

**Report on the Analysis of Coal Ash for  
2,3,7,8 – Tetrachlorodibenzo-*p*-dioxin and Related  
Dioxin-like Compounds**

**Former Swift Independent Packing Company Site  
(Swift Site)  
VCP Site No. 190**

**January 2009**

# Table of Contents

## List of Sections

Executive Summary ..... 1

Section 1      Sample Results and Estimated Total TCDD Concentration ..... 2

    1.1      Sample Results ..... 2

    1.2      Estimated Total TCDD Concentration ..... 4

Section 2      Comparison to Residential Protective Concentration Levels ..... 6

    2.1      Residential Protective Concentration Levels ..... 6

    2.2      Comparison Residential Protective Concentration Levels ..... 6

Section 3      Conclusions ..... 7

## List of Tables

Table 1      Summary of Analytical Data for “Coal Ash 7” Sample

Table 2      Comparison of Total 2,3,7,8 – TCDD TEQ to Residential Protective Concentration Levels

## List of Appendices

Appendix A    Laboratory Analytical Report

## Executive Summary

The former Swift Independent Packing Company site (Swift Site) is located on 1901 South San Marcos Street in San Antonio, Texas. The Swift Site is currently undergoing closure under the Texas Commission on Environmental Quality's (TCEQ's) Voluntary Cleanup Program (VCP). Residential land use is the proposed future use of the property. On January 13, 2008 a sample of coal ash was collected from the site by Geo-Marine, Inc. and submitted to DHL Analytical in Round Rock, Texas for analysis of 2,3,7,8 – tetrachlorodibenzo-*p*-dioxin (TCDD) and related dioxin-like compounds. TCDD is often called “dioxin” and is the reference compound for 2,3,7,8 – substituted polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans, typically referred to as “dioxins and furans” or “dioxin-like” compounds. These compounds usually occur as a mixture in environmental samples. The analytical results for TCDD and related dioxins and dioxin-like compounds in the coal ash sample were reviewed by RPS JDC, Inc. and the total results were compared to the TCEQ's Texas Risk Reduction Program protective concentration levels for TCDD in soils. The total results were determined to be below TCEQ's protective concentrations for residential land use and protection of groundwater resources. No further actions were recommended.

# Section 1

## Sample Results and Estimated Total TCDD Concentration

This section reports the coal ash sample results and describes how the total TCDD concentration was estimated.

### 1.1 Sample Results

On January 13, 2008 a sample of coal ash, i.e., Coal Ash 7 was collected from the Swift VCP Site by Geo-Marine, Inc. and submitted to DHL Analytical in Round Rock, Texas. DHL Analytical subsequently submitted the sample to Pace Analytical Services, Inc., a subcontract laboratory which performs analyses of environmental samples for polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDDs/ PCDFs). The most widely studied PCDD congener is 2,3,7,8 - tetrachlorodibenzo-p-dioxin (TCDD). TCDD, which is often called “dioxin”, is the reference compound for TCDD and related dioxin-like 2,3,7,8 – substituted PCDD and PCDF compounds, typically referred to as “dioxins and furans” or “dioxin-like” compounds. These compounds usually occur as a mixture in environmental samples. The latter compounds are considered “dioxin-like” since they have similar structures, similar physical and chemical properties, and common toxic responses as TCDD. The Pace Analytical Report, which includes the sample analysis results, blank and laboratory control sample results, and chain-of-custody record, can be found in Appendix A.

Results were reported by the laboratory in units of nanograms per kilogram (ng/kg) and were converted to units of milligrams per kilogram (mg/kg) for consistency with TCEQs’s Texas Risk Reduction Program (TRRP) Rule. The coal ash sample was analyzed for PCDD/PCDF on a dry weight basis. As shown in Table 1, results were reported for the following 2, 3, 7, 8 - PCDD/PCDF congeners and homologue classes:

- 2, 3, 7, 8 – tetrachlorodibenzofuran (TCDF);
- total TCDF;
- 2, 3, 7, 8 – TCDD;
- total TCDD;
- 1, 2, 3, 7, 8 – pentachlorodibenzofuran (PeCDF);
- 2, 3, 4, 7, 8 – PeCDF;
- total PeCDF;
- 1, 2, 3, 7, 8 – pentachlorodibenzodioxin (PeCDD);
- total PeCDD;
- 1, 2, 3, 4, 7, 8 – hexachlorodibenzofuran (HxCDF);

- 1, 2, 3, 6, 7, 8 – HxCDF;
- 2, 3, 4, 6, 7, 8 – HxCDF;
- 1, 2, 3, 7, 8, 9 – HxCDF;
- total HxCDF;
- 1, 2, 3, 4, 7, 8 – hexachlorodibenzodioxin (HxCDD);
- 1, 2, 3, 6, 7, 8 – HxCDD;
- 1, 2, 3, 7, 8, 9 – HxCDD;
- total HxCDD;
- 1, 2, 3, 4, 6, 7, 8 – heptachlorodibenzofuran (HpCDF):
- 1, 2, 3, 4, 7, 8, 9 – HpCDF;
- Total HpCDF;
- 1, 2, 3, 4, 6, 7, 8 – heptachlorodibenzodioxin (HpCDD):
- Total HpCDD;
- Octochlorodibenzofuran (ODCF); and
- Octachlorodibenzodioxin (OCDD).

The total concentration of dioxin and dioxin-like compounds in environmental samples is expressed as total 2,3,7,8 – TCDD Toxic Equivalents (TEQs). The concentration is based on (1) the analytical results for each TCDD/PCDF congener or homologue class reported by the laboratory, and (2) toxicity equivalency factors (TEFs) that were developed by the U. S. Environmental Protection Agency (EPA).<sup>1,2</sup> The TEF methodology compares the potential toxicity of each dioxin-like compound, for example 2,3,7,8 – TCDF, to TCDD which is the most toxic congener in the group. In this methodology TCDD is assigned a TEF of 1 and related compounds are assigned TEF values ranging from 1 to 0.00001. The TEFs were based on the scientific judgment of a panel of EPA experts which considered the available scientific data and uncertainties, and assigned conservative TEFs to avoid underestimating risk. The resulting total 2,3,7,8 – TCDD TEQ is calculated based on the following formula:

$$\text{Total 2,3,7,8 – TCDD TEQ} = \sum_{i \dots x} (\text{Congener}_i \times \text{TEF}_i) + (\text{Congener}_{ii} \times \text{TEF}_{ii}) + \dots (\text{Congener}_x \times \text{TEF}_x)$$

As shown in Table 1, the detected dioxin congeners/classes are total TCDF (0.0000013 mg/kg), total TCDD (0.000044 mg/kg), and OCDD (0.0000064 mg/kg). Pace calculated the total TCDD TEQ, the dioxin concentration, based on the detected congener OCDD, the international TEF of 0.001, and the following formula:

<sup>1</sup> EPA 1989a, *Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzop-dioxins and dibenzofurans and 1989 Update*, Risk Management Forum, Washington, DC, EPA/625/3-89.016

<sup>2</sup> Van den Berg et. al, 1998, *Toxic Equivalency Factors (TEF) for PCBs, PCDDs, PDCFs for Humans and Wildlife*, *Environ. Health Perspectives* 106(12): 775-792

$$\text{Total 2,3,7,8 - TCDD TEQ} = \text{OCDD Result} \times \text{TEF} = 6.6 \times 10^{-6} \text{ mg / kg} \times 0.001 = 6.4 \times 10^{-9} \text{ mg / kg}$$

Non-detect results and the results for total TCDF and total TCDD were not considered in the Pace calculation. In addition, the international TEFs for several dioxin-like compounds, including OCDD were revised by van den Berg et. al in 1998.

## 1.2 Estimated Total TCDD Concentration

The TCEQ has adopted the EPA's TEQ methodology for estimating dioxin concentrations in the TRRP Rule.<sup>3</sup> As shown in Table 1, the dioxin concentration in the coal ash sample collected from the Swift Site was estimated to be 0.0000443 mg/kg total 2,3,7,8-TCDD TEQs using the TEF methodology and factors in TRRP.

As specified in the TRRP Rule, when homologue-specific analytical data are available (e.g., total TCDF), it was assumed that the homologue class was comprised solely of 2,3,7,8 – substituted congeners, and the TEF specified for the 2,3,7,8 – substituted congeners was applied to the result. For example, the total TCDF homologue result of 0.0000013 mg/kg is presumed to consist solely of 2,3,7,8 – TCDF even though the 2,3,7,8 – TCDF congener was not detected. In this example the TEF is 0.1. The following formula shows the calculation of 2,3,7,8 - TCDD TEQs for this homologue class of dioxin-like compounds:

$$2,3,7,8 - \text{TCDD TEQ} = \text{Result} \times \text{TEF} = 1.3 \times 10^{-6} \text{ mg / kg} \times 0.1 = 1.3 \times 10^{-7} \text{ mg / kg}$$

As shown in Table 1, this approach was also used for the total TCDD homologue class of dioxins and dioxin-like compounds. The 2,3,7,8-TCDD congener was not detected in the sample.

As specified in the TRRP Rule, when congener-specific analytical data are available the TEF for the substituted 2,3,7,8 – substituted congener was applied to the result. Using OCDD as an example, the result is 0.0000064 mg/kg and the TEF is 0.0001. The following formula shows the calculation of 2,3,7,8 - TCDD TEQs for OCDD:

$$2,3,7,8 - \text{TCDD TEQ} = \text{Result} \times \text{TEF} = 6.4 \times 10^{-6} \text{ mg / kg} \times 0.0001 = 6.4 \times 10^{-10} \text{ mg / kg}$$

OCDD was the only congener detected in the coal ash sample.

<sup>3</sup> TCEQ Texas Risk Reduction Program, 30 Texas Administrative Code (TAC) §350.76(e) – Polychlorinated Dibenzop-Dioxins and Dibenzofurans

Regarding homologues that were not detected, one-half the reporting limit (RL) was used as the estimated concentration, and the TEF specified for the 2,3,7,8 – substituted congeners in the homologue class was applied to the result. Evaluation of non-detects is not required in §350.76(e), but this approach follows the most conservative, i.e., protective, procedures for handling non-detect results for property assessments in the TRRP Rule. Using PeCDF as an example, ½ the RL is <0.0000013 mg/kg and the TEF is 0.5. The following formula shows the calculated 2,3,7,8 - TCDD TEQs for this homologue class of dioxin-like compounds:

$$2,3,7,8 - TCDD \text{ TEQ} = \text{Result} \times \text{TEF} = 1.3 \times 10^{-6} \text{ mg / kg} \times 0.5 = 3.25 \times 10^{-7} \text{ mg / kg}$$

As shown in Table 1, this approach was also used for the non-detect homologues total PeCDD, total HxCDF, total HxCDD, total HpCDF, total HpCDD, and OCDF.

Overall, this is a very conservative approach for developing concentrations for a chemical of concern and should overestimate total TCDD concentrations in the sample.

## Section 2

# Comparison to Residential Protective Concentration Levels

This section discusses the residential protective concentration levels (PCLs) for TCDD in the TCEQ TRRP Rule and compares the site concentration to PCLs.

### 2.1 Residential Protective Concentration Levels

Residential PCLs are concentrations of chemicals of concern that can remain in an environmental medium such as soil or groundwater and not result in levels that exceed the human health risk based exposure limit for human exposure pathways when the property is used for residential purposes. The human health pathways and TRRP terminology for individual soil PCLs are the following:

- $^{Tot}Soil_{Comb}$  - direct contact through combined ingestion of soils, dermal contact with soils, inhalation of volatiles and air-born soil particulates, and ingestion of above and below-ground vegetables grown in soil containing chemicals of concern; and
- $^{GW}Soil_{Ing}$  – leaching of chemicals of concern in soil to groundwater. The TCEQ has published conservative Tier 1 residential PCLs for a number of chemicals of concern including TCDD.<sup>4</sup>

The TCEQ has adopted the EPA's 0.001 mg/kg preliminary remediation goal for TCDD (dioxins) as the Tier 1 TRRP residential  $^{Tot}Soil_{Comb}$  PCL for direct contact with soils.<sup>5</sup> The Tier 1 residential  $^{GW}Soil_{Ing}$  PCL is 0.017 mg/kg for affected areas less than 0.5 acres in size and 0.0085 mg/kg for areas less than 30 acres in size. The critical, or lowest, residential PCL for TCDD is 0.001 mg/kg.

### 2.2 Comparison Residential Protective Concentration Levels

The total 2,3,7,8-TCDD TEQ determined for the coal ash sample are compared to TCEQ residential PCLs in Table 2. As shown, the concentration of the chemical of concern is below the individual and critical PCLs.

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<sup>4</sup> TCEQ 2008, Table 1 – Tier 1 Residential Soil Protective Concentration Levels, In: TRRP Tables, last revised April 24, 2008

<sup>5</sup> EPA 1998, Memorandum From: Timothy Fields, Jr. Acting Administrator Office of Solid Waste and Emergency Response, To: Director Office of Site Remediation and Restoration Regions I through X, Subject: Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites, April 13, 1998, OSWER Directive 9200.4-26

## Section 3

### Conclusions

The coal ash sample collected at the Swift Site on January 13, 2008 by Geo-Marine, Inc. was intended to represent a “worst-case” for potential concentrations of dioxin and dioxin-like compounds at the subject property. As described in Section 1, the total concentration of dioxin and dioxin-like compounds in environmental samples is expressed as total 2,3,7,8 – TCDD TEQs. TCDD, which is often called “dioxin”, is the reference compound for this class of chemicals, which usually occur as a mixture in environmental samples. The sample results and calculation of total TCDD TEQs for the coal ash sample are shown in Table 1. The methodology used was conservative and should overestimated dioxin levels in the sample and at the site. A comparison of the result to residential PCLs is shown in Table 2. The level of total 2,3,7,8 - TCDD TEQ (dioxin) is below the individual and critical PCLs for TCDD at residential sites. Therefore conditions with regard to this chemical of concern are protective of human health and groundwater resources and no further actions are recommended.

# Tables

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**Table 1 Summary of Analytical Data for "Coal Ash 7" Sample**

$$2,3,7,8\text{-TCDD TEQ} = \text{Congener Result} \times \text{TEF}$$

$$\text{total } 2,3,7,8\text{-TCDD TEQ} = \sum_{i=1}^x (\text{Congener}_i \times \text{TEF}_i) + (\text{Congener}_{ii} \times \text{TEF}_{ii}) + \dots (\text{Congener}_x \times \text{TEF}_x)$$

Congener or Homologue Class	Result (ng/kg)	RL (ng/kg)	Result (mg/kg)	RL (mg/kg)	TRRP TEF Value	2,3,7,8-TCDD TEQ (mg/kg)
2,3,7,8-TCDF	ND	0.36	ND	3.60E-07	0.1	
Total TCDF <sup>(1)</sup>	1.3	0.36	<b>1.30E-06</b>	3.60E-07	0.1	<b>1.30E-07</b>
2,3,7,8-TCDD	ND	0.51	ND	5.10E-07	1	
Total TCDD <sup>(1)</sup>	43	0.51	<b>4.30E-05</b>	5.10E-07	1	<b>4.30E-05</b>
1,2,3,7,8-PeCDF	ND	1.3	ND	1.30E-06	0.05	
2,3,4,7,8-PeCDF	ND	1.3	ND	1.30E-06	0.5	
Total PeCDF <sup>(2)</sup>	ND	1.3	ND	1.30E-06	0.5	<b>3.25E-07</b>
1,2,3,7,8-PeCDD	ND	1.3	ND	1.30E-06	1	
Total PeCDD <sup>(2)</sup>	ND	1.3	ND	1.30E-06	1	<b>6.50E-07</b>
1,2,3,4,7,8-HxCDF	ND	1.3	ND	1.30E-06	0.1	
1,2,3,6,7,8-HxCDF	ND	1.3	ND	1.30E-06	0.1	
2,3,4,6,7,8-HxCDF	ND	1.3	ND	1.30E-06	0.1	
1,2,3,7,8,9-HxCDF	ND	1.3	ND	1.30E-06	0.1	
Total HxCDF <sup>(2)</sup>	ND	1.3	ND	1.30E-06	0.1	<b>6.50E-08</b>
1,2,3,4,7,8-HxCDD	ND	1.3	ND	1.30E-06	0.1	
1,2,3,6,7,8-HxCDD	ND	1.3	ND	1.30E-06	0.1	
1,2,3,7,8,9-HxCDD	ND	1.3	ND	1.30E-06	0.1	
Total HxCDD <sup>(2)</sup>	ND	1.3	ND	1.30E-06	0.1	<b>6.50E-08</b>
1,2,3,4,6,7,8-HpCDF	ND	1.3	ND	1.30E-06	0.01	
1,2,3,4,7,8,9-HpCDF	ND	1.3	ND	1.30E-06	0.01	
Total HpCDF	ND	1.3	ND	1.30E-06	0.01	<b>6.50E-09</b>
1,2,3,4,6,7,8-HpCDD	ND	1.3	ND	1.30E-06	0.01	
Total HpCDD <sup>(2)</sup>	ND	1.3	ND	1.30E-06	0.01	<b>6.50E-09</b>
OCDF <sup>(2)</sup>	ND	2.7	ND	2.70E-06	0.0001	<b>1.35E-10</b>
OCDD	6.4	2.7	<b>6.40E-06</b>	2.70E-06	0.0001	<b>6.40E-10</b>

**Total 2,3,7,8-TCDD Equivalents (mg/kg) = 4.42E-05**

ND = TCDD or TCDF Congener or Homologue Class Not detected

Result (mg/kg) = Result (ng/kg) x CF ug/ng x CF mg/ug

CF = 1/1000

TEF = Toxic Equivalency Factor from Texas Risk Reduction Program 30 TAC 350.76(e)

TEQ = Toxic Equivalent value based on 2,3,7,8-TCDD

(1) Assumes 100% of Total TCDD or TCDF detected is the 2,3,7,8-substituted congener even though these congeners were ND.

(2) Congener or Homologue Class was ND. Use 1/2 RL as the result to calculate TEQ value

**Table 2 Comparison of Total 2,3,7,8 TCDD TEQ Result to Residential Protective Concentration Level**

	<b>Affected Areas &lt;0.5 acres</b>	<b>Affected Areas &lt;30 acres</b>
Residential Tier 1 <sup>Tot</sup> Soil <sub>Comb</sub> PCL (mg/kg) =	0.001	0.001
Residential Tier 1 <sup>GW</sup> Soil <sub>Ing</sub> PCL (mg/kg) =	0.016950512	0.008475256
Critical Residential PCL (mg/kg) =	0.001	0.001
Total 2,3,7,8-TCDD Equivalents (mg/kg) =	0.0000442	0.0000442
<b>LESS THAN RESIDENTIAL PROTECTIVE LEVELS? =</b>	<b>YES</b>	<b>YES</b>

# **Appendix A**

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## **Laboratory Analytical Report**



www.pacelabs.com

Pace Analytical Services, Inc.  
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Minneapolis, MN 55414  
Phone: 612.607.1700  
Fax: 612.607.6444

**Report Prepared for:**

John Dupont  
DHL Analytical  
2300 Double Creek Drive  
Round Rock TX 78664

**REPORT OF  
LABORATORY  
ANALYSIS FOR  
PCDD/PCDF**

**Report Prepared Date:**

January 22, 2009

Report No.....1087615\_8290

**Report Information:**

**Pace Project #: 1087615**  
**Sample Receipt Date: 01/14/2009**  
**Client Project #: 0901056**  
**Client Sub PO #: 9276**  
**State Cert #: T104704192-06-TX**

**Invoicing & Reporting Options:**

The report provided has been invoiced as a Level 2 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Scott Unze, your Pace Project Manager.

**This report has been reviewed and prepared by:**

Scott Unze, Project Manager  
(612) 607-6383  
(612) 607-6444 (fax)  
scott.unze@pacelabs.com



**Report of Laboratory Analysis**

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.



Pace Analytical Services, Inc.  
1700 Elm Street  
Minneapolis, MN 55414  
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Fax: 612.607.6444

## **DISCUSSION**

This report presents the results from the analyses performed on one sample submitted by a representative of DHL Analytical. 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. Reporting limits were set to correspond to one-fifth of the lowest calibration points.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 33-94%. With the exception of one low value, which was flagged "P" on the results table, the labeled standard recoveries obtained for this project 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.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank to be free of PCDDs and PCDFs at the reporting limits.

A laboratory spike sample was 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 84-100%. These results indicate a high degree of accuracy for these determinations. Matrix spikes were prepared with the sample batch using sample material from a separate project; results from these analyses will be provided upon request.

## **REPORT OF LABORATORY ANALYSIS**

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## **Appendix A**

### Sample Management

1087615

# CHAIN-OF-CUSTODY RECORD

DHL Analytical  
2300 Double Creek Drive  
Round Rock, TX 78664

TEL: (512) 388-8222  
FAX: (512) 388-8229  
Work Order: 0901056

Subcontractor:  
Pace Analytical  
1700 Elm Str.  
Minneapolis, MN 55414

TEL: (612) 607-1700  
FAX: (612) 607-6444  
Acct.#:

13-Jan-09

Sample Id	Matrix	DHL#	Date Collected	Bottle Type	Requested Tests
Coat Ash 7	Solid	101A	01/13/09 10:00 AM	4-OZGJAR	SW8290 1087615001

1120

Report Dry Weight Basis.

General Comments:

Please analyze these samples with a Bush Turnaround Time. 1 week turn around

Quality Control Package Needed: Standard / \_\_\_\_\_  
Call John DuPont if you have questions.

Relinquished by:	Date/Time	Received by:	Date/Time
<i>[Signature]</i>	1/13/09 11:30	<i>[Signature]</i>	1/13/09 11:30
<i>[Signature]</i>		<i>[Signature]</i>	1/14/09 09:20

T= 3.45

**Sample Condition Upon Receipt**

Pace Analytical

Client Name: DHL analytical Project # 1087615

Courier:  Fed Ex  UPS  USPS  Client  Commercial  Pace Other

Tracking #: 797248083134

Optional:
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present:  Yes  no Seals intact:  yes  no

Packing Material:  Bubble Wrap  Bubble Bags  None  Other Temp Blank: Yes  No

Thermometer Used 80344042, 179426 Type of Ice: Wet Blue  None  Samples on ice, cooling process has begun

Cooler Temperature 3.4°C Biological Tissue is Frozen: Yes  No

Temp should be above freezing to 6°C

Date and initials of person examining contents:
<u>1/14/09</u>

Comments:

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5.
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9.
-Pace Containers Used:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10.
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
-Includes date/time/ID/Analysis Matrix:	<u>SL</u>	
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Exceptions: VOA, Coliform, TOC, Oil and Grease, WI-DRO (water)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Initial when completed
		Lot # of added preservative
Samples checked for dechlorination:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	15.
Trip Blank Present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	16.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):		

**Client Notification/ Resolution:**

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Project Manager Review: [Signature] Date: 01/14/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office for review. (If of hold time, out of temp, incorrect containers)

## **Appendix B**

### Sample Analysis Summary



**Method 8290 Sample Analysis Results**

Client - DHL Analytical

Client's Sample ID	Coal Ash 7			
Lab Sample ID	1087615001			
Filename	U90116A_09			
Injected By	CVS			
Total Amount Extracted	12.6 g	Matrix	Solid	
% Moisture	40.5	Dilution	NA	
Dry Weight Extracted	7.49 g	Collected	01/13/2009	
ICAL ID	U81216	Received	01/14/2009	
CCal Filename(s)	U90115B_17 & U90116A_19	Extracted	01/14/2009	
Method Blank ID	BLANK-18780	Analyzed	01/16/2009 14:51	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	0.36 A	2,3,7,8-TCDF-13C	2.00	79
Total TCDF	1.3	---	0.36	2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	77
2,3,7,8-TCDD	ND	---	0.51 A	2,3,4,7,8-PeCDF-13C	2.00	76
Total TCDD	43.0	---	0.51	1,2,3,7,8-PeCDD-13C	2.00	80
				1,2,3,4,7,8-HxCDF-13C	2.00	80
1,2,3,7,8-PeCDF	ND	---	1.30	1,2,3,6,7,8-HxCDF-13C	2.00	93
2,3,4,7,8-PeCDF	ND	---	1.30	2,3,4,6,7,8-HxCDF-13C	2.00	94
Total PeCDF	ND	---	1.30	1,2,3,7,8,9-HxCDF-13C	2.00	82
				1,2,3,4,7,8-HxCDD-13C	2.00	81
1,2,3,7,8-PeCDD	ND	---	1.30	1,2,3,6,7,8-HxCDD-13C	2.00	87
Total PeCDD	ND	---	1.30	1,2,3,4,6,7,8-HpCDF-13C	2.00	75
				1,2,3,4,7,8,9-HpCDF-13C	2.00	69
1,2,3,4,7,8-HxCDF	ND	---	1.30	1,2,3,4,6,7,8-HpCDD-13C	2.00	75
1,2,3,6,7,8-HxCDF	ND	---	1.30	OCDD-13C	4.00	33 P
2,3,4,6,7,8-HxCDF	ND	---	1.30			
1,2,3,7,8,9-HxCDF	ND	---	1.30	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	1.30	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	1.30	2,3,7,8-TCDD-37Cl4	0.20	80
1,2,3,6,7,8-HxCDD	ND	---	1.30			
1,2,3,7,8,9-HxCDD	ND	---	1.30			
Total HxCDD	ND	---	1.30			
1,2,3,4,6,7,8-HpCDF	ND	---	1.30	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	1.30	Equivalence: 0.0064 ng/Kg		
Total HpCDF	ND	---	1.30	(Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	1.30			
Total HpCDD	ND	---	1.30			
OCDF	ND	---	2.70			
OCDD	6.4	---	2.70 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit.

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Value below calibration range  
A = Reporting Limit based on signal to noise  
P = Recovery outside target range

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**Method 8290 Blank Analysis Results**

Lab Sample ID	BLANK-18780	Matrix	Solid
Filename	U90116A_07	Dilution	NA
Total Amount Extracted	10.2 g	Extracted	01/14/2009
ICAL ID	U81216	Analyzed	01/16/2009 13:19
CCal Filename(s)	U90115B_17 & U90116A_11	Injected By	CVS

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	0.20	2,3,7,8-TCDF-13C	2.00	75
Total TCDF	ND	---	0.20	2,3,7,8-TCDD-13C	2.00	80
				1,2,3,7,8-PeCDF-13C	2.00	77
2,3,7,8-TCDD	ND	---	0.20	2,3,4,7,8-PeCDF-13C	2.00	81
Total TCDD	ND	---	0.20	1,2,3,7,8-PeCDD-13C	2.00	78
				1,2,3,4,7,8-HxCDF-13C	2.00	73
1,2,3,7,8-PeCDF	ND	---	0.98	1,2,3,6,7,8-HxCDF-13C	2.00	92
2,3,4,7,8-PeCDF	ND	---	0.98	2,3,4,6,7,8-HxCDF-13C	2.00	87
Total PeCDF	ND	---	0.98	1,2,3,7,8,9-HxCDF-13C	2.00	76
				1,2,3,4,7,8-HxCDD-13C	2.00	73
1,2,3,7,8-PeCDD	ND	---	0.98	1,2,3,6,7,8-HxCDD-13C	2.00	86
Total PeCDD	ND	---	0.98	1,2,3,4,6,7,8-HpCDF-13C	2.00	77
				1,2,3,4,7,8,9-HpCDF-13C	2.00	67
1,2,3,4,7,8-HxCDF	ND	---	0.98	1,2,3,4,6,7,8-HpCDD-13C	2.00	77
1,2,3,6,7,8-HxCDF	ND	---	0.98	OCDD-13C	4.00	58
2,3,4,6,7,8-HxCDF	ND	---	0.98			
1,2,3,7,8,9-HxCDF	ND	---	0.98	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	0.98	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	0.98	2,3,7,8-TCDD-37Cl4	0.20	82
1,2,3,6,7,8-HxCDD	ND	---	0.98			
1,2,3,7,8,9-HxCDD	ND	---	0.98			
Total HxCDD	ND	---	0.98			
1,2,3,4,6,7,8-HpCDF	ND	---	0.98	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	0.98	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	---	0.98	(Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	0.98			
Total HpCDD	ND	---	0.98			
OCDF	ND	---	2.00			
OCDD	ND	---	2.00			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

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**Method 8290 Laboratory Control Spike Results**

Lab Sample ID	LCS-18781	Matrix	Solid
Filename	U90116A_01	Dilution	NA
Total Amount Extracted	10.1 g	Extracted	01/14/2009
ICAL ID	U81216	Analyzed	01/16/2009 08:32
CCal Filename(s)	U90115B_17 & U90116A_11	Injected By	CVS
Method Blank ID	BLANK-18780		

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.19	97	2,3,7,8-TCDF-13C	2.00	84
Total TCDF				2,3,7,8-TCDD-13C	2.00	89
				1,2,3,7,8-PeCDF-13C	2.00	84
2,3,7,8-TCDD	0.20	0.19	93	2,3,4,7,8-PeCDF-13C	2.00	89
Total TCDD				1,2,3,7,8-PeCDD-13C	2.00	83
				1,2,3,4,7,8-HxCDF-13C	2.00	73
1,2,3,7,8-PeCDF	1.00	0.98	98	1,2,3,6,7,8-HxCDF-13C	2.00	103
2,3,4,7,8-PeCDF	1.00	0.97	97	2,3,4,6,7,8-HxCDF-13C	2.00	95
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.00	82
				1,2,3,4,7,8-HxCDD-13C	2.00	72
1,2,3,7,8-PeCDD	1.00	0.95	95	1,2,3,6,7,8-HxCDD-13C	2.00	96
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.00	80
				1,2,3,4,7,8,9-HpCDF-13C	2.00	65
1,2,3,4,7,8-HxCDF	1.00	0.96	96	1,2,3,4,6,7,8-HpCDD-13C	2.00	77
1,2,3,6,7,8-HxCDF	1.00	0.93	93	OCDD-13C	4.00	54
2,3,4,6,7,8-HxCDF	1.00	0.89	89			
1,2,3,7,8,9-HxCDF	1.00	0.98	98	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	0.94	94	2,3,7,8-TCDD-37Cl4	0.20	89
1,2,3,6,7,8-HxCDD	1.00	0.98	98			
1,2,3,7,8,9-HxCDD	1.00	0.93	93			
Total HxCDD						
1,2,3,4,6,7,8-HpCDF	1.00	0.97	97			
1,2,3,4,7,8,9-HpCDF	1.00	0.97	97			
Total HpCDF						
1,2,3,4,6,7,8-HpCDD	1.00	0.84	84			
Total HpCDD						
OCDF	2.00	2.01	100			
OCDD	2.00	1.96	98			

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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