

DETERMINATION OF PCDD/PCDF LEVELS

**Prepared for:
ESS Laboratory
Attn: Jena Paola
185 Frances Avenue
Cranston, RI 02910-2211**



This report contains 13 pages.

The results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

Project: Chemical Analysis

Client Project Number: 0606372

REPORT OF LABORATORY ANALYSIS

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CHAIN OF CUSTODY

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face
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Turn Time: Standard Other _____
 If faster than 5 days, prior approval by laboratory is required # _____
 State where samples were collected from: MA RI CT NH NJ NY ME Other _____
 Is this project for any of the following: MA-MCP Navy USACE Other _____
 Reporting Limits: _____
 Electronic Deliverable: Yes No
 Format: Excel _____ Access _____ PDF _____ Other _____
 ESS LAB PROJECT ID: 0600372

Co. Name	Project #	Project Name (20 Char. or less)	Number of Containers	Type of Containers	Write Required Analysis		
Senafack			120	Dioxins/Furans			
City	Address	Zip	PO#	Sample Identification (20 Char. or less)	Pres Code		
Telephone #	Fax #	Collection Time	Date	COMP	GRAB	MATRIX	
ESS LAB Sample#	62206	1200	6/22/06	Xsw	0600372-03	120	
Container Type: P-Poly <input checked="" type="checkbox"/> Glass S-Sterile V-VOA Matrix: S-Soil SD-Solid D-Sludge WW-Waste Water GW-Ground Water SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Fillers	Cooler Present: Yes <input type="checkbox"/> No <input type="checkbox"/>	Seals Intact: Yes <input type="checkbox"/> No <input type="checkbox"/> NA: <input type="checkbox"/>	Internal Use Only: <input type="checkbox"/>	Preservation Code: 1-NB-2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-	Sampled by:	Comments: 7.8°C	
Relinquished by: (Signature) <i>[Signature]</i>	Date/Time: 6/22/06 1800	Received by: (Signature) <i>B. Flew</i>	Date/Time: 6/23/06 9:15	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Relinquished by: (Signature) <i>[Signature]</i>	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

REPORT OF: CHEMICAL ANALYSES

PROJECT: PCDD/PCDF ANALYSES

DATE: July 10, 2006

ISSUED TO: ESS Laboratory
Attn: Jena Paola
185 Frances Avenue
Cranston, RI 02910-2211

REPORT NO: 06-1034229

INTRODUCTION

This report presents the results from the analyses performed on one sample submitted by a representative of ESS Laboratory. The sample was analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using a modified version of USEPA Method 8290.

SAMPLE IDENTIFICATION

<u>Client ID</u>	<u>Sample Type</u>	<u>Date Received</u>	<u>PAGE ID</u>
0606372-03	Water	06/23/06	1034229001

RESULTS

The results are included in the following:

- Appendix A – Chain of Custody Documentation
- Appendix B – PCDD/PCDF Results

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REPORT OF: CHEMICAL ANALYSES

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DISCUSSION

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 75-116%. All of the labeled standard recoveries obtained for the sample were within the 40-135% target range specified in Method 8290. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for variation in recovery and accurate values were obtained.

The responses for two analytes in ending calibration F60705A_18 were outside the target range for this method. The average response factors from the bracketing continuing calibrations were used to quantify the samples, as described in the method.

In some cases, interfering substances impacted the determinations of PCDD or PCDF congeners. The affected values were flagged "E" where polychlorinated diphenyl ethers were present.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results, found at the beginning of Appendix B, show the blank to contain trace levels of selected PCDDs and PCDFs. These levels were below the calibration range of the method. Sample levels similar to the corresponding blank levels were flagged "B" on the results tables and may be, at least partially, attributed to the background. It should be noted that levels less than ten times the background are not generally considered to be statistically different from the background.

Laboratory spike samples were also prepared with the sample batch using clean sand that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 99-157%, with relative percent differences of 0.0-24.3%. The OCDD recovery in LCS-10090 was above the target range for this method and could indicate a high bias for this analyte. The remaining results indicate high degrees of accuracy and precision for these determinations.

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REMARKS

The sample extracts will be retained for a period of 15 days from the date of this report and then discarded unless other arrangements are made. The raw mass spectral data will be archived on magnetic tape for a period of not less than one year. Questions regarding the data contained in this report may be directed to the author at the number provided below.

Pace Analytical Services, Inc.



Scott C. Unze
Project Manager, HRMS
(612) 607-6383

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TABLE 1. 2,3,7,8-TCDD Equivalency Factors (TEFs) for the Polychlorinated Dibenzo-p-dioxins and Dibenzofurans

Number	Compound(s)	TEF
1	2,3,7,8-TCDD	1.00
2	1,2,3,7,8-PeCDD	0.50
3	1,2,3,6,7,8-HxCDD	0.1
4	1,2,3,7,8,9-HxCDD	0.1
5	1,2,3,4,7,8-HxCDD	0.1
6	1,2,3,4,6,7,8-HpCDD	0.01
7	OCDD	0.001
8	* Total - TCDD	0.0
9	* Total - PeCDD	0.0
10	* Total - HxCDD	0.0
11	* Total - HpCDD	0.0
12	2,3,7,8-TCDF	0.10
13	1,2,3,7,8-PeCDF	0.05
14	2,3,4,7,8-PeCDF	0.5
15	1,2,3,6,7,8-HxCDF	0.1
16	1,2,3,7,8,9-HxCDF	0.1
17	1,2,3,4,7,8-HxCDF	0.1
18	2,3,4,6,7,8-HxCDF	0.1
19	1,2,3,4,6,7,8-HpCDF	0.01
20	1,2,3,4,7,8,9-HpCDF	0.01
21	OCDF	0.001
22	* Total - TCDF	0.0
23	* Total - PeCDF	0.0
24	* Total - HxCDF	0.0
25	* Total - HpCDF	0.0

*Excluding the 2,3,7,8-substituted congeners.

Reference: International Toxic Equivalence

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APPENDIX A

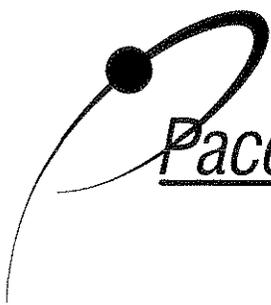
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APPENDIX B

REPORT OF LABORATORY ANALYSIS

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Method 8290 Blank Analysis Results

Client - ESS Laboratory

Lab Sample ID	BLANK-10089	Matrix	Water
Filename	F60706A_09	Dilution	NA
Total Amount Extracted	939 mL	Extracted	07/03/2006
ICAL Date	05/31/2006	Analyzed	07/06/2006 18:26
CCal Filename(s)	F60706A_04 & F60706A_20	Injected By	SMT

Native Isomers	Conc pg/L	EMPC pg/L	LRL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	2.1	2,3,7,8-TCDF-13C	2.00	98
Total TCDF	ND	----	2.1	2,3,7,8-TCDD-13C	2.00	92
				1,2,3,7,8-PeCDF-13C	2.00	88
2,3,7,8-TCDD	ND	----	2.1	2,3,4,7,8-PeCDF-13C	2.00	88
Total TCDD	ND	----	2.1	1,2,3,7,8-PeCDD-13C	2.00	101
				1,2,3,4,7,8-HxCDF-13C	2.00	90
1,2,3,7,8-PeCDF	ND	----	11.0	1,2,3,6,7,8-HxCDF-13C	2.00	86
2,3,4,7,8-PeCDF	ND	----	11.0	2,3,4,6,7,8-HxCDF-13C	2.00	88
Total PeCDF	ND	----	11.0	1,2,3,7,8,9-HxCDF-13C	2.00	96
				1,2,3,4,7,8-HxCDD-13C	2.00	91
1,2,3,7,8-PeCDD	ND	----	11.0	1,2,3,6,7,8-HxCDD-13C	2.00	79
Total PeCDD	ND	----	11.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	69
				1,2,3,4,7,8,9-HpCDF-13C	2.00	65
1,2,3,4,7,8-HxCDF	ND	----	11.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	77
1,2,3,6,7,8-HxCDF	ND	----	11.0	OCDD-13C	4.00	71
2,3,4,6,7,8-HxCDF	ND	----	11.0			
1,2,3,7,8,9-HxCDF	ND	----	11.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	11.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	11.0	2,3,7,8-TCDD-37Cl4	0.20	102
1,2,3,6,7,8-HxCDD	ND	----	11.0			
1,2,3,7,8,9-HxCDD	ND	----	11.0			
Total HxCDD	ND	----	11.0			
1,2,3,4,6,7,8-HpCDF	ND	----	11.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	11.0	Equivalence: 0.29 pg/L		
Total HpCDF	ND	----	11.0	(Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	18	----	11.0 J			
Total HpCDD	30	----	11.0 J			
OCDF	ND	----	21.0			
OCDD	110	----	21.0 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
LRL = Lower Reporting Limit
J = Concentration detected is below the calibration range
P = Recovery outside of target range
A = Detection Limit based on signal-to-noise measurement

I = Interference
E = PCDE Interference
ND = Not Detected
NA = Not Applicable
NC = Not Calculated
* = See Discussion

Report No.....1034229

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Method 8290 Analysis Results

Client - ESS Laboratory

Client's Sample ID 0606372-03
Lab Sample ID 1034229001
Filename F60705A_07
Injected By SMT
Total Amount Extracted 987 mL
% Moisture NA
Dry Weight Extracted NA
ICAL Date 05/31/2006
CCal Filename(s) F60705A_03 & F60705A_18
Method Blank ID BLANK-10089
Matrix Water
Dilution NA
Collected 06/22/2006
Received 06/23/2006
Extracted 07/03/2006
Analyzed 07/05/2006 14:54

Table with 7 columns: Native Isomers, Conc ng/L, EMPC ng/L, LRL ng/L, Internal Standards, ng's Added, Percent Recovery. Rows include TCDF, TCDD, PeCDF, PeCDD, HxCDF, HxCDD, HpCDF, HpCDD, OCDF, and OCDD.

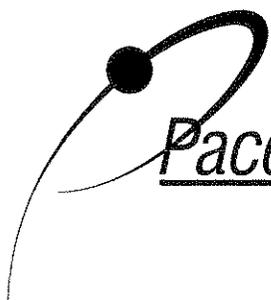
Conc = Concentration (Totals include 2,3,7,8-substituted isomers)
EMPC = Estimated Maximum Possible Concentration
A = Detection Limit based on signal-to-noise measurement
J = Concentration detected is below the calibration range
B = Less than 10 times higher than method blank level
P = Recovery outside of target range
Nn = Value obtained from additional analysis

LRL = Lower Reporting Limit
I = Interference
E = PCDE Interference
S = Saturated signal
ND = Not Detected
NA = Not Applicable
NC = Not Calculated
* = See Discussion

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Method 8290 Laboratory Control Spike Results

Client - ESS Laboratory

Lab Sample ID	LCS-10090	Matrix	Water
Filename	F60706A_05	Dilution	NA
Total Amount Extracted	909 mL	Extracted	07/03/2006
ICAL Date	05/31/2006	Analyzed	07/06/2006 15:07
CCal Filename(s)	F60706A_04 & F60706A_20	Injected By	SMT
Method Blank ID	BLANK-10089		

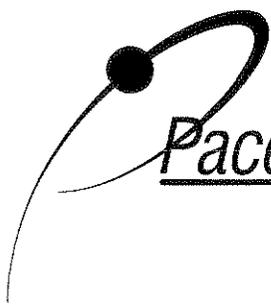
Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.21	107	2,3,7,8-TCDF-13C	2.00	89
				2,3,7,8-TCDD-13C	2.00	89
				1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	0.20	0.21	104	2,3,4,7,8-PeCDF-13C	2.00	80
				1,2,3,7,8-PeCDD-13C	2.00	93
				1,2,3,4,7,8-HxCDF-13C	2.00	73
1,2,3,7,8-PeCDF	1.00	1.19	119	1,2,3,6,7,8-HxCDF-13C	2.00	70
2,3,4,7,8-PeCDF	1.00	1.07	107	2,3,4,6,7,8-HxCDF-13C	2.00	75
				1,2,3,7,8,9-HxCDF-13C	2.00	82
				1,2,3,4,7,8-HxCDD-13C	2.00	70
1,2,3,7,8-PeCDD	1.00	0.99	99	1,2,3,6,7,8-HxCDD-13C	2.00	62
				1,2,3,4,6,7,8-HpCDF-13C	2.00	55
				1,2,3,4,7,8,9-HpCDF-13C	2.00	56
1,2,3,4,7,8-HxCDF	1.00	1.00	100	1,2,3,4,6,7,8-HpCDD-13C	2.00	66
1,2,3,6,7,8-HxCDF	1.00	1.08	108	OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	1.00	1.06	106			
1,2,3,7,8,9-HxCDF	1.00	1.04	104	1,2,3,4-TCDD-13C	2.00	NA
				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.11	111	2,3,7,8-TCDD-37Cl4	0.20	104
1,2,3,6,7,8-HxCDD	1.00	1.17	117			
1,2,3,7,8,9-HxCDD	1.00	1.30	130			
1,2,3,4,6,7,8-HpCDF	1.00	1.18	118			
1,2,3,4,7,8,9-HpCDF	1.00	1.20	120			
1,2,3,4,6,7,8-HpCDD	1.00	1.06	106			
OCDF	2.00	2.26	113			
OCDD	2.00	3.15	157 P			

Qs = Quantity Spiked
 Qm = Quantity Measured
 Rec. = Recovery (Expressed as Percent)
 P = Recovery outside of target range
 X = Background subtracted value
 Nn = Value obtained from additional analysis
 NA = Not Applicable
 * = See Discussion

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Method 8290 Laboratory Control Spike Results

Client - ESS Laboratory

Lab Sample ID	LCSD-10091	Matrix	Water
Filename	F60706A_06	Dilution	NA
Total Amount Extracted	940 mL	Extracted	07/03/2006
ICAL Date	05/31/2006	Analyzed	07/06/2006 15:56
CCal Filename(s)	F60706A_04 & F60706A_20	Injected By	SMT
Method Blank ID	BLANK-10089		

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.21	107	2,3,7,8-TCDF-13C	2.00	95
				2,3,7,8-TCDD-13C	2.00	86
				1,2,3,7,8-PeCDF-13C	2.00	87
2,3,7,8-TCDD	0.20	0.22	110	2,3,4,7,8-PeCDF-13C	2.00	83
				1,2,3,7,8-PeCDD-13C	2.00	97
				1,2,3,4,7,8-HxCDF-13C	2.00	83
1,2,3,7,8-PeCDF	1.00	1.23	123	1,2,3,6,7,8-HxCDF-13C	2.00	79
2,3,4,7,8-PeCDF	1.00	1.09	109	2,3,4,6,7,8-HxCDF-13C	2.00	79
				1,2,3,7,8,9-HxCDF-13C	2.00	83
				1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	1.00	1.05	105	1,2,3,6,7,8-HxCDD-13C	2.00	71
				1,2,3,4,6,7,8-HpCDF-13C	2.00	64
				1,2,3,4,7,8,9-HpCDF-13C	2.00	61
1,2,3,4,7,8-HxCDF	1.00	1.04	104	1,2,3,4,6,7,8-HpCDD-13C	2.00	70
1,2,3,6,7,8-HxCDF	1.00	1.14	114	OCDD-13C	4.00	67
2,3,4,6,7,8-HxCDF	1.00	1.10	110			
1,2,3,7,8,9-HxCDF	1.00	1.12	112	1,2,3,4-TCDD-13C	2.00	NA
				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.23	123	2,3,7,8-TCDD-37Cl4	0.20	99
1,2,3,6,7,8-HxCDD	1.00	1.19	119			
1,2,3,7,8,9-HxCDD	1.00	1.30	130			
1,2,3,4,6,7,8-HpCDF	1.00	1.22	122			
1,2,3,4,7,8,9-HpCDF	1.00	1.25	125			
1,2,3,4,6,7,8-HpCDD	1.00	1.04	104			
OCDF	2.00	2.40	120			
OCDD	2.00	2.46	123			

Qs = Quantity Spiked
 Qm = Quantity Measured
 Rec. = Recovery (Expressed as Percent)
 P = Recovery outside of target range
 X = Background subtracted value
 Nn = Value obtained from additional analysis
 NA = Not Applicable
 * = See Discussion

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SPIKE RECOVERY RELATIVE PERCENT DIFFERENCE (RPD) RESULTS

Client..... ESS Laboratory

SPIKE 1 ID..... LCS-10090
 SPIKE 1 Filename..... F60706A_05
 SPIKE 2 ID..... LCSD-10091
 SPIKE 2 Filename..... F60706A_06

COMPOUND	SPIKE 1 REC,%	SPIKE 2 REC,%	RPD,%
2378-TCDF	107	107	0.0
2378-TCDD	104	110	5.6
12378-PeCDF	119	123	3.3
23478-PeCDF	107	109	1.9
12378-PeCDD	99	105	5.9
123478-HxCDF	100	104	3.9
123678-HxCDF	108	114	5.4
234678-HxCDF	106	110	3.7
123789-HxCDF	104	112	7.4
123478-HxCDD	111	123	10.3
123678-HxCDD	117	119	1.7
123789-HxCDD	130	130	0.0
1234678-HpCDF	118	122	3.3
1234789-HpCDF	120	125	4.1
1234678-HpCDD	106	104	1.9
OCDF	113	120	6.0
OCDD	157	123	24.3

REC = Percent Recovered
 RPD = The difference between the two values divided by the average.
 NA = Not Applicable

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