,3,7,8,9-HxCDF	ND		0.37	0.1	0
Total HxCDF	**32**		**5.5**		
1,2,3,4,6,7,8-HpCDF	**4.7**	**J**	**5.5**	**0.01**	**0.047000**
1,2,3,4,7,8,9-HpCDF	ND		0.60	0.01	0
Total HpCDF	**7.9**		**5.5**		
OCDF	ND		4.6	0.0001	0
Total TEQ Concentration					**14.036100**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	83	40 - 135
13C-1,2,3,7,8-PeCDD	78	40 - 135
13C-1,2,3,6,7,8-HxCDD	75	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	87	40 - 135
13C-OCDD	84	40 - 135
13C-2,3,7,8-TCDF	80	40 - 135
13C-1,2,3,7,8-PeCDF	83	40 - 135
13C-1,2,3,4,7,8-HxCDF	69	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	75	40 - 135

RW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108333

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

DW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108334

Lot-Sample #...:	G2G240279 - 012	Work Order #...:	E48T81AC	Matrix....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/11/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	5.8

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**13**		**1.1**	**1**	**13.000000**
Total TCDD	**15**		**1.1**		
1,2,3,7,8-PeCDD	ND		0.78	1	0
Total PeCDD	ND		2.0		0
1,2,3,4,7,8-HxCDD	ND		0.57	0.1	0
1,2,3,6,7,8-HxCDD	ND		1.6	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.5	0.1	0
Total HxCDD	**11**		**5.3**		
1,2,3,4,6,7,8-HpCDD	**14**		**5.3**	**0.01**	**0.140000**
Total HpCDD	**27**		**5.3**		
OCDD	**94**		**11**	**0.0001**	**0.009400**
2,3,7,8-TCDF	**3.8**	**CON**	**1.1**	**0.1**	**0.380000**
Total TCDF	**28**		**1.1**		
1,2,3,7,8-PeCDF	ND		1.8	0.05	0
2,3,4,7,8-PeCDF	**2.8**	**J**	**5.3**	**0.5**	**1.400000**
Total PeCDF	**25**		**5.3**		
1,2,3,4,7,8-HxCDF	**2.8**	**J**	**5.3**	**0.1**	**0.280000**
1,2,3,6,7,8-HxCDF	ND		2.1	0.1	0
2,3,4,6,7,8-HxCDF	ND		2.3	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.20	0.1	0
Total HxCDF	**21**		**5.3**		
1,2,3,4,6,7,8-HpCDF	**7.1**		**5.3**	**0.01**	**0.071000**
1,2,3,4,7,8,9-HpCDF	ND		0.82	0.01	0
Total HpCDF	**12**		**5.3**		
OCDF	**8.4**	**J**	**11**	**0.0001**	**0.000840**
Total TEQ Concentration					**15.281240**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	96	40 - 135
13C-1,2,3,7,8-PeCDD	85	40 - 135
13C-1,2,3,6,7,8-HxCDD	87	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	95	40 - 135
13C-OCDD	89	40 - 135
13C-2,3,7,8-TCDF	88	40 - 135
13C-1,2,3,7,8-PeCDF	92	40 - 135
13C-1,2,3,4,7,8-HxCDF	78	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	87	40 - 135

gw 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108334

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

MW
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108335

Lot-Sample #...:	G2G240279 - 013	**Work Order #...:**	E48VH1AC	**Matrix....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/11/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	11

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**11**		**1.1**	**1**	**11.000000**
Total TCDD	**14**		**1.1**		
1,2,3,7,8-PeCDD	ND		0.65	1	0
Total PeCDD	ND		1.4		0
1,2,3,4,7,8-HxCDD	ND		0.36	0.1	0
1,2,3,6,7,8-HxCDD	ND		1.1	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.2	0.1	0
Total HxCDD	**4.2**		**5.6**		
1,2,3,4,6,7,8-HpCDD	**11**		**5.6**	**0.01**	**0.110000**
Total HpCDD	**23**		**5.6**		
OCDD	**81**		**11**	**0.0001**	**0.008100**
2,3,7,8-TCDF	**3.2**	**CON**	**1.1**	**0.1**	**0.320000**
Total TCDF	**19**		**1.1**		
1,2,3,7,8-PeCDF	ND		1.6	0.05	0
2,3,4,7,8-PeCDF	ND		2.0	0.5	0
Total PeCDF	**12**		**5.6**		
1,2,3,4,7,8-HxCDF	ND		2.4	0.1	0
1,2,3,6,7,8-HxCDF	ND		2.0	0.1	0
2,3,4,6,7,8-HxCDF	ND		2.1	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.18	0.1	0
Total HxCDF	**14**		**5.6**		
1,2,3,4,6,7,8-HpCDF	**6.2**		**5.6**	**0.01**	**0.062000**
1,2,3,4,7,8,9-HpCDF	ND		0.55	0.01	0
Total HpCDF	**9.9**		**5.6**		
OCDF	7.1	J	11	**0.0001**	**0.000710**
Total TEQ Concentration					**11.500810**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	83	40 - 135
13C-1,2,3,7,8-PeCDD	81	40 - 135
13C-1,2,3,6,7,8-HxCDD	78	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	94	40 - 135
13C-OCDD	93	40 - 135
13C-2,3,7,8-TCDF	82	40 - 135
13C-1,2,3,7,8-PeCDF	87	40 - 135
13C-1,2,3,4,7,8-HxCDF	70	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	92	40 - 135

gw 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108335

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et al., 1998).

CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.

MW
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108336

Lot-Sample #...:	G2G240279 - 014	Work Order #...:	E48VV1AC	Matrix....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/11/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	38

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	9500	D	16	1	9,500.000000
Total TCDD	9600		16		
1,2,3,7,8-PeCDD	22		8.1	1	22.000000
Total PeCDD	170		8.1		
1,2,3,4,7,8-HxCDD	26		8.1	0.1	2.600000
1,2,3,6,7,8-HxCDD	85		8.1	0.1	8.500000
1,2,3,7,8,9-HxCDD	77		8.1	0.1	7.700000
Total HxCDD	780		8.1		
1,2,3,4,6,7,8-HpCDD	1600		8.1	0.01	16.000000
Total HpCDD	3000		8.1		
OCDD	15000	D	160	0.0001	1.500000
2,3,7,8-TCDF	38	CON	1.6	0.1	3.800000
Total TCDF	400		1.6		
1,2,3,7,8-PeCDF	23		8.1	0.05	1.200000
2,3,4,7,8-PeCDF	46		8.1	0.5	23.000000
Total PeCDF	750		8.1		
1,2,3,4,7,8-HxCDF	79		8.1	0.1	7.900000
1,2,3,6,7,8-HxCDF	71		8.1	0.1	7.100000
2,3,4,6,7,8-HxCDF	57		8.1	0.1	5.700000
1,2,3,7,8,9-HxCDF	ND		2.2	0.1	0
Total HxCDF	1200		8.1		
1,2,3,4,6,7,8-HpCDF	460 J		8.1	0.01	4.600000
1,2,3,4,7,8,9-HpCDF	25		8.1	0.01	0.250000
Total HpCDF	1000		8.1		
OCDF	910 J	D	160	0.0001	0.091000
Total TEQ Concentration					9,611.941000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	62	40 - 135
13C-1,2,3,7,8-PeCDD	50	40 - 135
13C-1,2,3,6,7,8-HxCDD	52	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	58	40 - 135
13C-OCDD	45	40 - 135
13C-2,3,7,8-TCDF	54	40 - 135
13C-1,2,3,7,8-PeCDF	55	40 - 135
13C-1,2,3,4,7,8-HxCDF	50	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	52	40 - 135

MW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108336

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et al., 1998).

CON	Confirmation analysis.
D	Result was obtained from the analysis of a dilution.

lw
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108337

Lot-Sample #...:	G2G240279 - 015	Work Order #...:	E48WG1AC	Matrix....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/11/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	52

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	8400	D	53	1	8,400.000000
Total TCDD	8600		53		
1,2,3,7,8-PeCDD	24		11	1	24.000000
Total PeCDD	91		11		
1,2,3,4,7,8-HxCDD	29		11	0.1	2.900000
1,2,3,6,7,8-HxCDD	150		11	0.1	15.000000
1,2,3,7,8,9-HxCDD	110		11	0.1	11.000000
Total HxCDD	1000		11		
1,2,3,4,6,7,8-HpCDD	3200		11	0.01	32.000000
Total HpCDD	5800		11		
OCDD	29000	D	530	0.0001	2.900000
2,3,7,8-TCDF	38	CON	2.1	0.1	3.800000
Total TCDF	300		2.1		
1,2,3,7,8-PeCDF	16		11	0.05	0.800000
2,3,4,7,8-PeCDF	57		11	0.5	28.000000
Total PeCDF	510		11		
1,2,3,4,7,8-HxCDF	120		11	0.1	12.000000
1,2,3,6,7,8-HxCDF	65		11	0.1	6.500000
2,3,4,6,7,8-HxCDF	28		11	0.1	2.800000
1,2,3,7,8,9-HxCDF	ND		1.9	0.1	0
Total HxCDF	1100		11		
1,2,3,4,6,7,8-HpCDF	310		11	0.01	3.100000
1,2,3,4,7,8,9-HpCDF	41		11	0.01	0.410000
Total HpCDF	1100		11		
OCDF	1100	D	530	0.0001	0.110000
Total TEQ Concentration					8,545.320000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	81	40 - 135
13C-1,2,3,7,8-PeCDD	70	40 - 135
13C-1,2,3,6,7,8-HxCDD	72	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	72	40 - 135
13C-OCDD	69	40 - 135
13C-2,3,7,8-TCDF	70	40 - 135
13C-1,2,3,7,8-PeCDF	75	40 - 135
13C-1,2,3,4,7,8-HxCDF	71	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	68	40 - 135

lw 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108337

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
D	Result was obtained from the analysis of a dilution.

9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108338

Lot-Sample #...:	G2G240279 - 016	Work Order #...:	E48WH1AC	Matrix....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/11/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	79

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	40000 J ~~DE~~		47	1	40,000.000000
Total TCDD	40000		47		
1,2,3,7,8-PeCDD	29		23	1	29.000000
Total PeCDD	110		23		
1,2,3,4,7,8-HxCDD	34		23	0.1	3.400000
1,2,3,6,7,8-HxCDD	120		23	0.1	12.000000
1,2,3,7,8,9-HxCDD	87		23	0.1	8.700000
Total HxCDD	790		23		
1,2,3,4,6,7,8-HpCDD	2100		23	0.01	21.000000
Total HpCDD	3700		23		
OCDD	15000		47	0.0001	1.500000
2,3,7,8-TCDF	56	CON	4.7	0.1	5.600000
Total TCDF	970		4.7		
1,2,3,7,8-PeCDF	23		23	0.05	1.200000
2,3,4,7,8-PeCDF	54		23	0.5	27.000000
Total PeCDF	1200		23		
1,2,3,4,7,8-HxCDF	58		23	0.1	5.800000
1,2,3,6,7,8-HxCDF	56		23	0.1	5.600000
2,3,4,6,7,8-HxCDF	28		23	0.1	2.800000
1,2,3,7,8,9-HxCDF	ND		2.0	0.1	0
Total HxCDF	1800		23		
1,2,3,4,6,7,8-HpCDF	340		23	0.01	3.400000
1,2,3,4,7,8,9-HpCDF	27		23	0.01	0.270000
Total HpCDF	920		23		
OCDF	980		47	0.0001	0.098000
Total TEQ Concentration					40,127.368000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	81	40 - 135
13C-1,2,3,7,8-PeCDD	76	40 - 135
13C-1,2,3,6,7,8-HxCDD	82	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	70	40 - 135
13C-OCDD	64	40 - 135
13C-2,3,7,8-TCDF	76	40 - 135
13C-1,2,3,7,8-PeCDF	77	40 - 135
13C-1,2,3,4,7,8-HxCDF	84	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	65	40 - 135

LW
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108338

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
D	Result was obtained from the analysis of a dilution.
E	Estimated result. Result concentration exceeds the calibration range.

MW
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108339

Lot-Sample #...:	G2G240279 - 017	Work Order #...:	E48WM1AC	Matrix....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/11/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	37

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	8600 J	~~E D~~	16	1	8,600.000000
Total TCDD	8800		16		
1,2,3,7,8-PeCDD	21		7.9	1	21.000000
Total PeCDD	110		7.9		
1,2,3,4,7,8-HxCDD	23		7.9	0.1	2.300000
1,2,3,6,7,8-HxCDD	72		7.9	0.1	7.200000
1,2,3,7,8,9-HxCDD	66		7.9	0.1	6.600000
Total HxCDD	650		7.9		
1,2,3,4,6,7,8-HpCDD	1300		7.9	0.01	13.000000
Total HpCDD	2300		7.9		
OCDD	11000	D	160	0.0001	1.100000
2,3,7,8-TCDF	36	CON	1.6	0.1	3.600000
Total TCDF	730		1.6		
1,2,3,7,8-PeCDF	20		7.9	0.05	1.000000
2,3,4,7,8-PeCDF	51		7.9	0.5	26.000000
Total PeCDF	1000		7.9		
1,2,3,4,7,8-HxCDF	77		7.9	0.1	7.700000
1,2,3,6,7,8-HxCDF	51		7.9	0.1	5.100000
2,3,4,6,7,8-HxCDF	28		7.9	0.1	2.800000
1,2,3,7,8,9-HxCDF	ND		1.3	0.1	0
Total HxCDF	1300		7.9		
1,2,3,4,6,7,8-HpCDF	180		7.9	0.01	1.800000
1,2,3,4,7,8,9-HpCDF	22		7.9	0.01	0.220000
Total HpCDF	450		7.9		
OCDF	430	D	160	0.0001	0.043000
Total TEQ Concentration					8,699.463000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	61	40 - 135
13C-1,2,3,7,8-PeCDD	54	40 - 135
13C-1,2,3,6,7,8-HxCDD	57	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	51	40 - 135
13C-OCDD	44	40 - 135
13C-2,3,7,8-TCDF	53	40 - 135
13C-1,2,3,7,8-PeCDF	54	40 - 135
13C-1,2,3,4,7,8-HxCDF	68	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	45	40 - 135

MW
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108339

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
D	Result was obtained from the analysis of a dilution.
E	Estimated result. Result concentration exceeds the calibration range.

MW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108340

Lot-Sample #...:	G2G240279 - 018	Work Order #...:	E48WV1AC	Matrix.....:	SOLID
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/11/02	Units.....:	pg/g
Prep Batch #...:	2212455	Dilution Factor:	1	% Moisture:	53

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	800		2.1	1	800.000000
Total TCDD	910		2.1		
1,2,3,7,8-PeCDD	24		11	1	24.000000
Total PeCDD	180		11		
1,2,3,4,7,8-HxCDD	35		11	0.1	3.500000
1,2,3,6,7,8-HxCDD	110		11	0.1	11.000000
1,2,3,7,8,9-HxCDD	62		11	0.1	6.200000
Total HxCDD	1000		11		
1,2,3,4,6,7,8-HpCDD	3200		11	0.01	32.000000
Total HpCDD	6300		11		
OCDD	35000	D	530	0.0001	3.500000
2,3,7,8-TCDF	59	CON	2.1	0.1	5.900000
Total TCDF	340		2.1		
1,2,3,7,8-PeCDF	25		11	0.05	1.200000
2,3,4,7,8-PeCDF	48		11	0.5	24.000000
Total PeCDF	720		11		
1,2,3,4,7,8-HxCDF	120		11	0.1	12.000000
1,2,3,6,7,8-HxCDF	100		11	0.1	10.000000
2,3,4,6,7,8-HxCDF	53		11	0.1	5.300000
1,2,3,7,8,9-HxCDF	ND		2.4	0.1	0
Total HxCDF	1200		11		
1,2,3,4,6,7,8-HpCDF	460		11	0.01	4.600000
1,2,3,4,7,8,9-HpCDF	46		11	0.01	0.460000
Total HpCDF	1300		11		
OCDF	1300	D	530	0.0001	0.130000
Total TEQ Concentration					943.790000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	71	40 - 135
13C-1,2,3,7,8-PeCDD	68	40 - 135
13C-1,2,3,6,7,8-HxCDD	65	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	67	40 - 135
13C-OCDD	51	40 - 135
13C-2,3,7,8-TCDF	64	40 - 135
13C-1,2,3,7,8-PeCDF	70	40 - 135
13C-1,2,3,4,7,8-HxCDF	60	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	58	40 - 135

QLW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108340

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et al., 1998).

CON	Confirmation analysis.
D	Result was obtained from the analysis of a dilution.

JW 9/13/02

TABLE 3
SUMMARY OF PERFORMANCE EVALUATION SAMPLE RESULTS
ADDITIONAL SAMPLING - DIOXIN DELINEATION
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

		AQUEOUS		SOLID			
		PE Standard	PE Sample Result	PE Standard	PE Sample Result	PE Sample Result	Range of Expected Values[1]
	Location ID	CMS-DEL-PEAQ	CMS-DEL-PEAQ	NA	CMS-DEL-PES1	CMS-DEL-PES2	NA
	Sample ID	2108401	2108401	NA	2108402	2108342	NA
	Sample Date	NA	NA	NA	NA	NA	NA
	Sample Time	NA	NA	NA	NA	NA	NA
	Sample Depth	NA	N/A	NA	N/A	N/A	N/A
	Laboratory	CIL	STL	CIL	STL	STL	CIL
	Lot Number	34761-95	G2G190281	MAR-21985-85-A	G2G230229	G2G240279	MAR-21985-85-A
	Lab. Number	NA	013	EDF-2513	021	020	EDF-2513
	Date Dioxins/Furans Analyzed	NA	07/27/2002	NA	08/08/2002	08/11/2002	NA
Constituent	TEF	pg/L	pg/L	pg/g	pg/g	pg/g	pg/g
2,3,7,8-TCDD	1.000	**15000**	**8100 E**	**500**	**500 E**	**470 E**	**260 - 670**
Total TCDD	-	ND	**8100**	ND	**500**	**470**	-
1,2,3,7,8-PeCDD	1.000	ND	<12	**1000**	**1100**	**940**	**560 - 1370**
Total PeCDD	-	ND	<12	ND	**1100**	**940**	-
1,2,3,4,7,8-HxCDD	0.100	**6000**	**2400**	**1000**	**840**	**810**	**500 - 1290**
1,2,3,6,7,8-HxCDD	0.100	**15000**	**8100**	**1000**	**1000**	**940**	**520 - 1210**
1,2,3,7,8,9-HxCDD	0.100	ND	<42	**1000**	**1000**	**1000**	**460 - 1330**
Total HxCDD	-	ND	**11000**	ND	**2900**	**2800**	-
1,2,3,4,6,7,8-HpCDD	0.010	**20000**	**8700**	**1500**	**1500**	**1300**	**710 - 2070**
Total HpCDD	-	ND	**8700**	ND	**1500**	**1400**	-
OCDD	0.0001	**30000**	**12000**	**2500**	**4100 E**	**3500 D**	**1980 - 5030**
2,3,7,8-TCDF	0.100	**7000**	**4600 CON E**	**500**	**440 CON E**	**450 CON E**	**260 - 640**
Total TCDF	-	ND	**4800**	ND	**500**	**450**	-
1,2,3,7,8-PeCDF	0.050	**5000**	**3000**	**1000**	**1100**	**920**	**590 - 1150**
2,3,4,7,8-PeCDF	0.500	ND	<3.2	**1000**	**950**	**820**	**410 - 1310**
Total PeCDF	-	ND	**3000**	ND	**2000**	**1800**	-
1,2,3,4,7,8-HxCDF	0.100	ND	<13	**1000**	**1100**	**940**	**530 - 1230**
1,2,3,6,7,8-HxCDF	0.100	ND	<14	**1000**	**1200**	**1100**	**340 - 1560**
2,3,4,6,7,8-HxCDF	0.100	ND	<27	**1000**	**1200**	**1200**	**480 - 1350**
1,2,3,7,8,9-HxCDF	0.100	ND	<3.7	**1000**	**1200**	**1200**	**390 - 1260**
Total HxCDF	-	ND	**27**	ND	**4600**	**4500**	-
1,2,3,4,6,7,8-HpCDF	0.010	**10000**	**5000**	**1500**	**1500**	**1200**	**520 - 2010**
1,2,3,4,7,8,9-HpCDF	0.010	ND	<3.4	**1500**	**1500**	**1200**	**250 - 1980**
Total HpCDF	-	ND	**5000**	ND	**3000**	**2400**	-
OCDF	0.0001	ND	<4.3	**2500**	**3000**	**2000**	**1170 - 3330**

TABLE 3 (continued)
SUMMARY OF PERFORMANCE EVALUATION SAMPLE RESULTS
ADDITIONAL SAMPLING - DIOXIN DELINEATION
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Notes to Table 3

Laboratory results of samples analyzed by STL using USEPA Method 8290
pg/g = picograms per gram = parts per trillion (ppt)
pg/L = picograms per liter = parts per trillion (ppt)
D = Result was obtained from the analysis of a dilution
E = Estimated result; result concentration exceeds the calibration range
CON = Confirmation analysis
NA = Not applicable
ND = Not determined
STL = Severn Trent Laboratories, Inc. - Sacramento
PE = Performance Evaluation
Results have been adjusted for dry weight; the solid performance evaluation sample, as prepared, is dry
TEF = Toxic Equivalency Factor provided by World Health Organization (WHO) (7/23/99).
TEQ = Toxic Equivalents
[1] These values represent the upper and lower 95% tolerance limits which indicate the range of results that 95% of the laboratories should obtain 95^% of the time for a single sample analysis.
CIL = Cambridge Isotope Laboratories

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108342 PE

Lot-Sample #...:	G2G240279 - 020	**Work Order #...:**	E48XA1AC	**Matrix....:**	SOLID
Date Sampled...:	07/22/02	**Date Received..:**	07/24/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/11/02	**Units.....:**	pg/g
Prep Batch #...:	2212455	**Dilution Factor:**	1	**% Moisture:**	0.0

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	470	E	1.0	1	470.000000
Total TCDD	470		1.0		
1,2,3,7,8-PeCDD	940		5.0	1	940.000000
Total PeCDD	940		5.0		
1,2,3,4,7,8-HxCDD	810		5.0	0.1	81.000000
1,2,3,6,7,8-HxCDD	940		5.0	0.1	94.000000
1,2,3,7,8,9-HxCDD	1000		5.0	0.1	100.000000
Total HxCDD	2800		5.0		
1,2,3,4,6,7,8-HpCDD	1300		5.0	0.01	13.000000
Total HpCDD	1400		5.0		
OCDD	3500	D	200	0.0001	0.350000
2,3,7,8-TCDF	440	CON E	1.0	0.1	44.000000
Total TCDF	450		1.0		
1,2,3,7,8-PeCDF	920		5.0	0.05	46.000000
2,3,4,7,8-PeCDF	820		5.0	0.5	410.000000
Total PeCDF	1800		5.0		
1,2,3,4,7,8-HxCDF	940		5.0	0.1	94.000000
1,2,3,6,7,8-HxCDF	1100		5.0	0.1	110.000000
2,3,4,6,7,8-HxCDF	1200		5.0	0.1	120.000000
1,2,3,7,8,9-HxCDF	1200		5.0	0.1	120.000000
Total HxCDF	4500		5.0		
1,2,3,4,6,7,8-HpCDF	1200		5.0	0.01	12.000000
1,2,3,4,7,8,9-HpCDF	1200		5.0	0.01	12.000000
Total HpCDF	2400		5.0		
OCDF	2000		10	0.0001	0.200000
Total TEQ Concentration					2,666.550000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	84	40 - 135
13C-1,2,3,7,8-PeCDD	89	40 - 135
13C-1,2,3,6,7,8-HxCDD	77	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	95	40 - 135
13C-OCDD	94	40 - 135
13C-2,3,7,8-TCDF	83	40 - 135
13C-1,2,3,7,8-PeCDF	97	40 - 135
13C-1,2,3,4,7,8-HxCDF	65	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	84	40 - 135

LW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108342 PE

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et aL, 1998).

CON	Confirmation analysis.
D	Result was obtained from the analysis of a dilution.
E	Estimated result. Result concentration exceeds the calibration range.

MW 9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108323

Lot-Sample #...:	G2G240279 - 007	Work Order #...:	E48TE1AA	Matrix....:	WATER
Date Sampled...:	07/22/02	Date Received..:	07/24/02	Instrument:	8D5
Prep Date.....:	07/26/02	Analysis Date..:	08/01/02	Units.....:	pg/L
Prep Batch #...:	2207466	Dilution Factor:	1	% Moisture:	

PARAMETER	RESULT	DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	ND	0.29	1	0
Total TCDD	ND	0.44		0
1,2,3,7,8-PeCDD	ND	0.45	1	0
Total PeCDD	ND	0.64		0
1,2,3,4,7,8-HxCDD	ND	0.35	0.1	0
1,2,3,6,7,8-HxCDD	ND	0.39	0.1	0
1,2,3,7,8,9-HxCDD	ND	0.33	0.1	0
Total HxCDD	ND	1.3		0
1,2,3,4,6,7,8-HpCDD	ND	1.1	0.01	0
Total HpCDD	ND	1.1		0
OCDD	ND	6.6	0.0001	0
2,3,7,8-TCDF	ND	0.30	0.1	0
Total TCDF	ND	0.30		0
1,2,3,7,8-PeCDF	ND	0.29	0.05	0
2,3,4,7,8-PeCDF	ND	0.29	0.5	0
Total PeCDF	ND	0.38		0
1,2,3,4,7,8-HxCDF	ND	0.68	0.1	0
1,2,3,6,7,8-HxCDF	ND	0.32	0.1	0
2,3,4,6,7,8-HxCDF	ND	0.33	0.1	0
1,2,3,7,8,9-HxCDF	ND	0.34	0.1	0
Total HxCDF	ND	0.68		0
1,2,3,4,6,7,8-HpCDF	ND	0.62	0.01	0
1,2,3,4,7,8,9-HpCDF	ND	0.24	0.01	0
Total HpCDF	ND	0.62		0
OCDF	ND	2.7	0.0001	0
Total TEQ Concentration				0

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	92	40 - 135
13C-1,2,3,7,8-PeCDD	79	40 - 135
13C-1,2,3,6,7,8-HxCDD	94	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	77	40 - 135
13C-OCDD	81	40 - 135
13C-2,3,7,8-TCDF	88	40 - 135
13C-1,2,3,7,8-PeCDF	74	40 - 135
13C-1,2,3,4,7,8-HxCDF	85	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	81	40 - 135

PLW
9/13/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108323

Notes:

WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997 (Van den Berg et al., 1998).

JW 9/13/02