Superfund Records Center
SITE: Centredale
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OTHER: 35801

ENVIRONMENTAL
Data Services, Inc.

DIOXIN DATA VALIDATION REPORT
USEPA REGION I - TIER III

SDG No.: G2G230229
Laboratory: Severn Trent Laboratories, Inc., West Sacramento, CA
Site: Centredale Manor
Date: September 10, 2002
Samples:
Dioxin: 16/Soil/2108303, 2108304, 2108305, 2108306, 2108307, 2108308, 2108310, 2108311, 2108313, 2108315, 2108316, 2108318, 2108319, 2108320, 2108321, 2108322
1/PE Soil/2108402
1/Aqueous/2108309

A Tier III validation was performed on the dioxin/furan analytical data for sixteen 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 35801

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* = 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:

- 2378-TCDD and Total TCDD have been qualified as (EB) in all soil samples due to equipment blank contamination.
- 1234678-HpCDF has been qualified (J) in sample 2108303 due to a low MSD recovery.
- OCDD has been qualified as estimated (J) in sample 2108306 due to a low internal standard recovery.
- 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).

Blanks

The contamination detected in the blanks which resulted in qualification are summarized in the following section:

Blank	Date Extracted	Compound	Conc. pg/L	Action Level pg/g
2108309	07/26/02	2378-TCDD Total TCDD	12 12	None

- 2378-TCDD and Total TCDD have been qualified as (EB) in all soil samples.

Matrix Spike Analysis

MS/MSD Sample ID: 2108303

Compound	MS %R	MSD %R	RPD	Action
1234678-HpCDD	Ok	52%	Ok	J/UJ

- 1234678-HpCDF has been qualified (J) in sample 2108303.

Internal/Clean-up/Recovery Standards

Sample	Internal Standard	%R	Action
2108306	$^{13}C_{12}$-OCDD	35%	J/UJ

- OCDD has been qualified as estimated (J) in sample 2108306.

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 laboratory case narrative states that the instrument detector was not saturated. Some results were reported from the dilution analysis and no actions were required for these results.
- The samples were received at 0°C but were not frozen.
- Sample 2108313 was received broken and transferred to a new container upon receipt.
- 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

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 Mano
Reference Number: —

DIOXIN DATA REVIEW WORKSHEET
(LOW or HIGH RESOLUTION)

The following data package has been validated:

Lab Name: Severn Trent, West Sacramento, CA
DAS/Project No. Centredale Manor
SDG No. G2G230229
No. of Samples/Matrix 17 Soil/Water

Tech. Spec./Method No. SW846 8290-High Res. Dioxin/F
Sampling Date(s) 7/19/02
Shipping Date(s) 7/22/02
Date(s) Rec'd by Lab 7/23/02

Traffic Report Sample Nos. 2108303, 2108304, 2108305, 2108306, 2108307, 2108308, 2108310, 2108311, 2108313, 2108315, 2108316, 2108318, 2108319, 2108320, 2108321, 2108322, 2108402, 2108309
Equipment Blank Nos. 2108309
Field Duplicate Nos. 2108321 / 2108322
PES Nos. 2108402 - 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: 9/10/02

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: Several samples exhibited analytes which exceeded the linear range of the instrument and were flagged (E) by the laboratory. The reviewer further qualified these results as estimated (J). The laboratory case narrative states that the instrument detector was not saturated. Some results were reported from the dilution analysis. No action required for these results. The samples were received at zero degrees Celsius but were not frozen. Sample 2108313 was received broken and transferred to a new container upon receipt.

Reviewer: Nancy Weaver

Date: 9/10/02

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

II. PRESERVATION AND HOLDING TIMES

Sampler: JS Company: Loureiro Engineering 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
	2108303	Soil	N	7/19/02	7/31/02	8/7/02	None
	2108304				"	"	
	2108305						
	2108306						
	2108307						
	2108308						
	2108310						
	2108311						
	2108313						
	2108315						
	2108316						
	2108318						
	2108319						
	2108320						
	2108321						
	2108322					8/9/02	
1E	2108402					8/8/02	
EP	2108309	Water			7/26/02	8/1/02	

Validator: Nancy Weaver

Date: 9/10/02

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

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

SDG No G2G230229 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
E5NQJIAC	—	LCS	Soil	All analytes	All %Rok	(60-140)	—	All Soil Samples	None
E5E421AC	—	LCS	Water	all analytes	%Rok	(60-140)	—	All water Samples	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: Dana Weaver

Date: 9/10/02

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
8/9/02 8/10/02	06AU02102	all analytes	all ok	all pass	all pass	S →	→	all Samples	None
8/6/02	06AU02605	all analytes	all pass	all pass	all pass	→	→	all Samples	None
8/8/02	08AU02B6D5	↓	↓	↓	↓	↓	↓	↓	↓
8/5/02	05AU02A8D5	↓	↓	↓	↓	↓	↓	↓	↓
8/20/02	20AU02A7D5	↓	↓	↓	↓	↓	↓	↓	↓
8/8/02	07AU026D5	↓	↓	↓	↓	↓	↓	↓	↓
8/1/02	14MY028D5	↓	↓	↓	↓	↓	↓	↓	↓
8/5/02	05AU028D5	↓	↓	↓	↓	↓	↓	↓	↓

Comments: all criteria were met

Validator: [illegible]

Date: 9/10/02

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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
8/6/02	09AU02102	all analytes	all pass	all	all	all	all	all samples	None
8/7/02	06AU026D5			pass	pass	pass	pass		
8/8/02	08AU028D5								
8/9/02	09AU028D5								
8/2/02	20AU027D5								
8/1/02	31JL028D5								

Comments: all criteria were met.

Validator: LuLeaver

Date: 9/10/02

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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: DWeaver Date: 9/6/02

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 [X] No [ ]

List the blank contamination below.

Sampler: JS Company: Loureiro Engineering 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	8/7/02	Soil	E5NQJ1AA	HRGC/HRMS	all non-detect	—
7/26/02	8/1/02	Water	E5E421AA	" "	all non-detect	—

2. Field: Equipment (Rinsate) Blanks

Date Extracted	Date Analyzed	Matrix	Sample No. (Blank Type)	Instrument	Compound	Conc. (units)
7/26/02	8/1/02	AQ	2108309	HRGC/HRMS	2378 TCDD	12 pg/L
"			(pg/L) water		Total TCDD	12 "
			ER			

see next page

Validator: [signature] Date: 9/10/02

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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
2378 TCDD	EB	7/26/02 ext	12 pg/L	None (indicates presence)	all soil samples	EB
Total TCDD	EB	7/26/02	12 pg/L	None (indicates presence only)	all soil samples	EB

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: Nancy Weaver

Date: 9/10/02

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. 2108303 (G2G230229-001)

Compound	MS % Rec	MSD % Rec	RPD	Method QC Limits		Concentration			%RSD	Action
				% Rec	RPD	Unspiked Sample	MS	MSD		
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	ok	52*	ok	(60-140)	(0-30)					(J/UJ)
1234789-HpCDF										
OCDD										
OCDF										

Default Limits: % Recovery (50-150%), RPD (50%) *outside 60-140 QC limits

ACTIONS:

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

Validator: Nancy Weaver Date: 9/10/02

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: 2108321 DUPLICATE ID: 2108322

Compound	Sample Conc. pg/g	Sample EDL		Duplicate Conc. pg/g	Duplicate EDL		%RPD	Action
		EDL	2xEDL		EDL	2xEDL		
2378-TCDD								
2378-TCDF	5.3			4.4			19	None
12378-PeCDF								
12378-PeCDD								
23478-PeCDF	4.9J			ND			NC	None
123478-HxCDF	7.6J			4.5J			↓	↓
123678-HxCDF	6.7J			4.9J				
123478-HxCDD								
123678-HxCDD	12			9.2			26	None
123789-HxCDD	11			7.1J			NC	None
234678-HxCDF	6.6J			5.4J			NC	None
123789-HxCDF								
1234678-HpCDF	47			50			6	None
1234678-HpCDD	240			200			18	"
1234789-HpCDF	4.2J			ND			NC	None
OCDD	1800			1600			12	None
OCDF	97			92			5	None

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.

Validator: [signature] Date: 9/10/02

Region I
Data Review Worksheets - (High Resolution)

Xb. INTERNAL STANDARD RECOVERY

Recovery Acceptance Criteria per Table 10 in Dioxin Validation SOP:

Sample Nos.	2108306											
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												
$^{13}C_{12}$-123678-HxCDF												
$^{13}C_{12}$-123789-HxCDF												
$^{13}C_{12}$-234678-HxCDF												
$^{13}C_{12}$-1234678-HpCDD												
$^{13}C_{12}$-1234678-HpCDF												
$^{13}C_{12}$-1234789-HpCDF												
$^{13}C_{12}$-OCDD	35 %	all pass	(40-135)	(J/UJ)								
$^{37}Cl_4$-2378-TCDD												

Validator: Nancy Weaver

Date: 9/10/02

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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						
^{13}C-2378-TCDD						
^{13}C-2378-TCDF						
^{13}C-12378-PeCDD						
^{13}C-12378-PeCDF						
^{13}C-123478-HxCDD						
^{13}C-123678-HxCDD						
^{13}C-123478-HxCDF						
^{13}C-123678-HxCDF						
^{13}C-123789-HxCDF						
^{13}C-234678-HxCDF						
^{13}C-1234678-HpCDD						
^{13}C-1234678-HpCDF						
^{13}C-1234789-HpCDF						
^{13}C-OCDD						
^{37}Cl-2378-TCDD						
RECOVERY STANDARDS						
^{13}C-1234-TCDD						
^{13}C-123789-HxCDD						

PASS

Validator: Nancy Weaver

Date: 9/10/02

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XII. SAMPLE CALCULATION

2108305 (G2G230229-003)

$$(2378\text{-PeCDF} = \frac{137261000 \times 2000}{1167692000 \times 1.13 \times 10 \times 0.74} = 28\ pg/g$$

$$2378\text{-TCDD} = \frac{1498646000 \times 2000}{1029241000 \times 1.15 \times 10 \times 0.74} = 342$$

≈340p

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

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

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

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 Weaver

Date: 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108303

Lot-Sample #...:	G2G230229 - 001	Work Order #...:	E46PF1AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	10

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**4.5** EB			**1**	**4.500000**
Total TCDD	**11** EB				
1,2,3,7,8-PeCDD	ND		1.2	1	0
Total PeCDD	ND		3.9		0
1,2,3,4,7,8-HxCDD	ND		1.1	0.1	0
1,2,3,6,7,8-HxCDD	**4.8**	J		**0.1**	**0.480000**
1,2,3,7,8,9-HxCDD	**4.0**	J		**0.1**	**0.400000**
Total HxCDD	**34**				
1,2,3,4,6,7,8-HpCDD	**110** J			**0.01**	**1.100000**
Total HpCDD	**230**				
OCDD	**1600**			**0.0001**	**0.160000**
2,3,7,8-TCDF	**3.7**	CON		**0.1**	**0.370000**
Total TCDF	**62**				
1,2,3,7,8-PeCDF	**2.8**	J		**0.05**	**0.140000**
2,3,4,7,8-PeCDF	**4.8**	J		**0.5**	**2.400000**
Total PeCDF	**120**				
1,2,3,4,7,8-HxCDF	**4.4**	J		**0.1**	**0.440000**
1,2,3,6,7,8-HxCDF	**6.5**			**0.1**	**0.650000**
2,3,4,6,7,8-HxCDF	**5.7**			**0.1**	**0.570000**
1,2,3,7,8,9-HxCDF	ND		0.28	0.1	0
Total HxCDF	**100**				
1,2,3,4,6,7,8-HpCDF	**34**			**0.01**	**0.340000**
1,2,3,4,7,8,9-HpCDF	ND		1.9	0.01	0
Total HpCDF	**68**				
OCDF	**41**			**0.0001**	**0.004100**
Total TEQ Concentration					**11.554100**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	69	40 - 135
13C-1,2,3,7,8-PeCDD	63	40 - 135
13C-1,2,3,6,7,8-HxCDD	63	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	64	40 - 135
13C-OCDD	60	40 - 135
13C-2,3,7,8-TCDF	64	40 - 135
13C-1,2,3,7,8-PeCDF	66	40 - 135
13C-1,2,3,4,7,8-HxCDF	54	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	62	40 - 135

lew 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108303

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 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108304

Lot-Sample #...:	G2G230229 - 002	Work Order #...:	E46PJ1AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	26

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	61 EB			1	61.000000
Total TCDD	160 EB				
1,2,3,7,8-PeCDD	7.0			1	7.000000
Total PeCDD	75				
1,2,3,4,7,8-HxCDD	5.8	J		0.1	0.580000
1,2,3,6,7,8-HxCDD	23			0.1	2.300000
1,2,3,7,8,9-HxCDD	15			0.1	1.500000
Total HxCDD	220				
1,2,3,4,6,7,8-HpCDD	340			0.01	3.400000
Total HpCDD	600				
OCDD	1400			0.0001	0.140000
2,3,7,8-TCDF	18	CON		0.1	1.800000
Total TCDF	360				
1,2,3,7,8-PeCDF	15			0.05	0.750000
2,3,4,7,8-PeCDF	22			0.5	11.000000
Total PeCDF	360				
1,2,3,4,7,8-HxCDF	25			0.1	2.500000
1,2,3,6,7,8-HxCDF	23			0.1	2.300000
2,3,4,6,7,8-HxCDF	21			0.1	2.100000
1,2,3,7,8,9-HxCDF	ND		1.1	0.1	0
Total HxCDF	250				
1,2,3,4,6,7,8-HpCDF	110			0.01	1.100000
1,2,3,4,7,8,9-HpCDF	7.7			0.01	0.077000
Total HpCDF	190				
OCDF	93			0.0001	0.009300
Total TEQ Concentration					97.556300

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	74	40 - 135
13C-1,2,3,7,8-PeCDD	69	40 - 135
13C-1,2,3,6,7,8-HxCDD	79	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	74	40 - 135
13C-OCDD	68	40 - 135
13C-2,3,7,8-TCDF	63	40 - 135
13C-1,2,3,7,8-PeCDF	69	40 - 135
13C-1,2,3,4,7,8-HxCDF	71	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	78	40 - 135

LW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108304

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 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108305

Lot-Sample #...:	G2G230229 - 003	Work Order #...:	E46PK1AC	Matrix.....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	26

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	340 EB			1	340.000000
Total TCDD	470 EB				
1,2,3,7,8-PeCDD	14			1	14.000000
Total PeCDD	150				
1,2,3,4,7,8-HxCDD	11			0.1	1.100000
1,2,3,6,7,8-HxCDD	43			0.1	4.300000
1,2,3,7,8,9-HxCDD	30			0.1	3.000000
Total HxCDD	390				
1,2,3,4,6,7,8-HpCDD	510			0.01	5.100000
Total HpCDD	890				
OCDD	2100			0.0001	0.210000
2,3,7,8-TCDF	39	CON		0.1	3.900000
Total TCDF	540				
1,2,3,7,8-PeCDF	28			0.05	1.400000
2,3,4,7,8-PeCDF	40			0.5	20.000000
Total PeCDF	550				
1,2,3,4,7,8-HxCDF	39			0.1	3.900000
1,2,3,6,7,8-HxCDF	38			0.1	3.800000
2,3,4,6,7,8-HxCDF	37			0.1	3.700000
1,2,3,7,8,9-HxCDF	ND		2.0	0.1	0
Total HxCDF	450				
1,2,3,4,6,7,8-HpCDF	150			0.01	1.500000
1,2,3,4,7,8,9-HpCDF	12			0.01	0.120000
Total HpCDF	260				
OCDF	110			0.0001	0.011000
Total TEQ Concentration					406.041000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	57	40 - 135
13C-1,2,3,7,8-PeCDD	52	40 - 135
13C-1,2,3,6,7,8-HxCDD	57	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	56	40 - 135
13C-OCDD	53	40 - 135
13C-2,3,7,8-TCDF	48	40 - 135
13C-1,2,3,7,8-PeCDF	53	40 - 135
13C-1,2,3,4,7,8-HxCDF	51	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	58	40 - 135

MW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108305

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.

lew 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108306

Lot-Sample #...:	G2G230229 - 004	Work Order #...:	E46PL1AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	34

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	370 EB			1	370.000000
Total TCDD	440 EB				
1,2,3,7,8-PeCDD	6.8	J		1	6.800000
Total PeCDD	61				
1,2,3,4,7,8-HxCDD	9.4			0.1	0.940000
1,2,3,6,7,8-HxCDD	23			0.1	2.300000
1,2,3,7,8,9-HxCDD	14			0.1	1.400000
Total HxCDD	210				
1,2,3,4,6,7,8-HpCDD	390			0.01	3.900000
Total HpCDD	740				
OCDD	2000 J			0.0001	0.200000
2,3,7,8-TCDF	22	CON		0.1	2.200000
Total TCDF	410				
1,2,3,7,8-PeCDF	19			0.05	0.950000
2,3,4,7,8-PeCDF	39			0.5	20.000000
Total PeCDF	480				
1,2,3,4,7,8-HxCDF	74			0.1	7.400000
1,2,3,6,7,8-HxCDF	53			0.1	5.300000
2,3,4,6,7,8-HxCDF	62			0.1	6.200000
1,2,3,7,8,9-HxCDF	ND		2.4	0.1	0
Total HxCDF	530				
1,2,3,4,6,7,8-HpCDF	380			0.01	3.800000
1,2,3,4,7,8,9-HpCDF	43			0.01	0.430000
Total HpCDF	620				
OCDF	310			0.0001	0.031000
Total TEQ Concentration					431.851000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	60	40 - 135
13C-1,2,3,7,8-PeCDD	54	40 - 135
13C-1,2,3,6,7,8-HxCDD	54	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	48	40 - 135
13C-OCDD	35 *	40 - 135
13C-2,3,7,8-TCDF	53	40 - 135
13C-1,2,3,7,8-PeCDF	58	40 - 135
13C-1,2,3,4,7,8-HxCDF	50	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	43	40 - 135

lw
9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108306

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.

lw 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108307

Lot-Sample #...:	G2G230229 - 005	**Work Order #...:**	E46PM1AC	**Matrix....:**	SOLID
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/07/02	**Units.....:**	pg/g
Prep Batch #...:	2212453	**Dilution Factor:**	1	**% Moisture:**	14

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**9.6** EB			**1**	**9.600000**
Total TCDD	**18** EB				
1,2,3,7,8-PeCDD	ND		1.2	1	0
Total PeCDD	ND		4.2		0
1,2,3,4,7,8-HxCDD	ND		1.2	0.1	0
1,2,3,6,7,8-HxCDD	**3.4**	**J**		**0.1**	**0.340000**
1,2,3,7,8,9-HxCDD	ND		2.4	0.1	0
Total HxCDD	**27**				
1,2,3,4,6,7,8-HpCDD	**43**			**0.01**	**0.430000**
Total HpCDD	**85**				
OCDD	**460**			**0.0001**	**0.046000**
2,3,7,8-TCDF	**4.1**	**CON**		**0.1**	**0.410000**
Total TCDF	**57**				
1,2,3,7,8-PeCDF	**3.6**	**J**		**0.05**	**0.180000**
2,3,4,7,8-PeCDF	**5.5**	**J**		**0.5**	**2.700000**
Total PeCDF	**58**				
1,2,3,4,7,8-HxCDF	**6.8**			**0.1**	**0.680000**
1,2,3,6,7,8-HxCDF	**5.0**	**J**		**0.1**	**0.500000**
2,3,4,6,7,8-HxCDF	**5.5**	**J**		**0.1**	**0.550000**
1,2,3,7,8,9-HxCDF	ND		0.28	0.1	0
Total HxCDF	**51**				
1,2,3,4,6,7,8-HpCDF	**22**			**0.01**	**0.220000**
1,2,3,4,7,8,9-HpCDF	ND		1.7	0.01	0
Total HpCDF	**32**				
OCDF	**16**			**0.0001**	**0.001600**
Total TEQ Concentration					**15.657600**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	81	40 - 135
13C-1,2,3,7,8-PeCDD	80	40 - 135
13C-1,2,3,6,7,8-HxCDD	80	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	78	40 - 135
13C-OCDD	71	40 - 135
13C-2,3,7,8-TCDF	72	40 - 135
13C-1,2,3,7,8-PeCDF	80	40 - 135
13C-1,2,3,4,7,8-HxCDF	70	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	69	40 - 135

9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108307

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 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108308

Lot-Sample #...:	G2G230229 - 006	**Work Order #...:**	E46PN1AC	**Matrix....:**	SOLID
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/07/02	**Units.....:**	pg/g
Prep Batch #...:	2212453	**Dilution Factor:**	1	**% Moisture:**	16

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**28** EB			**1**	**28.000000**
Total TCDD	**33** EB				
1,2,3,7,8-PeCDD	ND		1.1	1	0
Total PeCDD	ND		3.0		0
1,2,3,4,7,8-HxCDD	ND		0.87	0.1	0
1,2,3,6,7,8-HxCDD	ND		2.7	0.1	0
1,2,3,7,8,9-HxCDD	ND		2.7	0.1	0
Total HxCDD	**23**				
1,2,3,4,6,7,8-HpCDD	**41**			**0.01**	**0.410000**
Total HpCDD	**73**				
OCDD	**290**			**0.0001**	**0.029000**
2,3,7,8-TCDF	**3.0**	**CON**		**0.1**	**0.300000**
Total TCDF	**35**				
1,2,3,7,8-PeCDF	ND		2.3	0.05	0
2,3,4,7,8-PeCDF	**3.4**	**J**		**0.5**	**1.700000**
Total PeCDF	**24**				
1,2,3,4,7,8-HxCDF	**3.2**	**J**		**0.1**	**0.320000**
1,2,3,6,7,8-HxCDF	**3.2**	**J**		**0.1**	**0.320000**
2,3,4,6,7,8-HxCDF	**3.4**	**J**		**0.1**	**0.340000**
1,2,3,7,8,9-HxCDF	ND		0.23	0.1	0
Total HxCDF	**30**				
1,2,3,4,6,7,8-HpCDF	**20**			**0.01**	**0.200000**
1,2,3,4,7,8,9-HpCDF	ND		1.4	0.01	0
Total HpCDF	**36**				
OCDF	**19**			**0.0001**	**0.001900**
Total TEQ Concentration					**31.620900**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	77	40 - 135
13C-1,2,3,7,8-PeCDD	79	40 - 135
13C-1,2,3,6,7,8-HxCDD	83	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	80	40 - 135
13C-OCDD	75	40 - 135
13C-2,3,7,8-TCDF	73	40 - 135
13C-1,2,3,7,8-PeCDF	82	40 - 135
13C-1,2,3,4,7,8-HxCDF	68	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	69	40 - 135

JW
9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108308

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.

JW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108310

Lot-Sample #...:	G2G230229 - 008	Work Order #...:	E46PR1AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	14

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**2.1** EB			**1**	**2.100000**
Total TCDD	**15** EB				
1,2,3,7,8-PeCDD	ND		1.9	1	0
Total PeCDD	**13**				
1,2,3,4,7,8-HxCDD	ND		1.8	0.1	0
1,2,3,6,7,8-HxCDD	**3.2**	J		**0.1**	**0.320000**
1,2,3,7,8,9-HxCDD	**4.2**	J		**0.1**	**0.420000**
Total HxCDD	**39**				
1,2,3,4,6,7,8-HpCDD	**54**			**0.01**	**0.540000**
Total HpCDD	**120**				
OCDD	**490**			**0.0001**	**0.049000**
2,3,7,8-TCDF	**6.1**	CON		**0.1**	**0.610000**
Total TCDF	**95**				
1,2,3,7,8-PeCDF	**5.4**	J		**0.05**	**0.270000**
2,3,4,7,8-PeCDF	**6.2**			**0.5**	**3.100000**
Total PeCDF	**53**				
1,2,3,4,7,8-HxCDF	**6.9**			**0.1**	**0.690000**
1,2,3,6,7,8-HxCDF	**5.9**			**0.1**	**0.590000**
2,3,4,6,7,8-HxCDF	**6.5**			**0.1**	**0.650000**
1,2,3,7,8,9-HxCDF	ND		0.36	0.1	0
Total HxCDF	**40**				
1,2,3,4,6,7,8-HpCDF	**20**			**0.01**	**0.200000**
1,2,3,4,7,8,9-HpCDF	ND		1.8	0.01	0
Total HpCDF	**27**				
OCDF	**13**			**0.0001**	**0.001300**
Total TEQ Concentration					**9.540300**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	40 - 135
13C-1,2,3,7,8-PeCDD	84	40 - 135
13C-1,2,3,6,7,8-HxCDD	77	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	77	40 - 135
13C-OCDD	74	40 - 135
13C-2,3,7,8-TCDF	73	40 - 135
13C-1,2,3,7,8-PeCDF	83	40 - 135
13C-1,2,3,4,7,8-HxCDF	64	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	64	40 - 135

MW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108310

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
9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108311

Lot-Sample #...:	G2G230229 - 009	**Work Order #...:**	E46PV1AC	**Matrix....:**	SOLID
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/07/02	**Units.....:**	pg/g
Prep Batch #...:	2212453	**Dilution Factor:**	1	**% Moisture:**	22

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**46** EB			**1**	**46.000000**
Total TCDD	**49** EB				
1,2,3,7,8-PeCDD	ND		1.3	1	0
Total PeCDD	ND		2.6		0
1,2,3,4,7,8-HxCDD	ND		2.4	0.1	0
1,2,3,6,7,8-HxCDD	**45**			**0.1**	**4.500000**
1,2,3,7,8,9-HxCDD	**9.1**			**0.1**	**0.910000**
Total HxCDD	**180**				
1,2,3,4,6,7,8-HpCDD	**4300**	**D**		**0.01**	**43.000000**
Total HpCDD	**9500**				
OCDD	**84000** J	~~D~~ E		**0.0001**	**8.400000**
2,3,7,8-TCDF	**1.4**	**CON**		**0.1**	**0.140000**
Total TCDF	**15**				
1,2,3,7,8-PeCDF	ND		0.98	0.05	0
2,3,4,7,8-PeCDF	ND		2.1	0.5	0
Total PeCDF	**29**				
1,2,3,4,7,8-HxCDF	**3.5**	**J**		**0.1**	**0.350000**
1,2,3,6,7,8-HxCDF	ND		2.8	0.1	0
2,3,4,6,7,8-HxCDF	ND		3.0	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.35	0.1	0
Total HxCDF	**130**				
1,2,3,4,6,7,8-HpCDF	**130**			**0.01**	**1.300000**
1,2,3,4,7,8,9-HpCDF	**5.8**	**J**		**0.01**	**0.058000**
Total HpCDF	**700**				
OCDF	**440**	**D**		**0.0001**	**0.044000**
Total TEQ Concentration					**104.702000**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	70	40 - 135
13C-1,2,3,7,8-PeCDD	70	40 - 135
13C-1,2,3,6,7,8-HxCDD	62	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	54	40 - 135
13C-OCDD	60	40 - 135
13C-2,3,7,8-TCDF	60	40 - 135
13C-1,2,3,7,8-PeCDF	66	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

DW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108311

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.
J	Estimated result. Result is less than the reporting limit.

JW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108313

Lot-Sample #...:	G2G230229 - 011	**Work Order #...:**	E46P11AC	**Matrix.....:**	SOLID
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/07/02	**Units.....:**	pg/g
Prep Batch #...:	2212453	**Dilution Factor:**	1	**% Moisture:**	40

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**310** EB			**1**	**310.000000**
Total TCDD	**320** EB				
1,2,3,7,8-PeCDD	ND		1.2	1	0
Total PeCDD	ND		1.9		0
1,2,3,4,7,8-HxCDD	ND		1.2	0.1	0
1,2,3,6,7,8-HxCDD	ND		3.8	0.1	0
1,2,3,7,8,9-HxCDD	ND		3.4	0.1	0
Total HxCDD	**17**				
1,2,3,4,6,7,8-HpCDD	**81**			**0.01**	**0.810000**
Total HpCDD	**150**				
OCDD	**480**			**0.0001**	**0.048000**
2,3,7,8-TCDF	**1.4**	**J CON**		**0.1**	**0.140000**
Total TCDF	**6.9**				
1,2,3,7,8-PeCDF	ND		0.81	0.05	0
2,3,4,7,8-PeCDF	ND		0.96	0.5	0
Total PeCDF	**4.9**				
1,2,3,4,7,8-HxCDF	ND		1.3	0.1	0
1,2,3,6,7,8-HxCDF	ND		1.2	0.1	0
2,3,4,6,7,8-HxCDF	ND		1.2	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.33	0.1	0
Total HxCDF	**15**				
1,2,3,4,6,7,8-HpCDF	**10**			**0.01**	**0.100000**
1,2,3,4,7,8,9-HpCDF	ND		0.83	0.01	0
Total HpCDF	**22**				
OCDF	**19**			**0.0001**	**0.001900**
Total TEQ Concentration					**311.099900**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	40 - 135
13C-1,2,3,7,8-PeCDD	77	40 - 135
13C-1,2,3,6,7,8-HxCDD	67	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	77	40 - 135
13C-OCDD	80	40 - 135
13C-2,3,7,8-TCDF	75	40 - 135
13C-1,2,3,7,8-PeCDF	76	40 - 135
13C-1,2,3,4,7,8-HxCDF	58	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	68	40 - 135

lw 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108313

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.

aw 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108315

Lot-Sample #...:	G2G230229 - 013	**Work Order #...:**	E46P41AC	**Matrix....:**	SOLID
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/07/02	**Units.....:**	pg/g
Prep Batch #...:	2212453	**Dilution Factor:**	1	**% Moisture:**	17

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**57** EB			**1**	**57.000000**
Total TCDD	**59** EB				
1,2,3,7,8-PeCDD	ND		0.59	1	0
Total PeCDD	ND		1.1		0
1,2,3,4,7,8-HxCDD	ND		0.49	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.96	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.3	0.1	0
Total HxCDD	**3.1**				
1,2,3,4,6,7,8-HpCDD	**18**			**0.01**	**0.180000**
Total HpCDD	**35**				
OCDD	**110**			**0.0001**	**0.011000**
2,3,7,8-TCDF	**0.88**	**CON J**		**0.1**	**0.088000**
Total TCDF	**4.5**				
1,2,3,7,8-PeCDF	ND		0.52	0.05	0
2,3,4,7,8-PeCDF	ND		0.63	0.5	0
Total PeCDF	ND		2.3		0
1,2,3,4,7,8-HxCDF	ND		0.86	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.51	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.49	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.21	0.1	0
Total HxCDF	ND		2.1		0
1,2,3,4,6,7,8-HpCDF	**3.4**	**J**		**0.01**	**0.034000**
1,2,3,4,7,8,9-HpCDF	ND		0.29	0.01	0
Total HpCDF	**3.4**				
OCDF	ND		4.9	0.0001	0
Total TEQ Concentration					**57.313000**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	81	40 - 135
13C-1,2,3,7,8-PeCDD	72	40 - 135
13C-1,2,3,6,7,8-HxCDD	72	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	95	40 - 135
13C-OCDD	99	40 - 135
13C-2,3,7,8-TCDF	81	40 - 135
13C-1,2,3,7,8-PeCDF	76	40 - 135
13C-1,2,3,4,7,8-HxCDF	63	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	95	40 - 135

lw 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108315

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.

RW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108316

Lot-Sample #...:	G2G230229 - 014	**Work Order #...:**	E46P51AC	**Matrix....:**	SOLID
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/07/02	**Units.....:**	pg/g
Prep Batch #...:	2212453	**Dilution Factor:**	1	**% Moisture:**	22

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**140** EB			**1**	**140.000000**
Total TCDD	**140** EB				
1,2,3,7,8-PeCDD	ND		0.80	1	0
Total PeCDD	ND		0.80		0
1,2,3,4,7,8-HxCDD	ND		0.94	0.1	0
1,2,3,6,7,8-HxCDD	ND		2.5	0.1	0
1,2,3,7,8,9-HxCDD	ND		2.6	0.1	0
Total HxCDD	**10**				
1,2,3,4,6,7,8-HpCDD	**41**			**0.01**	**0.410000**
Total HpCDD	**77**				
OCDD	**210**			**0.0001**	**0.021000**
2,3,7,8-TCDF	**0.76**	**CON J**		**0.1**	**0.076000**
Total TCDF	**2.9**				
1,2,3,7,8-PeCDF	ND		0.50	0.05	0
2,3,4,7,8-PeCDF	ND		0.60	0.5	0
Total PeCDF	ND		1.8		0
1,2,3,4,7,8-HxCDF	ND		1.4	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.73	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.82	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.17	0.1	0
Total HxCDF	**4.7**				
1,2,3,4,6,7,8-HpCDF	**5.4**	**J**		**0.01**	**0.054000**
1,2,3,4,7,8,9-HpCDF	ND		0.46	0.01	0
Total HpCDF	**11**				
OCDF	**10**	**J**		**0.0001**	**0.001000**
Total TEQ Concentration					**140.562000**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	81	40 - 135
13C-1,2,3,7,8-PeCDD	69	40 - 135
13C-1,2,3,6,7,8-HxCDD	71	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	97	40 - 135
13C-OCDD	97	40 - 135
13C-2,3,7,8-TCDF	72	40 - 135
13C-1,2,3,7,8-PeCDF	77	40 - 135
13C-1,2,3,4,7,8-HxCDF	63	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	92	40 - 135

JLW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108316

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.

9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108318

Lot-Sample #...:	G2G230229 - 016	**Work Order #...:**	E46QK1AC	**Matrix....:**	SOLID
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**Instrument:**	6D5
Prep Date.....:	07/31/02	**Analysis Date..:**	08/07/02	**Units.....:**	pg/g
Prep Batch #...:	2212453	**Dilution Factor:**	1	**% Moisture:**	12

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**3.3** EB			**1**	**3.300000**
Total TCDD	**5.7** EB				
1,2,3,7,8-PeCDD	ND		0.65	1	0
Total PeCDD	ND		1.6		0
1,2,3,4,7,8-HxCDD	ND		0.43	0.1	0
1,2,3,6,7,8-HxCDD	ND		1.6	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.6	0.1	0
Total HxCDD	**4.0**				
1,2,3,4,6,7,8-HpCDD	**21**			**0.01**	**0.210000**
Total HpCDD	**38**				
OCDD	**130**			**0.0001**	**0.013000**
2,3,7,8-TCDF	**1.9**	**CON**		**0.1**	**0.190000**
Total TCDF	**19**				
1,2,3,7,8-PeCDF	ND		1.1	0.05	0
2,3,4,7,8-PeCDF	ND		1.4	0.5	0
Total PeCDF	**4.9**				
1,2,3,4,7,8-HxCDF	ND		2.7	0.1	0
1,2,3,6,7,8-HxCDF	ND		1.0	0.1	0
2,3,4,6,7,8-HxCDF	ND		1.4	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.20	0.1	0
Total HxCDF	**6.6**				
1,2,3,4,6,7,8-HpCDF	**7.2**			**0.01**	**0.072000**
1,2,3,4,7,8,9-HpCDF	ND		0.64	0.01	0
Total HpCDF	**13**				
OCDF	**6.9**	**J**		**0.0001**	**0.000690**
Total TEQ Concentration					**3.785690**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	58	40 - 135
13C-1,2,3,7,8-PeCDD	55	40 - 135
13C-1,2,3,6,7,8-HxCDD	53	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	73	40 - 135
13C-OCDD	72	40 - 135
13C-2,3,7,8-TCDF	57	40 - 135
13C-1,2,3,7,8-PeCDF	54	40 - 135
13C-1,2,3,4,7,8-HxCDF	48	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	68	40 - 135

lles 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108318

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.

llw 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108319

Lot-Sample #...:	G2G230229 - 017	Work Order #...:	E46QP1AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	38

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	1900 EB E			1	1,900.000000
Total TCDD	1900 EB				
1,2,3,7,8-PeCDD	9.9			1	9.900000
Total PeCDD	27				
1,2,3,4,7,8-HxCDD	10			0.1	1.000000
1,2,3,6,7,8-HxCDD	28			0.1	2.800000
1,2,3,7,8,9-HxCDD	34			0.1	3.400000
Total HxCDD	200				
1,2,3,4,6,7,8-HpCDD	730			0.01	7.300000
Total HpCDD	1200				
OCDD	4800			0.0001	0.480000
2,3,7,8-TCDF	12	CON		0.1	1.200000
Total TCDF	130				
1,2,3,7,8-PeCDF	5.9	J		0.05	0.290000
2,3,4,7,8-PeCDF	15			0.5	7.500000
Total PeCDF	240				
1,2,3,4,7,8-HxCDF	20			0.1	2.000000
1,2,3,6,7,8-HxCDF	14			0.1	1.400000
2,3,4,6,7,8-HxCDF	15			0.1	1.500000
1,2,3,7,8,9-HxCDF	ND		0.66	0.1	0
Total HxCDF	310				
1,2,3,4,6,7,8-HpCDF	61			0.01	0.610000
1,2,3,4,7,8,9-HpCDF	6.0	J		0.01	0.060000
Total HpCDF	140				
OCDF	110			0.0001	0.011000
Total TEQ Concentration					1,939.451000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	63	40 - 135
13C-1,2,3,7,8-PeCDD	58	40 - 135
13C-1,2,3,6,7,8-HxCDD	56	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	68	40 - 135
13C-OCDD	46	40 - 135
13C-2,3,7,8-TCDF	58	40 - 135
13C-1,2,3,7,8-PeCDF	55	40 - 135
13C-1,2,3,4,7,8-HxCDF	46	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	62	40 - 135

lw 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108319

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.

9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108320

Lot-Sample #...:	G2G230229 - 018	Work Order #...:	E46QT1AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	49

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	1200 EB	E		1	1,200.000000
Total TCDD	1300 EB				
1,2,3,7,8-PeCDD	11	J		1	11.000000
Total PeCDD	28				
1,2,3,4,7,8-HxCDD	19			0.1	1.900000
1,2,3,6,7,8-HxCDD	57			0.1	5.700000
1,2,3,7,8,9-HxCDD	47			0.1	4.700000
Total HxCDD	310				
1,2,3,4,6,7,8-HpCDD	1400			0.01	14.000000
Total HpCDD	2600				
OCDD	11000 J	E		0.0001	1.100000
2,3,7,8-TCDF	6.2	CON		0.1	0.620000
Total TCDF	130				
1,2,3,7,8-PeCDF	ND		4.5	0.05	0
2,3,4,7,8-PeCDF	8.1	J		0.5	4.000000
Total PeCDF	260				
1,2,3,4,7,8-HxCDF	21			0.1	2.100000
1,2,3,6,7,8-HxCDF	18			0.1	1.800000
2,3,4,6,7,8-HxCDF	12			0.1	1.200000
1,2,3,7,8,9-HxCDF	ND		0.70	0.1	0
Total HxCDF	340				
1,2,3,4,6,7,8-HpCDF	210			0.01	2.100000
1,2,3,4,7,8,9-HpCDF	16			0.01	0.160000
Total HpCDF	600				
OCDF	790			0.0001	0.079000
Total TEQ Concentration					1,250.459000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	78	40 - 135
13C-1,2,3,7,8-PeCDD	72	40 - 135
13C-1,2,3,6,7,8-HxCDD	74	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	78	40 - 135
13C-OCDD	46	40 - 135
13C-2,3,7,8-TCDF	68	40 - 135
13C-1,2,3,7,8-PeCDF	76	40 - 135
13C-1,2,3,4,7,8-HxCDF	64	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	78	40 - 135

9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108320

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.

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9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108321

Lot-Sample #...:	G2G230229 - 019	Work Order #...:	E46QX1AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/07/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	39

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**280** EB			**1**	**280.000000**
Total TCDD	**290** EB				
1,2,3,7,8-PeCDD	ND		2.9	1	0
Total PeCDD	**4.8**				
1,2,3,4,7,8-HxCDD	ND		3.1	0.1	0
1,2,3,6,7,8-HxCDD	**12**			**0.1**	**1.200000**
1,2,3,7,8,9-HxCDD	**11**			**0.1**	**1.100000**
Total HxCDD	**77**				
1,2,3,4,6,7,8-HpCDD	**240**			**0.01**	**2.400000**
Total HpCDD	**440**				
OCDD	**1800**			**0.0001**	**0.180000**
2,3,7,8-TCDF	**5.3**	**CON**		**0.1**	**0.530000**
Total TCDF	**43**				
1,2,3,7,8-PeCDF	ND		3.6	0.05	0
2,3,4,7,8-PeCDF	**4.9**	**J**		**0.5**	**2.500000**
Total PeCDF	**55**				
1,2,3,4,7,8-HxCDF	**7.6**	**J**		**0.1**	**0.760000**
1,2,3,6,7,8-HxCDF	**6.7**	**J**		**0.1**	**0.670000**
2,3,4,6,7,8-HxCDF	**6.6**	**J**		**0.1**	**0.660000**
1,2,3,7,8,9-HxCDF	ND		0.39	0.1	0
Total HxCDF	**100**				
1,2,3,4,6,7,8-HpCDF	**47**			**0.01**	**0.470000**
1,2,3,4,7,8,9-HpCDF	**4.2**	**J**		**0.01**	**0.042000**
Total HpCDF	**120**				
OCDF	**97**			**0.0001**	**0.009700**
Total TEQ Concentration					**290.521700**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	58	40 - 135
13C-1,2,3,7,8-PeCDD	54	40 - 135
13C-1,2,3,6,7,8-HxCDD	45	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	53	40 - 135
13C-OCDD	46	40 - 135
13C-2,3,7,8-TCDF	55	40 - 135
13C-1,2,3,7,8-PeCDF	55	40 - 135
13C-1,2,3,4,7,8-HxCDF	40	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	47	40 - 135

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LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108321

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.

LW
9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108322

Lot-Sample #...:	G2G230229 - 020	Work Order #...:	E46Q01AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	8D5
Prep Date.....:	07/31/02	Analysis Date..:	08/09/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	35

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**130** EB			**1**	**130.000000**
Total TCDD	**130** EB				
1,2,3,7,8-PeCDD	ND		2.3	1	0
Total PeCDD	ND		2.3		0
1,2,3,4,7,8-HxCDD	ND		2.6	0.1	0
1,2,3,6,7,8-HxCDD	**9.2**			**0.1**	**0.920000**
1,2,3,7,8,9-HxCDD	**7.1**	**J**		**0.1**	**0.710000**
Total HxCDD	**57**				
1,2,3,4,6,7,8-HpCDD	**200**			**0.01**	**2.000000**
Total HpCDD	**350**				
OCDD	**1600**			**0.0001**	**0.160000**
2,3,7,8-TCDF	**4.4**	**CON**		**0.1**	**0.440000**
Total TCDF	**27**				
1,2,3,7,8-PeCDF	ND		2.2	0.05	0
2,3,4,7,8-PeCDF	ND		3.6	0.5	0
Total PeCDF	**41**				
1,2,3,4,7,8-HxCDF	**4.5**	**J**		**0.1**	**0.450000**
1,2,3,6,7,8-HxCDF	**4.9**	**J**		**0.1**	**0.490000**
2,3,4,6,7,8-HxCDF	**5.4**	**J**		**0.1**	**0.540000**
1,2,3,7,8,9-HxCDF	ND		0.32	0.1	0
Total HxCDF	**80**				
1,2,3,4,6,7,8-HpCDF	**50**			**0.01**	**0.500000**
1,2,3,4,7,8,9-HpCDF	ND		3.2	0.01	0
Total HpCDF	**110**				
OCDF	**92**			**0.0001**	**0.009200**
Total TEQ Concentration					**136.219200**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	88	40 - 135
13C-1,2,3,7,8-PeCDD	70	40 - 135
13C-1,2,3,6,7,8-HxCDD	65	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	88	40 - 135
13C-OCDD	99	40 - 135
13C-2,3,7,8-TCDF	74	40 - 135
13C-1,2,3,7,8-PeCDF	72	40 - 135
13C-1,2,3,4,7,8-HxCDF	60	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	70	40 - 135

lw 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108322

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.

lw 9/10/02

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) PE

Client Sample ID: 2108402

Lot-Sample #...:	G2G230229 - 021	Work Order #...:	E46Q11AC	Matrix....:	SOLID
Date Sampled...:	07/19/02	Date Received..:	07/23/02	Instrument:	6D5
Prep Date.....:	07/31/02	Analysis Date..:	08/08/02	Units.....:	pg/g
Prep Batch #...:	2212453	Dilution Factor:	1	% Moisture:	0.0

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	500	E		1	500.000000
Total TCDD	500				
1,2,3,7,8-PeCDD	1100			1	1,100.000000
Total PeCDD	1100				
1,2,3,4,7,8-HxCDD	840			0.1	84.000000
1,2,3,6,7,8-HxCDD	1000			0.1	100.000000
1,2,3,7,8,9-HxCDD	1000			0.1	100.000000
Total HxCDD	2900				
1,2,3,4,6,7,8-HpCDD	1500			0.01	15.000000
Total HpCDD	1500				
OCDD	4100	E		0.0001	0.410000
2,3,7,8-TCDF	440	CON E		0.1	44.000000
Total TCDF	500				
1,2,3,7,8-PeCDF	1100			0.05	55.000000
2,3,4,7,8-PeCDF	950			0.5	480.000000
Total PeCDF	2000				
1,2,3,4,7,8-HxCDF	1100			0.1	110.000000
1,2,3,6,7,8-HxCDF	1200			0.1	120.000000
2,3,4,6,7,8-HxCDF	1200			0.1	120.000000
1,2,3,7,8,9-HxCDF	1200			0.1	120.000000
Total HxCDF	4600				
1,2,3,4,6,7,8-HpCDF	1500			0.01	15.000000
1,2,3,4,7,8,9-HpCDF	1500			0.01	15.000000
Total HpCDF	3000				
OCDF	3000			0.0001	0.300000
Total TEQ Concentration					2,978.710000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	78	40 - 135
13C-1,2,3,7,8-PeCDD	62	40 - 135
13C-1,2,3,6,7,8-HxCDD	81	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	99	40 - 135
13C-OCDD	72	40 - 135
13C-2,3,7,8-TCDF	82	40 - 135
13C-1,2,3,7,8-PeCDF	74	40 - 135
13C-1,2,3,4,7,8-HxCDF	81	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	101	40 - 135

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LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108402 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.
E	Estimated result. Result concentration exceeds the calibration range.

MW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108309

Lot-Sample #...:	G2G230229 - 007	**Work Order #...:**	E46PQ1AA	**Matrix....:**	WATER
Date Sampled...:	07/19/02	**Date Received..:**	07/23/02	**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	**12**		**1**	**12.000000**
Total TCDD	**12**			
1,2,3,7,8-PeCDD	ND	0.87	1	0
Total PeCDD	ND	0.87		0
1,2,3,4,7,8-HxCDD	ND	0.51	0.1	0
1,2,3,6,7,8-HxCDD	ND	0.55	0.1	0
1,2,3,7,8,9-HxCDD	ND	0.48	0.1	0
Total HxCDD	ND	1.2		0
1,2,3,4,6,7,8-HpCDD	ND	2.7	0.01	0
Total HpCDD	ND	2.7		0
OCDD	ND	20	0.0001	0
2,3,7,8-TCDF	ND	0.57	0.1	0
Total TCDF	ND	0.57		0
1,2,3,7,8-PeCDF	ND	0.47	0.05	0
2,3,4,7,8-PeCDF	ND	0.46	0.5	0
Total PeCDF	ND	0.57		0
1,2,3,4,7,8-HxCDF	ND	0.40	0.1	0
1,2,3,6,7,8-HxCDF	ND	0.41	0.1	0
2,3,4,6,7,8-HxCDF	ND	0.42	0.1	0
1,2,3,7,8,9-HxCDF	ND	0.44	0.1	0
Total HxCDF	ND	0.44		0
1,2,3,4,6,7,8-HpCDF	ND	1.0	0.01	0
1,2,3,4,7,8,9-HpCDF	ND	0.33	0.01	0
Total HpCDF	ND	1.0		0
OCDF	ND	4.2	0.0001	0
Total TEQ Concentration				**12.000000**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	68	40 - 135
13C-1,2,3,7,8-PeCDD	59	40 - 135
13C-1,2,3,6,7,8-HxCDD	69	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	62	40 - 135
13C-OCDD	70	40 - 135
13C-2,3,7,8-TCDF	56	40 - 135
13C-1,2,3,7,8-PeCDF	63	40 - 135
13C-1,2,3,4,7,8-HxCDF	69	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	73	40 - 135

RW 9/10/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108309

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).

lw 9/10/02