Superfund Records Center
SITE: Centredale
BREAK: 2.03
OTHER: 48762

Loureiro Engineering Associates, Inc.

November 8, 2002

U.S. Environmental Protection Agency
New England Regional Office
1 Congress Street, Suite 1100 (HBO)
Boston, Massachusetts 02114-2023

Attn: Anna Krasko, On-Scene Coordinator

RE: Data Validation Summary Report
September Sampling Event
Centredale Manor Restoration Project
North Providence, Rhode Island

Dear Ms. Krasko:

As requested, the data validation summary report for the September 2002 sampling event is attached for your review. This report includes Region I worksheets and annotated Form Is for the sample delivery group associated with this sampling event. Upon your review of the attached report, please feel free to contact me at (860) 410-2976 should you have any questions.

Sincerely,

LOUREIRO ENGINEERING ASSOCIATES, INC.

David N. Scotti, P.G.
Project Manager

Copy to: Centredale Manor Performing Parties Group (w/o attachment)

Attachment

SDMS DocID 48762

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TABLE 1
SUMMARY OF CONSTITUENTS DETECTED IN SOIL
ADDITIONAL SAMPLING - DIOXIN DELINEATION
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Location ID		03 / 04-DEL-104		03 / 04-DEL-104		03 / 04-DEL-105		10-DEL-304	
Sample ID		2112412		2112416 (Duplicate)		2112413		2112410	
Sample Date		9/10/02		9/10/02		9/10/02		9/10/02	
Sample Time		1405		1405		1435		1135	
Sample Depth		0.0-2.0'		0.0-2.0'		0.0-2.0'		0.0-2.0'	
Laboratory		STL		STL		STL		STL	
Lot Number		G2I120184		G2I120184		G2I120184		G2I120184	
Lab. Number		003		007		004		001	
Date Dioxins/Furans Analyzed									
Constituent	TEF	Result	TEQ	Result	TEQ	Result	TEQ	Result	TEQ
2,3,7,8-TCDD	1.000	18	18	11	11	19	19	64 J	64
Total TCDD	-	18	-	11	-	39	-	79	-
1,2,3,7,8-PeCDD	1.000	<0.20	0	<0.15	0	<0.24	0	<0.86	0
Total PeCDD	-	<0.82	-	<0.76	-	8.2	-	6.7	-
1,2,3,4,7,8-HxCDD	0.100	<0.42	0	<0.45	0	<1.4	0	<0.90	0
1,2,3,6,7,8-HxCDD	0.100	<0.99	0	<0.90	0	5.2 J	0.52	<3.3	0
1,2,3,7,8,9-HxCDD	0.100	<0.96	0	<1.0	0	4.4 J	0.44	<3.4	0
Total HxCDD	-	2.9	-	3.2	-	44	-	15	-
1,2,3,4,6,7,8-HpCDD	0.010	21	0.21	24	0.24	150	1.5	66	0.66
Total HpCDD	-	38	-	44	-	270	-	130	-
OCDD	0.0001	140	0.014	160	0.016	1200	0.12	680	0.068
2,3,7,8-TCDF	0.100	<0.42 CON	0	0.82 J, CON	0.082	7.8 CON	0.78	5.2 CON	0.52
Total TCDF	-	7.5	-	8.1	-	90	-	61	-
1,2,3,7,8-PeCDF	0.050	<0.27	0	<0.31	0	3.6 J	0.18	<1.8	0
2,3,4,7,8-PeCDF	0.500	<0.56	0	<0.61	0	6.0	3.0	<2.7	0
Total PeCDF	-	18	-	8.1	-	130	-	70	-
1,2,3,4,7,8-HxCDF	0.100	<0.77	0	<0.88	0	5.2 J	0.52	<2.1	0
1,2,3,6,7,8-HxCDF	0.100	<0.59	0	<0.71	0	4.8 J	0.48	<2.8	0
2,3,4,6,7,8-HxCDF	0.100	<0.63	0	<0.68	0	4.7 J	0.47	<2.3	0
1,2,3,7,8,9-HxCDF	0.100	<0.15	0	<0.097	0	<0.23	0	<0.14	0
Total HxCDF	-	7.8	-	9.6	-	97	-	33	-
1,2,3,4,6,7,8-HpCDF	0.010	3.5 J	0.035	4.1 J	0.041	35	0.35	26	0.26
1,2,3,4,7,8,9-HpCDF	0.010	<0.26	0	<0.34	0	<2.5	0	<1.3	0
Total HpCDF	-	7.6	-	9.2	-	76	-	59	-
OCDF	0.0001	6.3 J	0.00063	7.3 J	0.00073	51	0.0051	46	0.0046
Total TEQ Concentration	-	-	18	-	11	-	27	-	66

TABLE 1 (continued)
SUMMARY OF CONSTITUENTS DETECTED IN SOIL
ADDITIONAL SAMPLING - DIOXIN DELINEATION
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Notes to Table 1

Laboratory results of samples analyzed by STL using USEPA Method 8290; results have been adjusted for dry weight
pg/g = picograms per gram = parts per trillion (ppt)
TEQ = Toxic Equivalents
Total TEQ concentration reported to the nearest pg/g
TEF = Toxic Equivalency Factor provided by World Health Organization (WHO) (7/23/99)
J = Estimated result; result is less than the reporting limit
CON = Confirmation analysis
STL = Severn Trent Laboratories, Inc. - Sacramento

Data Validation Qualifiers presented in Italics:
J = The associated numerical value is an estimated quantity.

TABLE 2
SUMMARY OF EQUIPMENT RINSATE BLANK SAMPLE RESULTS
ADDITIONAL SAMPLING - DIOXIN DELINEATION
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Location ID		BKE	
Sample ID		2112417	
Sample Date		9/10/02	
Sample Time		1500	
Sample Depth		NA	
Laboratory		STL	
Lot Number		G2I120184	
Lab. Number		008	
Date Dioxins/Furans Analyzed			
Constituent	TEF	pg/L	TEQ
2,3,7,8-TCDD	1.000	<0.70	0
Total TCDD	-	<0.82	-
1,2,3,7,8-PeCDD	1.000	<1.4	0
Total PeCDD	-	<1.4	-
1,2,3,4,7,8-HxCDD	0.100	<0.68	0
1,2,3,6,7,8-HxCDD	0.100	<0.59	0
1,2,3,7,8,9-HxCDD	0.100	<0.58	0
Total HxCDD	-	<2.0	-
1,2,3,4,6,7,8-HpCDD	0.010	<1.3	0
Total HpCDD	-	<1.3	-
OCDD	0.0001	<11	0
2,3,7,8-TCDF	0.100	<1.1	0
Total TCDF	-	<1.1	-
1,2,3,7,8-PeCDF	0.050	<0.64	0
2,3,4,7,8-PeCDF	0.500	<0.61	0
Total PeCDF	-	<0.87	-
1,2,3,4,7,8-HxCDF	0.100	<0.92	0
1,2,3,6,7,8-HxCDF	0.100	<0.36	0
2,3,4,6,7,8-HxCDF	0.100	<0.44	0
1,2,3,7,8,9-HxCDF	0.100	<0.46	0
Total HxCDF	-	<0.92	-
1,2,3,4,6,7,8-HpCDF	0.010	<0.75	0
1,2,3,4,7,8,9-HpCDF	0.010	<0.78	0
Total HpCDF	-	<0.78	-
OCDF	0.0001	<1.4	0
Total TEQ Concentration	-	-	0

TABLE 2 (continued)
SUMMARY OF EQUIPMENT RINSATE BLANK SAMPLE RESULTS
ADDITIONAL SAMPLING - DIOXIN DELINEATION
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Notes to Table 2

Laboratory results of samples analyzed by STL using USEPA Method 8290
pg/L = picograms per liter = parts per trillion (ppt)
TEQ = Toxic Equivalents
Total TEQ concentration reported to the nearest pg/L
STL = Severn Trent Laboratories, Inc. - Sacramento
TEF = Toxic Equivalency Factor provided by World Health Organization (WHO) (7/23/99)

ENVIRONMENTAL
Data Services, Inc.

DIOXIN DATA VALIDATION REPORT
USEPA REGION I - TIER III

SDG No.: G2I120184
Laboratory: Severn Trent Laboratories, Inc., West Sacramento, CA
Site: Centredale Manor
Date: November 4, 2002
Samples:
Dioxin: 4/Soil/2112410, 2112412, 2112413, 2112416
1/Aqueous/2112417

A Tier III validation was performed on the dioxin/furan analytical data for four 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.

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

Overall Evaluation of Data and Potential Usability Issues

Dioxin/Furans:

Dioxin/furan sample results were qualified as follows:

- 2378-TCDD has been qualified as estimated (J) in sample 2112410 due to high matrix spike recoveries.

Matrix Spike Analysis

Matrix spike sample recoveries outside of QC criteria that resulted in qualifications are summarized below.

MS/MSD ID	Compound	MS/MSD %R	RPD	Action
2112410	2378-TCDD	153%/165%	Ok	J

- 2378-TCDD has been qualified as estimated (J) in sample 2112410.

Additional Comments

- The samples were received at 0°C but were not frozen.

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 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. G2I120184
No. of Samples/Matrix 4S/1W

Tech. Spec./Method No. 8290-High Res. Dioxin/Fu
Sampling Date(s) 9/10/02
Shipping Date(s) 9/11/02
Date(s) Rec'd by Lab 9/12/02

Traffic Report Sample Nos. 2112410, 2112412, 2112413, 2112416, 2112417

Equipment Blank Nos. 2112417
Field Duplicate Nos. 2112412/2112416
PES Nos. ---

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: [signature]

Date: 11/4/02

11/98

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

I. DATA COMPLETENESS

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

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

Reviewer: Nancy Weaver

Date: 11/4/02

11/98

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

II. PRESERVATION AND HOLDING TIMES

Sampler: RZ Company: Lowrey Eng Contacted Yes No Date:

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

Sample Number	Matrix	Preserved Y/N	Date Sampled	Date Extracted	Date Analyzed	Action
2112410	Soil	N	9/10/02	9/19/02	10/6/02	None
2112412				"	"	
2112413				"	"	
2112416				"	"	
2112417	aqueous			"	09/25/02	

Validator: LWeaver

Date: 11/4/02

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. G2I12081 CASE/PROJECT No. Centedale 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
E8JJ31AC	—	LCS	Soil	all analytes	%R all mass	(60-140)	—	all Soils	None
(E8JW51AC)	—	LCS/	water	123478-HXCDD	149/147	(60-140)	—	all Water (2/12417)	(J)
(E8JW51AD)	—	LCSD	"						
↓	↓	↓	↓	123789 HXCDD	142/0K	(60-140)	—	↓	↓
↓	↓	↓	↓	OCDD	64/142	(60-140)	—	↓	↓

* 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: DWeaver

Date: 11/4/02

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
8/3/02	31J02A053	all analytes	all PAHs					all samples	None
8/6/02	06AU021D2								
9/21/02	21SE028D5								
9/24/02	24SE028D5								
9/25/02	23SE029D5								
10/6/02	05OC028D5								
10/9/02	07OC021D2								

Comments: all criteria were met.

Validator: [illegible]

Date: 11/4/02

11/98

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
9/24/02	24SE028D5	all analytes	all	PASS	→	→	→	all samples	None
9/25/02	23SE029D5	↓		↓		↓	↓	↓	↓
10/6/02	050C028D5	↓		↓		↓	↓	↓	↓
10/9/02	070C021D2	↓		↓		↓	↓	↓	↓

Comments: all criteria were met

Validator: [signature]

Date: 11/4/02

VI. COLUMN PERFORMANCE RESOLUTION CHECK

Date:_____ ID:_____

Was the chromatographic resolution of the TCDD/TCDF isomers and the in the CCS 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:

PW

% 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: [illegible]

Date: 11/4/02

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

VIIa. BLANKS ANALYSIS

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

List the blank contamination below.

Sampler: RZ 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)
9/19/02	9/24/02	Soil	E8JJ31AA	HRGC/HRMS	all ND	all ND
9/19/02	9/25/02	Water	E8JW51AA	HRGC/HRMS	OCDD	85 pg/L

water sample ND - no action

2. Field: Equipment (Rinsate) Blanks

Date Extracted	Date Analyzed	Matrix	Sample No. (Blank Type)	Instrument	Compound	Conc. (units)
9/19/02	9/25/02	Water	211247 ER	HRGC/HRMS	all ND	—

Validator: [signature] Date: 11/4/02

11/98

VIIb. BLANKS ANALYSIS

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

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

Validator: LWeaver

Date: 1/4/02

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. 2112910

Compound	MS % Rec	MSD % Rec	RPD	Method QC Limits		Concentration			%RSD	Action
				% Rec	RPD	Unspiked Sample	MS	MSD		
2378-TCDD	153	165	ok	60-140	0-30					(J)
2378-TCDF										
12378-PeCDF										
12378-PeCDD										
23478-PeCDF										
123478-HxCDF										
123678-HxCDF										
123478-HxCDD	ok	142	ok	60-140	0-30					(J)
123678-HxCDD										
123789-HxCDD										
234678-HxCDF										
123789-HxCDF										
1234678-HpCDF										
1234678-HpCDD										
1234789-HpCDF										
OCDD										
OCDF										

ND
NO action

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.

Validator: R. Weaver

Date: 11/4/02

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: 211241 DUPLICATE ID: 211241 6

Compound	Sample Conc. pg/g	Sample EDL		Duplicate Conc. pg/g	Duplicate EDL		%RPD	Action
		EDL	2xEDL		EDL	2xEDL		
2378-TCDD	18	1.1	2.2	11	1.1	2.2	48	None
2378-TCDF	ND	0.42	0.84	0.82	1.1	2.2	NC	None
12378-PeCDF								
12378-PeCDD								
23478-PeCDF								
123478-HxCDF								
123678-HxCDF								
123478-HxCDD								
123678-HxCDD								
123789-HxCDD								
234678-HxCDF								
123789-HxCDF								
1234678-HpCDF	3.5	5.4	10.8	4.1	5.5	11.0	44	None
1234678-HpCDD	21	5.4	10.8	24	5.5	11.0	13	"
1234789-HpCDF								
OCDD	140	11	22	160	11	22	13	None
OCDF	6.3	11	22	7.3	11	22	15	"

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 be~~yond the specified~~ range. Professional judgement should be used to ascertain effect on the final data despite sample concentration.

Validator: R Weaver Date: 11/14/02

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												
$^{37}Cl_4$-2378-TCDD												

all PASS

Validator: DWeaver

Date: 11/4/02

Region I
Data Review Worksheet - (High Resolution)

XI. Sample Analysis and Identification

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

SAMPLE No.						
NATIVE ANALYTES	RT	S/N	Ion Ratio	RT	S/N	Ion Ratio
2378-TCDD						
2378-TCDF						
12378-PeCDF						
12378-PeCDD						
23478-PeCDF						
123478-HxCDF						
123678-HxCDF						
123478-HxCDD						
123678-HxCDD						
123789-HxCDD						
234678-HxCDF						
123789-HxCDF						
1234678-HpCDF						
1234678-HpCDD						
1234789-HpCDF						
OCDD						
OCDF						
INTERNAL STANDARDS VS RECOVERY STANDARDS						
13C-2378-TCDD						
13C-2378-TCDF						
13C-12378-PeCDD						
13C-12378-PeCDF						
13C-123478-HxCDD						
13C-123678-HxCDD						
13C-123478-HxCDF						
13C-123678-HxCDF						
13C-123789-HxCDF						
13C-1234678-HpCDF						
13C-1234678-HpCDD						
13C-1234789-HpCDF						
13C-1234789-HpCDF						
13C-OCDD						
13C-2378-TCDD						
RECOVERY STANDARDS						
37Cl-2378-TCDD						
13C-123789-HxCDD						

Validator: [illegible]

Date: 11/4/02

XII. SAMPLE CALCULATION

211410

$$2378\text{-}TCDD = \frac{9703420 \times 2000}{41552900 \times 0.70 \times 10 \times 1.05}$$

$$= 63.5 \approx 64 \text{ pg/g}$$

$$1234678\text{-}HpCDD = \frac{7295200 \times 2000}{32168000 \times 0.70 \times 10 \times}$$

$$= 66.1 \approx 66 \text{ pg/g}$$

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

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

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

where:

Q_{is}	=	Quantity (ng) of appropriate internal standard added to sample before extraction.
A_{x1}/A_{x2}	=	Integrated areas of the two quantitation ions.
A_{is1}/A_{is2}	=	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.
$H_{x1} + H_{x2}$	=	Peak heights of the noise for the quantitation ions.
$H_{is1} + H_{is2}$	=	Peak heights of the internal standard quantitation ions.
D	=	Dilution.

Validator: [illegible] Date: 1/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112410

Lot-Sample #...:	G2I120184 - 001	Work Order #...:	E74941AC	Matrix....:	SOLID
Date Sampled...:	09/10/02	Date Received..:	09/12/02	Instrument:	8D5
Prep Date.....:	09/19/02	Analysis Date..:	10/06/02	Units.....:	pg/g
Prep Batch #...:	2262500	Dilution Factor:	1	% Moisture:	30

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	64 J		1.4	1	64.000
Total TCDD	79		1.4		
1,2,3,7,8-PeCDD	ND		0.86	1	0
Total PeCDD	6.7		7.1		
1,2,3,4,7,8-HxCDD	ND		0.90	0.1	0
1,2,3,6,7,8-HxCDD	ND		3.3	0.1	0
1,2,3,7,8,9-HxCDD	ND		3.4	0.1	0
Total HxCDD	15		7.1		
1,2,3,4,6,7,8-HpCDD	66		7.1	0.01	0.660
Total HpCDD	130		7.1		
OCDD	680		14	0.0001	0.068
2,3,7,8-TCDF	5.2	CON	1.4	0.1	0.520
Total TCDF	61		1.4		
1,2,3,7,8-PeCDF	ND		1.8	0.05	0
2,3,4,7,8-PeCDF	ND		2.7	0.5	0
Total PeCDF	70		7.1		
1,2,3,4,7,8-HxCDF	ND		2.1	0.1	0
1,2,3,6,7,8-HxCDF	ND		2.8	0.1	0
2,3,4,6,7,8-HxCDF	ND		2.3	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.14	0.1	0
Total HxCDF	33		7.1		
1,2,3,4,6,7,8-HpCDF	26		7.1	0.01	0.260
1,2,3,4,7,8,9-HpCDF	ND		1.3	0.01	0
Total HpCDF	59		7.1		
OCDF	46		14	0.0001	0.005
Total TEQ Concentration					65.513

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	75	40 - 135
13C-1,2,3,7,8-PeCDD	71	40 - 135
13C-1,2,3,6,7,8-HxCDD	81	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	92	40 - 135
13C-OCDD	87	40 - 135
13C-2,3,7,8-TCDF	73	40 - 135
13C-1,2,3,7,8-PeCDF	75	40 - 135
13C-1,2,3,4,7,8-HxCDF	86	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	87	40 - 135

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112410

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.

JLW
11/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112412

Lot-Sample #...:	G2I120184 - 003	Work Order #...:	E75AE1AC	Matrix.....:	SOLID
Date Sampled...:	09/10/02	Date Received..:	09/12/02	Instrument:	8D5
Prep Date.....:	09/19/02	Analysis Date..:	10/06/02	Units.....:	pg/g
Prep Batch #...:	2262500	Dilution Factor:	1	% Moisture:	7.0

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	18		1.1	1	18.000
Total TCDD	18		1.1		
1,2,3,7,8-PeCDD	ND		0.20	1	0
Total PeCDD	ND		0.82		0
1,2,3,4,7,8-HxCDD	ND		0.42	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.99	0.1	0
1,2,3,7,8,9-HxCDD	ND		0.96	0.1	0
Total HxCDD	2.9		5.4		
1,2,3,4,6,7,8-HpCDD	21		5.4	0.01	0.210
Total HpCDD	38		5.4		
OCDD	140		11	0.0001	0.014
2,3,7,8-TCDF	ND	CON	0.42	0.1	0
Total TCDF	7.5		1.1		
1,2,3,7,8-PeCDF	ND		0.27	0.05	0
2,3,4,7,8-PeCDF	ND		0.56	0.5	0
Total PeCDF	18		5.4		
1,2,3,4,7,8-HxCDF	ND		0.77	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.59	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.63	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.15	0.1	0
Total HxCDF	7.8		5.4		
1,2,3,4,6,7,8-HpCDF	3.5	J	5.4	0.01	0.035
1,2,3,4,7,8,9-HpCDF	ND		0.26	0.01	0
Total HpCDF	7.6		5.4		
OCDF	6.3	J	11	0.0001	0.001
Total TEQ Concentration					18.260

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	61	40 - 135
13C-1,2,3,7,8-PeCDD	60	40 - 135
13C-1,2,3,6,7,8-HxCDD	69	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	71	40 - 135
13C-OCDD	71	40 - 135
13C-2,3,7,8-TCDF	62	40 - 135
13C-1,2,3,7,8-PeCDF	66	40 - 135
13C-1,2,3,4,7,8-HxCDF	76	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	71	40 - 135

QAW 11/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 211241 2

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.

11/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112413

Lot-Sample #...:	G2I120184 - 004	Work Order #...:	E75AG1AC	Matrix.....:	SOLID
Date Sampled...:	09/10/02	Date Received..:	09/12/02	Instrument:	HD5
Prep Date.....:	09/19/02	Analysis Date..:	10/06/02	Units.....:	pg/g
Prep Batch #...:	2262500	Dilution Factor:	1	% Moisture:	16

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	19		1.2	1	19.000
Total TCDD	39		1.2		
1,2,3,7,8-PeCDD	ND		0.24	1	0
Total PeCDD	8.2		6.0		
1,2,3,4,7,8-HxCDD	ND		1.4	0.1	0
1,2,3,6,7,8-HxCDD	5.2	J	6.0	0.1	0.520
1,2,3,7,8,9-HxCDD	4.4	J	6.0	0.1	0.440
Total HxCDD	44		6.0		
1,2,3,4,6,7,8-HpCDD	150		6.0	0.01	1.500
Total HpCDD	270		6.0		
OCDD	1200		12	0.0001	0.120
2,3,7,8-TCDF	7.8	CON	1.2	0.1	0.780
Total TCDF	90		1.2		
1,2,3,7,8-PeCDF	3.6	J	6.0	0.05	0.180
2,3,4,7,8-PeCDF	6.0		6.0	0.5	3.000
Total PeCDF	130		6.0		
1,2,3,4,7,8-HxCDF	5.2	J	6.0	0.1	0.520
1,2,3,6,7,8-HxCDF	4.8	J	6.0	0.1	0.480
2,3,4,6,7,8-HxCDF	4.7	J	6.0	0.1	0.470
1,2,3,7,8,9-HxCDF	ND		0.23	0.1	0
Total HxCDF	97		6.0		
1,2,3,4,6,7,8-HpCDF	35		6.0	0.01	0.350
1,2,3,4,7,8,9-HpCDF	ND		2.5	0.01	0
Total HpCDF	76		6.0		
OCDF	51		12	0.0001	0.005
Total TEQ Concentration					27.365

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	71	40 - 135
13C-1,2,3,7,8-PeCDD	82	40 - 135
13C-1,2,3,6,7,8-HxCDD	73	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	76	40 - 135
13C-OCDD	74	40 - 135
13C-2,3,7,8-TCDF	74	40 - 135
13C-1,2,3,7,8-PeCDF	84	40 - 135
13C-1,2,3,4,7,8-HxCDF	80	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	71	40 - 135

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11/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112413

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.

lew
11/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112416

Lot-Sample #...:	G2I120184 - 007	Work Order #...:	E75AR1AC	Matrix....:	SOLID
Date Sampled...:	09/10/02	Date Received..:	09/12/02	Instrument:	8D5
Prep Date.....:	09/19/02	Analysis Date..:	10/06/02	Units.....:	pg/g
Prep Batch #...:	2262500	Dilution Factor:	1	% Moisture:	8.4

PARAMETER	RESULT		DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	11		1.1	1	11.000
Total TCDD	11		1.1		
1,2,3,7,8-PeCDD	ND		0.15	1	0
Total PeCDD	ND		0.76		0
1,2,3,4,7,8-HxCDD	ND		0.45	0.1	0
1,2,3,6,7,8-HxCDD	ND		0.90	0.1	0
1,2,3,7,8,9-HxCDD	ND		1.0	0.1	0
Total HxCDD	3.2		5.5		
1,2,3,4,6,7,8-HpCDD	24		5.5	0.01	0.240
Total HpCDD	44		5.5		
OCDD	160		11	0.0001	0.016
2,3,7,8-TCDF	0.82	J CON	1.1	0.1	0.082
Total TCDF	8.1		1.1		
1,2,3,7,8-PeCDF	ND		0.31	0.05	0
2,3,4,7,8-PeCDF	ND		0.61	0.5	0
Total PeCDF	8.1		5.5		
1,2,3,4,7,8-HxCDF	ND		0.88	0.1	0
1,2,3,6,7,8-HxCDF	ND		0.71	0.1	0
2,3,4,6,7,8-HxCDF	ND		0.68	0.1	0
1,2,3,7,8,9-HxCDF	ND		0.097	0.1	0
Total HxCDF	9.6		5.5		
1,2,3,4,6,7,8-HpCDF	4.1	J	5.5	0.01	0.041
1,2,3,4,7,8,9-HpCDF	ND		0.34	0.01	0
Total HpCDF	9.2		5.5		
OCDF	7.3	J	11	0.0001	0.001
Total TEQ Concentration					11.380

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	71	40 - 135
13C-1,2,3,7,8-PeCDD	70	40 - 135
13C-1,2,3,6,7,8-HxCDD	76	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	81	40 - 135
13C-OCDD	78	40 - 135
13C-2,3,7,8-TCDF	73	40 - 135
13C-1,2,3,7,8-PeCDF	69	40 - 135
13C-1,2,3,4,7,8-HxCDF	82	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	75	40 - 135

11/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112416

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.

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

Client Sample ID: 2112417

Lot-Sample #...:	G2I120184 - 008	Work Order #...:	E75AV1AA	Matrix....:	WATER
Date Sampled...:	09/10/02	Date Received..:	09/12/02	Instrument:	9D5
Prep Date.....:	09/19/02	Analysis Date..:	09/25/02	Units.....:	pg/L
Prep Batch #...:	2263162	Dilution Factor:	1	% Moisture:	

PARAMETER	RESULT	DETECTION LIMIT	TEF FACTOR	TEQ CONCENTRATION
2,3,7,8-TCDD	ND	0.70	1	0
Total TCDD	ND	0.82		0
1,2,3,7,8-PeCDD	ND	1.4	1	0
Total PeCDD	ND	1.4		0
1,2,3,4,7,8-HxCDD	ND	0.68	0.1	0
1,2,3,6,7,8-HxCDD	ND	0.59	0.1	0
1,2,3,7,8,9-HxCDD	ND	0.58	0.1	0
Total HxCDD	ND	2.0		0
1,2,3,4,6,7,8-HpCDD	ND	1.3	0.01	0
Total HpCDD	ND	1.3		0
OCDD	ND	11	0.0001	0
2,3,7,8-TCDF	ND	1.1	0.1	0
Total TCDF	ND	1.1		0
1,2,3,7,8-PeCDF	ND	0.64	0.05	0
2,3,4,7,8-PeCDF	ND	0.61	0.5	0
Total PeCDF	ND	0.87		0
1,2,3,4,7,8-HxCDF	ND	0.92	0.1	0
1,2,3,6,7,8-HxCDF	ND	0.36	0.1	0
2,3,4,6,7,8-HxCDF	ND	0.44	0.1	0
1,2,3,7,8,9-HxCDF	ND	0.46	0.1	0
Total HxCDF	ND	0.92		0
1,2,3,4,6,7,8-HpCDF	ND	0.75	0.01	0
1,2,3,4,7,8,9-HpCDF	ND	0.78	0.01	0
Total HpCDF	ND	0.78		0
OCDF	ND	1.4	0.0001	0
Total TEQ Concentration				**0**

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	69	40 - 135
13C-1,2,3,7,8-PeCDD	69	40 - 135
13C-1,2,3,6,7,8-HxCDD	66	40 - 135
13C-1,2,3,4,6,7,8-HpCDD	89	40 - 135
13C-OCDD	84	40 - 135
13C-2,3,7,8-TCDF	62	40 - 135
13C-1,2,3,7,8-PeCDF	78	40 - 135
13C-1,2,3,4,7,8-HxCDF	91	40 - 135
13C-1,2,3,4,6,7,8-HpCDF	97	40 - 135

11/4/02

LOUREIRO ENGINEERING ASSOCIATES, P.C.

Dioxins/Furans, HRGC/HRMS (8290)

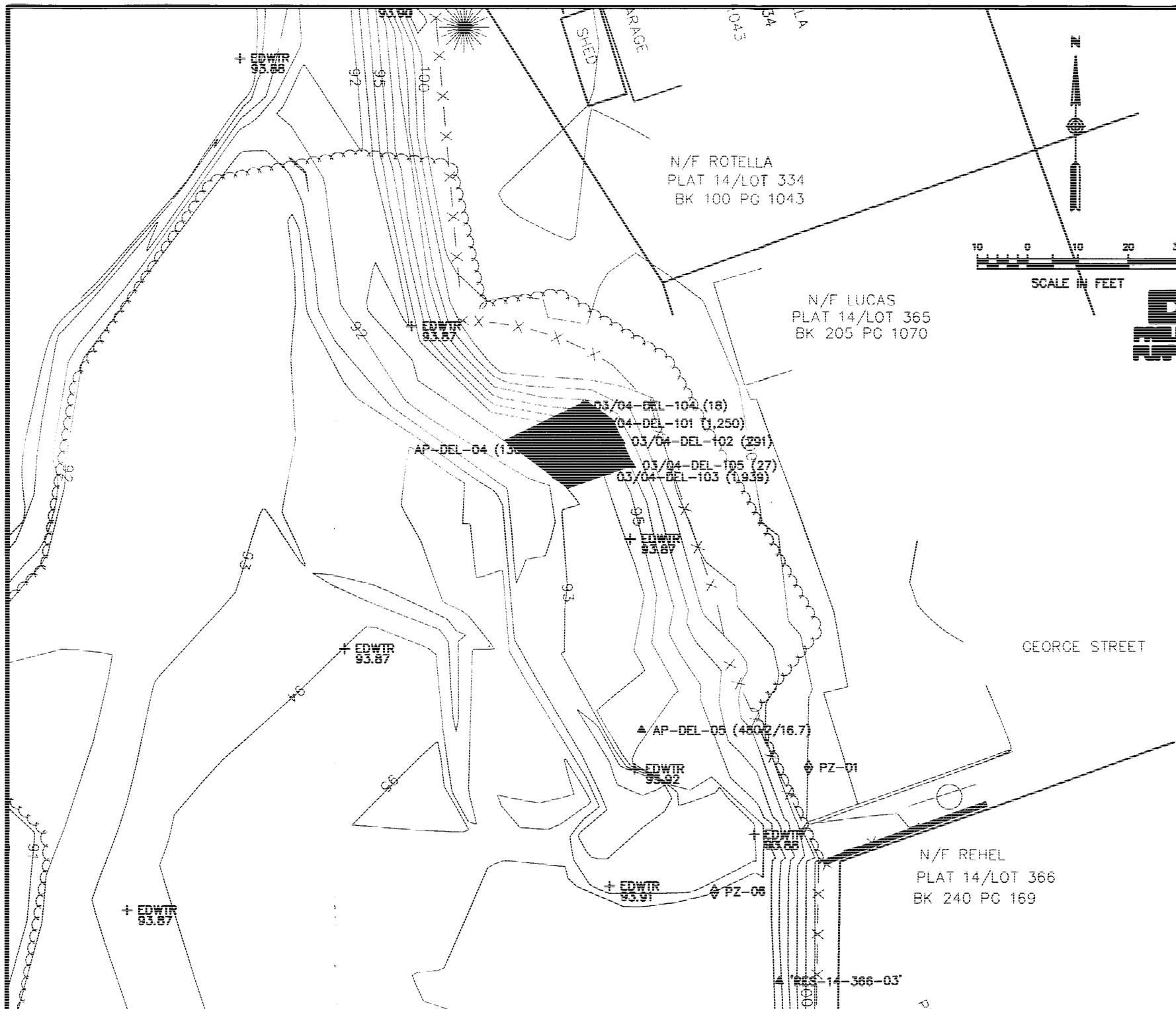
Client Sample ID: 2112417

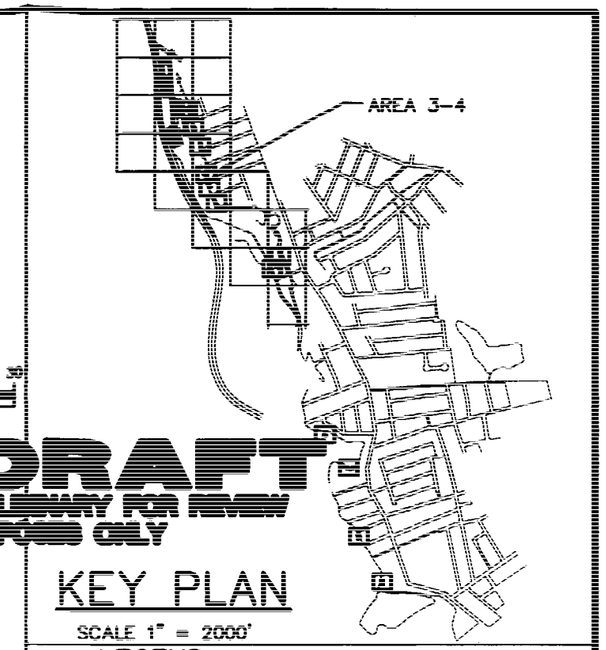
Notes:

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).

11/4/02

Original includes color coding.





DRAFT
PRELIMINARY FOR REVIEW
PURPOSES ONLY

KEY PLAN

SCALE 1" = 2000'

LEGEND

CMS-422	EPA SOIL SAMPLE, DIOXIN < 1000 ppt
CMS-456 (2100)	EPA SOIL SAMPLE, DIOXIN > 1000 ppt (DIOXIN CONCENTRATION IN ppt)
CMS-091	EPA SEDIMENT SAMPLE, DIOXIN < 1000 ppt
CMS-123 (2100)	EPA SEDIMENT SAMPLE, DIOXIN > 1000 ppt (DIOXIN CONCENTRATION IN ppt)
AP-DEL-01 (50.9/78.9)	APRIL 2002 SAMPLE LOCATION (TOTAL TEQ CONCENTRATION IN ppt) (0-1.0'/1.0'-2.0')
02-DEL-201 (54)	SAMPLE LOCATION (TOTAL TEQ CONCENTRATION IN ppt) (< 1000 ppt)
01-DEL-201 (9612)	SAMPLE LOCATION (TOTAL TEQ CONCENTRATION IN ppt) (>1000 ppt)
	PROPOSED AREA OF EXCAVATION
+ 96.70	SPOT ELEV. & OR WATER ELEV.
	PIEZOMETER LOCATION
ppt	PARTS PER TRILLION

CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, R.I.
PROPOSED AREA OF EXCAVATION
ACTION AREA 3-4

Comm.No. 15RP102.003

FIGURE 3/4

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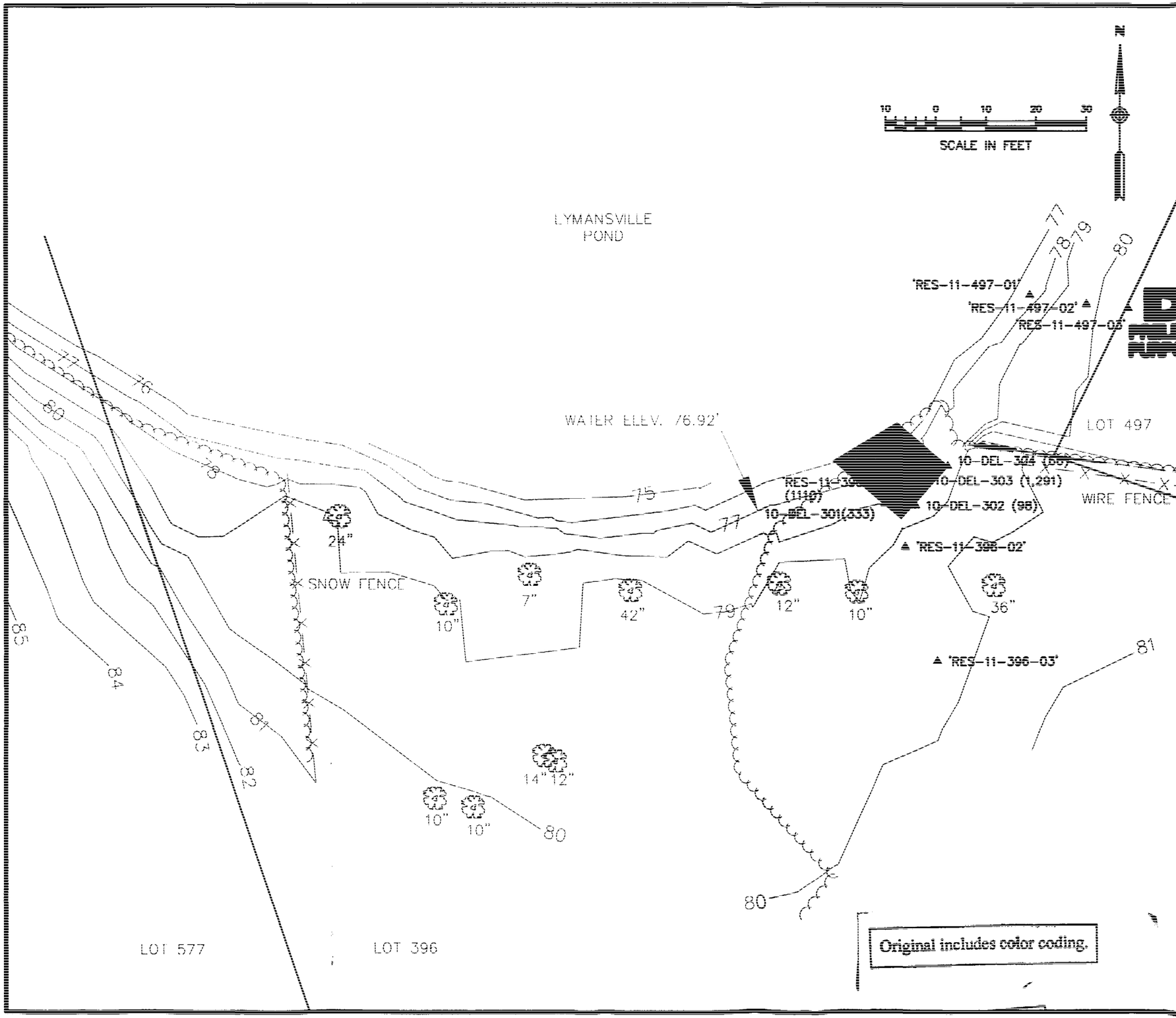

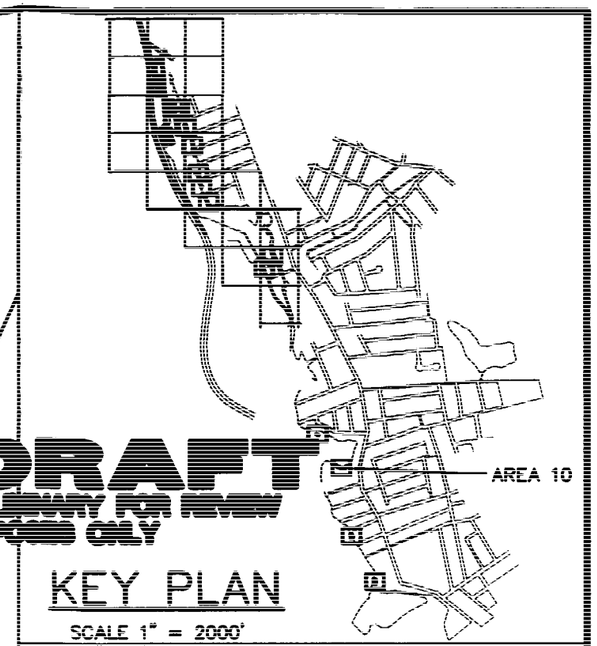

DRAFT
FOR REVIEW AND COMMENT
PURPOSES ONLY

KEY PLAN

SCALE 1" = 2000'

LEGEND

CMS-422	EPA SOIL SAMPLE, DIOXIN < 1000 ppt
CMS-456 (2100)	EPA SOIL SAMPLE, DIOXIN > 1000 ppt (DIOXIN CONCENTRATION IN ppt)
CMS-091	EPA SEDIMENT SAMPLE, DIOXIN < 1000 ppt
CMS-123 (2100)	EPA SEDIMENT SAMPLE, DIOXIN > 1000 ppt (DIOXIN CONCENTRATION IN ppt)
AP-DEL-01 (50.9/76.9)	APRIL 2002 SAMPLE LOCATION (TOTAL TEQ CONCENTRATION IN ppt) (0-1.0'/1.0'-2.0')
02-DEL-201 (54)	SAMPLE LOCATION (TOTAL TEQ CONCENTRATION IN ppt) (< 1000 ppt)
01-DEL-201 (9612)	SAMPLE LOCATION (TOTAL TEQ CONCENTRATION IN ppt) (>1000 ppt)
	PROPOSED AREA OF EXCAVATION
+ 96.70	SPOT ELEV. & OR WATER ELEV.
	PIEZOMETER LOCATION
ppt	PARTS PER TRILLION

CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, R.I.

PROPOSED AREA OF EXCAVATION
ACTION AREA 10

Comm.No. 15RP102.003

FIGURE 10