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ENVIRONMENTAL
Data Services, Inc.

DIOXIN DATA VALIDATION REPORT
USEPA REGION I - TIER III

SDG No.: G2G220146
Laboratory: Severn Trent Laboratories, Inc., West Sacramento, CA
Site: Centredale Manor
Date: September 10, 2002
Samples:
Dioxin: 8/Soil/2108294, 2108295, 2108296, 2108297, 2108298, 2108299, 2108300, 2108301
1/Aqueous/2108302

A Tier III validation was performed on the dioxin/furan analytical data for eight soil samples 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.

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

SDMS DocID 35800

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Overall Evaluation of Data and Potential Usability Issues

Dioxin/Furans:

Dioxin/furan sample results were qualified as follows:

- 23478-PeCDF has been qualified as estimated (UJ) in sample 2108302 due to a low LCS recovery.

Accuracy Check

Laboratory control sample recoveries outside of QC criteria that resulted in qualifications are summarized below.

LCS ID	Compound	%R	Samples Affected	Action
E47801AC	23478-PeCDF	46%	2108302	J/UJ

- 23478-PeCDF has been qualified as estimated (UJ) in sample 2108302.

Additional Comments

- Three compounds in sample 2108301 were reported from the 20X dilution due to the initial analysis of these compounds which saturated the instrument detector. The laboratory reported these results with a (D) flag indicating dilution. No action was taken on this basis.
- 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 Severn Trent West Sacramento, CA
DAS/Project No. Centredale Manor
SDG No. G2G220146
No. of Samples/Matrix 8 Soil/Water

Tech. Spec./Method No. SW846 8290-High Res Dioxin/fu
Sampling Date(s) 7/18/02
Shipping Date(s) 7/19/02
Date(s) Rec'd by Lab 7/20/02

Traffic Report Sample Nos. 2108294, 2108295, 2108296, 2108297, 2108298, 2108299, 2108300, 2108301, 2108302

Equipment Blank Nos. 2108302
Field Duplicate Nos. 2108297/2108298
PES Nos. (2108402 + 2108342 both in other pkgs) summary attached

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: 9/11/02

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: Three compounds in Sample 2108301 were reported from the 20x dilution due to the initial analysis of these compounds which saturated the instrument detector. The laboratory reported these results with a (D) flag indicating "dilution". No further action required by the reviewer.

Reviewer: Nancy Weaver

Date: 9/11/02

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

II. PRESERVATION AND HOLDING TIMES

Sampler: JM Company: Laureiro 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
2108294	Soil	N	7/18/02	8/6/02	8/14/02	None
2108295						
2108296						
2108297						
2108298						
2108299						
2108300						
2108301						
2108302	Water			7/24/02	7/27/02	

Validator: Nancy Weaver

Date: 9/11/02

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: G2G220146 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
E51LG1AC	—	LCS	Soil	All Analytes	all ok	all PASS (60-140)	—	all Soils	None
E47801AC	—	LCS	Water	123789-HxCDD	195	(60-140)	—	Water Sample	(J) N
↓	↓	↓	↓	23478-PeCDF	46	(60-140)	—	(2108302)	(J/UJ)
↓	↓	↓	↓	234678 HxCDF	224	↓	—	↓	(J) N
↓	↓	↓	↓	123789 HxCDF	237	↓	—	↓	(J)
↓	↓	↓	↓	1234789 HpCDF	186	↓	—	↓	(J)

* 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: [signature]

Date: 9/11/02

11/98

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
8/15/02	06AU02102	all analytes	all	all	all	all	pass	all	None
8/14/02	12AU026D5		PASS	PASS	PASS				
8/15/02	14AU026D5								
8/6/02	06AU02102								
8/8/02	07AU026D5								
7/27/02	24JU026D5								
7/24/02	24JU026D5								

Comments: all criteria were met.

Validator: Nancy Weaver

Date: 9/11/02

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
8/15/02	15AU021D2	Au analytes	all	all				all	None
8/14/02	14A4026D5		analytes pass	analytes pass					
7/27/02	27J4026D5								

Comments: all criteria were met.

Validator: Mary Weaver

Date: 9/11/02

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%)

PASS

For DB-225 columns:

All

% 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 dio. 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: 9/11/02

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: JM Company: Loureiro Eng. Contacted: Yes No Date:

1. Laboratory: Method and Instrument Blanks

Date Extracted	Date Analyzed	Matrix	Sample No. (Blank Type)	Instrument	Compound	Conc. (units)
8/6/02	8/14/02	Soil	E51LG1AA	HRGC/HRMS	all ND	—
7/24/02	7/26/02	Water	E47801AA	" "	all ND	—

2. Field: Equipment (Rinsate) Blanks

Date Extracted	Date Analyzed	Matrix	Sample No. (Blank Type)	Instrument	Compound	Conc. (units)
7/24/02	7/27/02	water	2108302	HRGC/HRMS	all ND	→

Validator: LWeaver Date: 9/11/02

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
			ND			
		all				

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 (ED) those detected compounds in the associated non-aqueous sample: indicate an indeterminate amount of sampling error has potentially affected the sample results.

Validator: [signature]

Date: 9/11/02

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

VIII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE G2G190281-006.

List all MS/MSD analytes that are outside method QC acceptance criteria. Not evaluated since this is not a samp in this packa

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										
1234789-HpCDF										
OCDD										
OCDF										

NA

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

ACTIONS:

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

dator: [illegible] Date: 9/11/02

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

IX. LABORATORY AND FIELD DUPLICATES

Was a duplicate run for each matrix? Yes ~~No~~ No

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

SAMPLE ID: 210829 7 DUPLICATE ID: 2108298

Compound	Sample Conc. pg/g	Sample EDL		Duplicate Conc. pg/g	Duplicate EDL		%RPD	Action
		EDL	2xEDL		EDL	2xEDL		
2378-TCDD	320	1.6		360	1.6		12	None
2378-TCDF	8.8	1.6		9.8	1.6		11	"
12378-PeCDF								
12378-PeCDD	4.5 J	7.8		5.2 J	7.9		NC	None
23478-PeCDF	5.6 J	7.8		5.1 J	7.9			
123478-HxCDF	6.0 J	7.8		5.8 J	7.9			
123678-HxCDF	5.2 J	7.8		5.4 J	7.9			
123478-HxCDD								
123678-HxCDD	8.2	7.8		11	7.9		29	None
123789-HxCDD	8.5	7.8		10	7.9		16	"
234678-HxCDF								
123789-HxCDF								
1234678-HpCDF	43	7.8		49	7.9		13	None
1234678-HpCDD	140	7.8		190	7.9		30	"
1234789-HpCDF								
OCDD	910	16		1200	16		27	None
OCDF	44	16		52	16		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.

Validator: tsweaver Date: 9/11/02

Region I
Data Review Worksheets - (High Resolution)

Xb. INTERNAL STANDARD RECOVERY

Recovery Acceptance Criteria per Table 10 in Dioxin Validation SOP:

Sample Nos.												
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												
$^{13}C_{12}$-2378-TCDD												

Clu PASS

Validator: [signature]

Date: 9/11/02

11/98

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						

All PASS

Validator: A Weaver

Date: 9/11/02

XII. SAMPLE CALCULATION

2108299

$$2378\text{-TCDD} = \frac{10972470 \times 2000}{292465000 \times 10 \times 1.06 \times 0.61}$$

$$= 11.6 \approx 12 \text{ pg/g}$$

$$1234678\text{-HpCDD} = \frac{14694100 \times 2000}{272799000 \times 10 \times 1.02 \times 0.61} \approx 17 \text{ pg/g}$$

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

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

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

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: Mary Weaver

Date: 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108294

Lot-Sample #...:	G2G220146 - 001	**Work Order #...:**	E44VT2AC	**Matrix.....:**	SOLID
Date Sampled...:	07/18/02	**Date Received..:**	07/20/02	**Instrument:**	6D5
Prep Date.....:	08/06/02	**Analysis Date..:**	08/14/02	**Units.....:**	pg/g
Prep Batch #...:	2218489	**Dilution Factor:**	1	**% Moisture:**	24

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	ND		0.22	1	0
Total TCDD	ND		0.22		0
1,2,3,7,8-PeCDD	ND		0.43	1	0
Total PeCDD	ND		0.43		0
1,2,3,4,7,8-HxCDD	ND		0.22	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.24	0.1	0
1,2,3,7,8,9-HxCDD	ND		0.22	0.1	0
Total HxCDD	ND		0.29		0
1,2,3,4,6,7,8-HpCDD	ND		1.2	0.01	0
Total HpCDD	ND		1.2		0
OCDD	**9.3**	**J**	**13**	**0.0001**	**0.000930**
2,3,7,8-TCDF	ND		0.26	0.1	0
Total TCDF	ND		0.26		0
1,2,3,7,8-PeCDF	ND		0.34	0.05	0
2,3,4,7,8-PeCDF	ND		0.34	0.5	0
Total PeCDF	ND		0.34		0
1,2,3,4,7,8-HxCDF	ND		0.18	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.18	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.20	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.20	0.1	0
Total HxCDF	ND		0.20		0
1,2,3,4,6,7,8-HpCDF	ND		0.39	0.01	0
1,2,3,4,7,8,9-HpCDF	ND		0.21	0.01	0
Total HpCDF	ND		0.39		0
OCDF	ND		0.38	0.0001	0
Total TEQ Concentration					**0.000930**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	75	40 - 135
13C-1,2,3,7,8-PeCDD	70	40 - 135
13C-1,2,3,6,7,8-HxCDD	85	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	95	40 - 135
13C-OCDD	93	40 - 135
13C-2,3,7,8-TCDF	72	40 - 135
13C-1,2,3,7,8-PeCDF	71	40 - 135
13C-1,2,3,4,7,8-HxCDF	82	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	98	40 - 135

MW 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108294

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).

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

KW
9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108295

Lot-Sample #...:	G2G220146 - 002	**Work Order #...:**	E44V12AC	**Matrix....:**	SOLID
Date Sampled...:	07/18/02	**Date Received..:**	07/20/02	**Instrument:**	6D5
Prep Date.....:	08/06/02	**Analysis Date..:**	08/14/02	**Units.....:**	pg/g
Prep Batch #...:	2218489	**Dilution Factor:**	1	**% Moisture:**	35

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**1.4**	**J**	**1.5**	**1**	**1.400000**
Total TCDD	**1.4**		**1.5**		
1,2,3,7,8-PeCDD	ND		0.69	1	0
Total PeCDD	ND		0.69		0
1,2,3,4,7,8-HxCDD	ND		0.32	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.49	0.1	0
1,2,3,7,8,9-HxCDD	ND		0.39	0.1	0
Total HxCDD	ND		0.92		0
1,2,3,4,6,7,8-HpCDD	**7.0**	**J**	**7.7**	**0.01**	**0.070000**
Total HpCDD	**14**		**7.7**		
OCDD	**110**		**15**	**0.0001**	**0.011000**
2,3,7,8-TCDF	ND		0.52	0.1	0
Total TCDF	ND		0.52		0
1,2,3,7,8-PeCDF	ND		0.54	0.05	0
2,3,4,7,8-PeCDF	ND		0.52	0.5	0
Total PeCDF	ND		0.85		0
1,2,3,4,7,8-HxCDF	ND		0.28	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.35	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.28	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.29	0.1	0
Total HxCDF	ND		2.1		0
1,2,3,4,6,7,8-HpCDF	**6.2**	**J**	**7.7**	**0.01**	**0.062000**
1,2,3,4,7,8,9-HpCDF	ND		0.31	0.01	0
Total HpCDF	**15**		**7.7**		
OCDF	**24**		**15**	**0.0001**	**0.002400**
Total TEQ Concentration					**1.545400**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	81	40 - 135
13C-1,2,3,7,8-PeCDD	88	40 - 135
13C-1,2,3,6,7,8-HxCDD	77	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	97	40 - 135
13C-OCDD	105	40 - 135
13C-2,3,7,8-TCDF	86	40 - 135
13C-1,2,3,7,8-PeCDF	84	40 - 135
13C-1,2,3,4,7,8-HxCDF	81	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	85	40 - 135

9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108295

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).

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

lw 9/1/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108296

Lot-Sample #...:	G2G220146 - 003	**Work Order #...:**	E44V22AC	**Matrix....:**	SOLID
Date Sampled...:	07/18/02	**Date Received..:**	07/20/02	**Instrument:**	6D5
Prep Date.....:	08/06/02	**Analysis Date..:**	08/14/02	**Units.....:**	pg/g
Prep Batch #...:	2218489	**Dilution Factor:**	1	**% Moisture:**	27

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**97**		**1.4**	**1**	**97.000000**
Total TCDD	**110**		**1.4**		
1,2,3,7,8-PeCDD	ND		1.9	1	0
Total PeCDD	ND		4.1		0
1,2,3,4,7,8-HxCDD	ND		0.69	0.1	0
1,2,3,6,7,8-HxCDD	ND		2.6	0.1	0
1,2,3,7,8,9-HxCDD	ND		3.0	0.1	0
Total HxCDD	**18**		**6.9**		
1,2,3,4,6,7,8-HpCDD	**39**		**6.9**	**0.01**	**0.390000**
Total HpCDD	**76**		**6.9**		
OCDD	**260**		**14**	**0.0001**	**0.026000**
2,3,7,8-TCDF	**4.5**	**CON**	**1.4**	**0.1**	**0.450000**
Total TCDF	**54**		**1.4**		
1,2,3,7,8-PeCDF	ND		1.9	0.05	0
2,3,4,7,8-PeCDF	ND		2.7	0.5	0
Total PeCDF	**25**		**6.9**		
1,2,3,4,7,8-HxCDF	ND		2.7	0.1	0
1,2,3,6,7,8-HxCDF	ND		2.2	0.1	0
2,3,4,6,7,8-HxCDF	ND		1.7	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.37	0.1	0
Total HxCDF	**13**		**6.9**		
1,2,3,4,6,7,8-HpCDF	**15**		**6.9**	**0.01**	**0.150000**
1,2,3,4,7,8,9-HpCDF	ND		0.96	0.01	0
Total HpCDF	**27**		**6.9**		
OCDF	**17**		**14**	**0.0001**	**0.001700**
Total TEQ Concentration					**98.017700**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	77	40 - 135
13C-1,2,3,7,8-PeCDD	72	40 - 135
13C-1,2,3,6,7,8-HxCDD	80	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	92	40 - 135
13C-OCDD	101	40 - 135
13C-2,3,7,8-TCDF	71	40 - 135
13C-1,2,3,7,8-PeCDF	75	40 - 135
13C-1,2,3,4,7,8-HxCDF	84	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	97	40 - 135

lew 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108296

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.

JW 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108297

Lot-Sample #...:	G2G220146 - 004	Work Order #...:	E44V32AC	Matrix....:	SOLID
Date Sampled...:	07/18/02	Date Received..:	07/20/02	Instrument:	6D5
Prep Date.....:	08/06/02	Analysis Date..:	08/14/02	Units.....:	pg/g
Prep Batch #...:	2218489	Dilution Factor:	1	% Moisture:	36

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**320**		**1.6**	**1**	**320.000000**
Total TCDD	**360**		**1.6**		
1,2,3,7,8-PeCDD	**4.5**	**J**	**7.8**	**1**	**4.500000**
Total PeCDD	**13**		**7.8**		
1,2,3,4,7,8-HxCDD	ND		2.9	0.1	0
1,2,3,6,7,8-HxCDD	**8.2**		**7.8**	**0.1**	**0.820000**
1,2,3,7,8,9-HxCDD	**8.5**		**7.8**	**0.1**	**0.850000**
Total HxCDD	**65**		**7.8**		
1,2,3,4,6,7,8-HpCDD	**140**		**7.8**	**0.01**	**1.400000**
Total HpCDD	**260**		**7.8**		
OCDD	**910**		**16**	**0.0001**	**0.091000**
2,3,7,8-TCDF	**8.8**	**CON**	**1.6**	**0.1**	**0.880000**
Total TCDF	**83**		**1.6**		
1,2,3,7,8-PeCDF	ND		2.8	0.05	0
2,3,4,7,8-PeCDF	**5.6**	**J**	**7.8**	**0.5**	**2.800000**
Total PeCDF	**82**		**7.8**		
1,2,3,4,7,8-HxCDF	**6.0**	**J**	**7.8**	**0.1**	**0.600000**
1,2,3,6,7,8-HxCDF	**5.2**	**J**	**7.8**	**0.1**	**0.520000**
2,3,4,6,7,8-HxCDF	ND		3.3	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.39	0.1	0
Total HxCDF	**74**		**7.8**		
1,2,3,4,6,7,8-HpCDF	**43**		**7.8**	**0.01**	**0.430000**
1,2,3,4,7,8,9-HpCDF	ND		2.5	0.01	0
Total HpCDF	**82**		**7.8**		
OCDF	**44**		**16**	**0.0001**	**0.004400**
Total TEQ Concentration					**332.895400**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	79	40 - 135
13C-1,2,3,7,8-PeCDD	70	40 - 135
13C-1,2,3,6,7,8-HxCDD	81	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	101	40 - 135
13C-OCDD	112	40 - 135
13C-2,3,7,8-TCDF	73	40 - 135
13C-1,2,3,7,8-PeCDF	73	40 - 135
13C-1,2,3,4,7,8-HxCDF	86	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	102	40 - 135

JW 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108297

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.

QW
9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108298

Lot-Sample #...:	G2G220146 - 005	Work Order #...:	E44V52AC	Matrix....:	SOLID
Date Sampled...:	07/18/02	Date Received..:	07/20/02	Instrument:	6D5
Prep Date.....:	08/06/02	Analysis Date..:	08/14/02	Units.....:	pg/g
Prep Batch #...:	2218489	Dilution Factor:	1	% Moisture:	37

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	360		1.6	1	360.000000
Total TCDD	410		1.6		
1,2,3,7,8-PeCDD	5.2	J	7.9	1	5.200000
Total PeCDD	23		7.9		
1,2,3,4,7,8-HxCDD	ND		3.6	0.1	0
1,2,3,6,7,8-HxCDD	11		7.9	0.1	1.100000
1,2,3,7,8,9-HxCDD	10		7.9	0.1	1.000000
Total HxCDD	90		7.9		
1,2,3,4,6,7,8-HpCDD	190		7.9	0.01	1.900000
Total HpCDD	370		7.9		
OCDD	1200		16	0.0001	0.120000
2,3,7,8-TCDF	9.8	CON	1.6	0.1	0.980000
Total TCDF	150		1.6		
1,2,3,7,8-PeCDF	ND		4.0	0.05	0
2,3,4,7,8-PeCDF	5.1	J	7.9	0.5	2.500000
Total PeCDF	140		7.9		
1,2,3,4,7,8-HxCDF	5.8	J	7.9	0.1	0.580000
1,2,3,6,7,8-HxCDF	5.4	J	7.9	0.1	0.540000
2,3,4,6,7,8-HxCDF	ND		3.6	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.35	0.1	0
Total HxCDF	83		7.9		
1,2,3,4,6,7,8-HpCDF	49		7.9	0.01	0.490000
1,2,3,4,7,8,9-HpCDF	ND		2.2	0.01	0
Total HpCDF	94		7.9		
OCDF	52		16	0.0001	0.005200
Total TEQ Concentration					374.415200

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	79	40 - 135
13C-1,2,3,7,8-PeCDD	69	40 - 135
13C-1,2,3,6,7,8-HxCDD	85	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	94	40 - 135
13C-OCDD	100	40 - 135
13C-2,3,7,8-TCDF	73	40 - 135
13C-1,2,3,7,8-PeCDF	72	40 - 135
13C-1,2,3,4,7,8-HxCDF	88	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	100	40 - 135

DW 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108298

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.

9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108299

Lot-Sample #...:	G2G220146 - 006	**Work Order #...:**	E44V62AC	**Matrix....:**	SOLID
Date Sampled...:	07/18/02	**Date Received..:**	07/20/02	**Instrument:**	6D5
Prep Date.....:	08/06/02	**Analysis Date..:**	08/14/02	**Units.....:**	pg/g
Prep Batch #...:	2218489	**Dilution Factor:**	1	**% Moisture:**	39

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**12**		**1.6**	**1**	**12.000000**
Total TCDD	**27**		**1.6**		
1,2,3,7,8-PeCDD	ND		1.2	1	0
Total PeCDD	**8.7**		**8.2**		
1,2,3,4,7,8-HxCDD	ND		0.56	0.1	0
1,2,3,6,7,8-HxCDD	ND		1.3	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.3	0.1	0
Total HxCDD	**16**		**8.2**		
1,2,3,4,6,7,8-HpCDD	**17**		**8.2**	**0.01**	**0.170000**
Total HpCDD	**40**		**8.2**		
OCDD	**120**		**16**	**0.0001**	**0.012000**
2,3,7,8-TCDF	**4.4**	**CON**	**1.6**	**0.1**	**0.440000**
Total TCDF	**36**		**1.6**		
1,2,3,7,8-PeCDF	ND		2.9	0.05	0
2,3,4,7,8-PeCDF	ND		2.6	0.5	0
Total PeCDF	**8.8**		**8.2**		
1,2,3,4,7,8-HxCDF	ND		2.2	0.1	0
1,2,3,6,7,8-HxCDF	ND		2.0	0.1	0
2,3,4,6,7,8-HxCDF	ND		1.7	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.36	0.1	0
Total HxCDF	**6.2**		**8.2**		
1,2,3,4,6,7,8-HpCDF	**10**		**8.2**	**0.01**	**0.100000**
1,2,3,4,7,8,9-HpCDF	ND		0.64	0.01	0
Total HpCDF	**15**		**8.2**		
OCDF	**10**	**J**	**16**	**0.0001**	**0.001000**
Total TEQ Concentration					**12.723000**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	75	40 - 135
13C-1,2,3,7,8-PeCDD	70	40 - 135
13C-1,2,3,6,7,8-HxCDD	81	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	94	40 - 135
13C-OCDD	102	40 - 135
13C-2,3,7,8-TCDF	68	40 - 135
13C-1,2,3,7,8-PeCDF	72	40 - 135
13C-1,2,3,4,7,8-HxCDF	82	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	95	40 - 135

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9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108299

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 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108300

Lot-Sample #...:	G2G220146 - 007	**Work Order #...:**	E44V72AC	**Matrix....:**	SOLID
Date Sampled...:	07/18/02	**Date Received..:**	07/20/02	**Instrument:**	6D5
Prep Date.....:	08/06/02	**Analysis Date..:**	08/14/02	**Units.....:**	pg/g
Prep Batch #...:	2218489	**Dilution Factor:**	1	**% Moisture:**	39

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	**41**		**1.6**	**1**	**41.000000**
Total TCDD	**76**		**1.6**		
1,2,3,7,8-PeCDD	ND		1.1	1	0
Total PeCDD	**9.6**		**8.2**		
1,2,3,4,7,8-HxCDD	ND		0.77	0.1	0
1,2,3,6,7,8-HxCDD	ND		3.0	0.1	0
1,2,3,7,8,9-HxCDD	ND		2.9	0.1	0
Total HxCDD	**24**		**8.2**		
1,2,3,4,6,7,8-HpCDD	**25**		**8.2**	**0.01**	**0.250000**
Total HpCDD	**51**		**8.2**		
OCDD	**130**		**16**	**0.0001**	**0.013000**
2,3,7,8-TCDF	**7.9**	**CON**	**1.6**	**0.1**	**0.790000**
Total TCDF	**96**		**1.6**		
1,2,3,7,8-PeCDF	**4.3**	**J**	**8.2**	**0.05**	**0.210000**
2,3,4,7,8-PeCDF	**4.4**	**J**	**8.2**	**0.5**	**2.200000**
Total PeCDF	**54**		**8.2**		
1,2,3,4,7,8-HxCDF	ND		4.0	0.1	0
1,2,3,6,7,8-HxCDF	ND		3.1	0.1	0
2,3,4,6,7,8-HxCDF	ND		3.1	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.35	0.1	0
Total HxCDF	**18**		**8.2**		
1,2,3,4,6,7,8-HpCDF	**17**		**8.2**	**0.01**	**0.170000**
1,2,3,4,7,8,9-HpCDF	ND		1.1	0.01	0
Total HpCDF	**25**		**8.2**		
OCDF	**13**	**J**	**16**	**0.0001**	**0.001300**
Total TEQ Concentration					**44.634300**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	78	40 - 135
13C-1,2,3,7,8-PeCDD	71	40 - 135
13C-1,2,3,6,7,8-HxCDD	82	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	98	40 - 135
13C-OCDD	107	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	84	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	103	40 - 135

RLW 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108300

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 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108301

Lot-Sample #...:	G2G220146 - 008	Work Order #...:	E44V82AC	Matrix....:	SOLID
Date Sampled...:	07/18/02	Date Received..:	07/20/02	Instrument:	6D5
Prep Date.....:	08/06/02	Analysis Date..:	08/14/02	Units.....:	pg/g
Prep Batch #...:	2218489	Dilution Factor:	1	% Moisture:	47

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	1200	D	38	1	1,200.000000
Total TCDD	1300		38		
1,2,3,7,8-PeCDD	15		9.4	1	15.000000
Total PeCDD	77		9.4		
1,2,3,4,7,8-HxCDD	12		9.4	0.1	1.200000
1,2,3,6,7,8-HxCDD	97		9.4	0.1	9.700000
1,2,3,7,8,9-HxCDD	33		9.4	0.1	3.300000
Total HxCDD	390		9.4		
1,2,3,4,6,7,8-HpCDD	3300		9.4	0.01	33.000000
Total HpCDD	5200		9.4		
OCDD	42000	D	380	0.0001	4.200000
2,3,7,8-TCDF	27	CON	1.9	0.1	2.700000
Total TCDF	460		1.9		
1,2,3,7,8-PeCDF	8.7	J	9.4	0.05	0.430000
2,3,4,7,8-PeCDF	16		9.4	0.5	8.000000
Total PeCDF	300		9.4		
1,2,3,4,7,8-HxCDF	39		9.4	0.1	3.900000
1,2,3,6,7,8-HxCDF	15		9.4	0.1	1.500000
2,3,4,6,7,8-HxCDF	9.7		9.4	0.1	0.970000
1,2,3,7,8,9-HxCDF	ND		0.94	0.1	0
Total HxCDF	610		9.4		
1,2,3,4,6,7,8-HpCDF	620		9.4	0.01	6.200000
1,2,3,4,7,8,9-HpCDF	70		9.4	0.01	0.700000
Total HpCDF	2700		9.4		
OCDF	1800	D	380	0.0001	0.180000
Total TEQ Concentration					1,290.980000

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	73	40 - 135
13C-1,2,3,7,8-PeCDD	71	40 - 135
13C-1,2,3,6,7,8-HxCDD	76	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	98	40 - 135
13C-OCDD	94	40 - 135
13C-2,3,7,8-TCDF	70	40 - 135
13C-1,2,3,7,8-PeCDF	74	40 - 135
13C-1,2,3,4,7,8-HxCDF	80	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	91	40 - 135

JLW 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108301

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.

JW 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108302

Lot-Sample #...:	G2G220146 - 009	**Work Order #...:**	E44V91AA	**Matrix....:**	WATER
Date Sampled...:	07/18/02	**Date Received..:**	07/20/02	**Instrument:**	6D5
Prep Date.....:	07/24/02	**Analysis Date..:**	07/27/02	**Units.....:**	pg/L
Prep Batch #...:	2205351	**Dilution Factor:**	1	**% Moisture:**	

PARAMETER	RESULT	DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	ND	4.2	1	0
Total TCDD	ND	4.2		0
1,2,3,7,8-PeCDD	ND	6.4	1	0
Total PeCDD	ND	6.4		0
1,2,3,4,7,8-HxCDD	ND	4.0	0.1	0
1,2,3,6,7,8-HxCDD	ND	4.2	0.1	0
1,2,3,7,8,9-HxCDD	ND	3.6	0.1	0
Total HxCDD	ND	4.2		0
1,2,3,4,6,7,8-HpCDD	ND	4.3	0.01	0
Total HpCDD	ND	4.3		0
OCDD	ND	5.1	0.0001	0
2,3,7,8-TCDF	ND	3.0	0.1	0
Total TCDF	ND	3.0		0
1,2,3,7,8-PeCDF	ND	4.6	0.05	0
2,3,4,7,8-PeCDF	~~ND~~ UJ	4.5	0.5	0
Total PeCDF	ND	5.5		0
1,2,3,4,7,8-HxCDF	ND	2.7	0.1	0
1,2,3,6,7,8-HxCDF	ND	2.7	0.1	0
2,3,4,6,7,8-HxCDF	ND	2.8	0.1	0
1,2,3,7,8,9-HxCDF	ND	2.9	0.1	0
Total HxCDF	ND	2.9		0
1,2,3,4,6,7,8-HpCDF	ND	2.3	0.01	0
1,2,3,4,7,8,9-HpCDF	ND	2.8	0.01	0
Total HpCDF	ND	2.8		0
OCDF	ND	4.4	0.0001	0
Total TEQ Concentration				**0**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	40 - 135
13C-1,2,3,7,8-PeCDD	78	40 - 135
13C-1,2,3,6,7,8-HxCDD	90	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	85	40 - 135
13C-OCDD	81	40 - 135
13C-2,3,7,8-TCDF	74	40 - 135
13C-1,2,3,7,8-PeCDF	70	40 - 135
13C-1,2,3,4,7,8-HxCDF	87	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	85	40 - 135

gw 9/11/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2108302

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).

9/11/02

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