

US EPA ARCHIVE DOCUMENT

# Beazer

BEAZER EAST, INC. C/O THREE RIVERS MANAGEMENT, INC.  
MANOR OAK ONE, SUITE 200, 1910 COCHRAN ROAD, PITTSBURGH, PA 15220

February 19, 2013

Ms. Carolyn Bury  
U.S. Environmental Protection Agency, Region V  
77 West Jackson Boulevard  
Mail Code DE-9J  
Chicago, IL 60604-3590

Re: Former Koppers Wood-Treating Site – Carbondale, Illinois  
November 2012 Dioxin Sampling Final/Validated Data Submittal

Dear Ms. Bury:

In accordance with the November 19, 2012 *Work Plan for Additional Soil Sampling and PCDD/PCDF Analysis* (Work Plan), which was approved by the USEPA on November 20, 2012, Beazer conducted sampling in the residential area south of the Former Koppers Wood-Treating Site in Carbondale, Illinois on November 27 and 28, 2012. The purpose of this letter is to transmit the final/validated laboratory analytical data associated with the November 2012 sampling to the USEPA. The following are attached to this letter:

- Attachment 1 – Validated Analytical Data Summary Table
- Attachment 2 – Sample Location Maps
- Attachment 3 – Data Validation Reports (includes validated laboratory analytical data sheets)

As discussed in the Work Plan, a total of 16 samples were collected – eight of the 16 were initially analyzed for PCDDs/PCDFs, and the other eight were held at the laboratory. Based on discussions with USEPA during a December 18, 2012 conference call, four of the initially held samples were released for PCDD/PCDF analysis. The results for all 12 of the analyzed samples are reported herein.

Please feel contact me at 412-208-8867 if you have any questions or comments regarding this submittal.

Sincerely,



Michael Slenska, P.E.  
Senior Environmental Manager

Enclosure

cc: James Moore, IEPA  
Jeffrey Holden, ARCADIS  
Paul Anderson, ARCADIS  
David Bessingpas, ARCADIS

Writer's Direct Dial: 412/208-8867

**Attachment 1**

Validated Analytical Data  
Summary Table

TABLE 1  
VALIDATED ANALYTICAL DATA SUMMARY - NOV. 2012 SAMPLES

FORMER KOPPERS WOOD-TREATING SITE  
CARBONDALE, ILLINOIS

Sample ID: Depth (ft bgs): Sample Date:	Units	A1-64 0 - 0.5 11/27/12	A1-65 0 - 0.5 11/27/12	A1-66 0 - 0.5 11/28/12	A1-67 0 - 0.5 11/28/12	A1-68 0 - 0.5 11/27/12	A1-69 0 - 0.5 11/27/12	A1-70 0 - 0.5 11/27/12	A1-71 0 - 0.5 11/27/12	A1-72 0 - 0.5 11/27/12	A1-73 0 - 0.5 11/27/12	A1-74 0 - 0.5 11/27/12	A1-75 0 - 0.5 11/27/12
<b>CDDs/PCDFs</b>													
2,3,4,6,7,8-HpCDD	pg/g	344	358	1,530	5,010 EJ	296 [317]	205	897	653	269	773 [1,160]	316	817
2,3,4,6,7,8-HpCDF	pg/g	25.8	41.3	189 J	468	24.1 [26.5]	19.7	254	82.8	19.4	130 [186]	30.6	62.4
2,3,4,7,8,9-HpCDF	pg/g	1.88 J	3.13	13.1	29.3	1.88 J [1.84 J]	1.42 J	26.5	5.77	1.39 J	9.45 [14.6]	2.21 J	4.42
2,3,4,7,8-HxCDD	pg/g	2.88	3.52	11.5	31.4	3.31 [3.34]	2.15 J	8.26	7.01	2.77 J	9.72 [12.4]	3.19	9.48
2,3,4,7,8-HxCDF	pg/g	1.48 J	1.93 J	7.81	7.87	1.51 J [1.46 J]	1.16 J	11.7	3.85	0.844 J	5.26 [6.94]	1.98 J	2.32 J
2,3,6,7,8-HxCDD	pg/g	7.22	10.1	44.5	95.0	8.83 [10.7]	5.83	29.7	17.9	6.08	24.1 [30.8]	7.64	20.8
2,3,6,7,8-HxCDF	pg/g	1.09 J	1.42 J	5.86	5.54	1.26 J [1.12 UX]	0.808 UX	7.16	3.19	0.685 UX	5.98 [7.50]	1.65 J	2.12 J
2,3,7,8,9-HxCDD	pg/g	6.96	8.17	27.1	79.3	8.04 [9.54]	5.35	21.0	16.4	6.66	23.7 [29.5]	6.97	33.7
2,3,7,8,9-HxCDF	pg/g	0.139 J	0.193 J	0.745 J	0.737 J	0.483 U [0.505 U]	0.390 U	1.63 J	0.275 J	0.316 U	0.984 U [1.59 J]	0.375 U	0.277 U
2,3,7,8-PeCDD	pg/g	1.64 J	2.04 J	4.85	10.5	2.06 J [2.56 J]	1.53 J	4.04	4.16	1.22 UX	6.58 [6.47]	2.03 J	8.18
2,3,7,8-PeCDF	pg/g	0.419 J	0.336 J	2.29 J	0.807 J	0.453 J [0.395 J]	0.429 J	0.721 J	1.03 J	0.235 U	1.14 J [1.11 J]	0.709 J	0.682 J
3,4,6,7,8-HxCDF	pg/g	1.76 J	2.32 J	9.08	11.1	2.12 J [2.21 J]	1.24 J	14.3	5.05	1.18 J	8.06 [10.7]	2.17 J	3.58
3,4,7,8-PeCDF	pg/g	0.524 J	0.778 J	3.86 J	1.58 J	1.04 J [1.03 J]	0.654 J	0.609 J	2.48 J	0.190 UX	1.38 J [1.54 J]	1.00 J	0.568 J
3,7,8-TCDD	pg/g	0.301 J	0.269 UX	0.870	0.782	0.364 J [0.372 J]	0.316 UX	0.329 UX	0.561 J	0.185 UX	0.667 [0.579]	0.259 J	1.25
3,7,8-TCDF	pg/g	0.652	0.408 J	1.65	0.479 J	0.331 J [0.287 J]	0.555 J	0.336 J	1.22	0.157 J	0.627 [0.769]	0.821	0.760
CDD	pg/g	17,700 EJ	12,700 EJ	30,900 EJ	170,000 DEJ	10,900 EJ [11,200 EJ]	9,870 EJ	19,900 EJ	24,000 EJ	20,000 EJ	21,500 EJ [26,800 EJ]	12,400 EJ	21,000 EJ
CDF	pg/g	112	169	718	3,970 J	82.3 [88.8]	60.9	576	319	78.7	450 [871]	107	340
total HpCDD	pg/g	759	832	2,610	8,240	583 [656]	439	1,450	1,570	588	1,480 [2,150]	709	1,730
total HpCDF	pg/g	88.7	138	639	2,250	82.7 [80.6]	58.5	849	273	62.4	397 [633]	97.7	227
total HxCDD	pg/g	75.2	89.8	257	601	73.5 [84.3]	61.3	157	162	57.5	208 [274]	81.9	204
total HxCDF	pg/g	31.5	47.4	170	327	38.1 [37.9]	19.3	281	91.3	20.4	139 [205]	36.4	64.4
total PeCDD	pg/g	18.4	17.9	36.3	52.5	13.6 [16.5]	15.9	21.9	34.2	9.91	36.2 [47.1]	16.4	37.4
total PeCDF	pg/g	13.3	14.8	52.9	34.4	22.3 [19.6]	9.72	25.7	38.2	4.96	40.7 [58.5]	19.7	40.6
total TCDD	pg/g	9.13	5.82	7.00	4.51	2.11 [2.33]	3.73	1.46	12.2	1.25	7.27 [9.10]	1.87	7.82
total TCDF	pg/g	9.56	8.38	30.5	9.56	9.05 [6.87]	7.12	2.86	27.0	1.78	16.9 [20.7]	16.1	16.3
3,7,8-TCDD TEQ	pg/g	13.4	13.0	44.6	142	11.8 [12.8]	8.61	31.6	25.7	10.7	31.1 [39.5]	12.3	32.1

**Notes:**

All 12 samples were composites of five discrete soil sample locations.

**Definitions:**

CDDs/PCDFs = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans

pg/g = picograms per gram, or parts per trillion (ppt)

bgs = feet below ground surface

EQ = Toxicity Equivalent, calculated using 2005 World Health Organization (WHO) Toxicity Equivalent Factors (TEFs)

[ ] = analytical result for duplicate sample

**Data Qualifiers:**

D = result based on analysis of diluted sample

E = the amount detected is above the High Calibration Limit

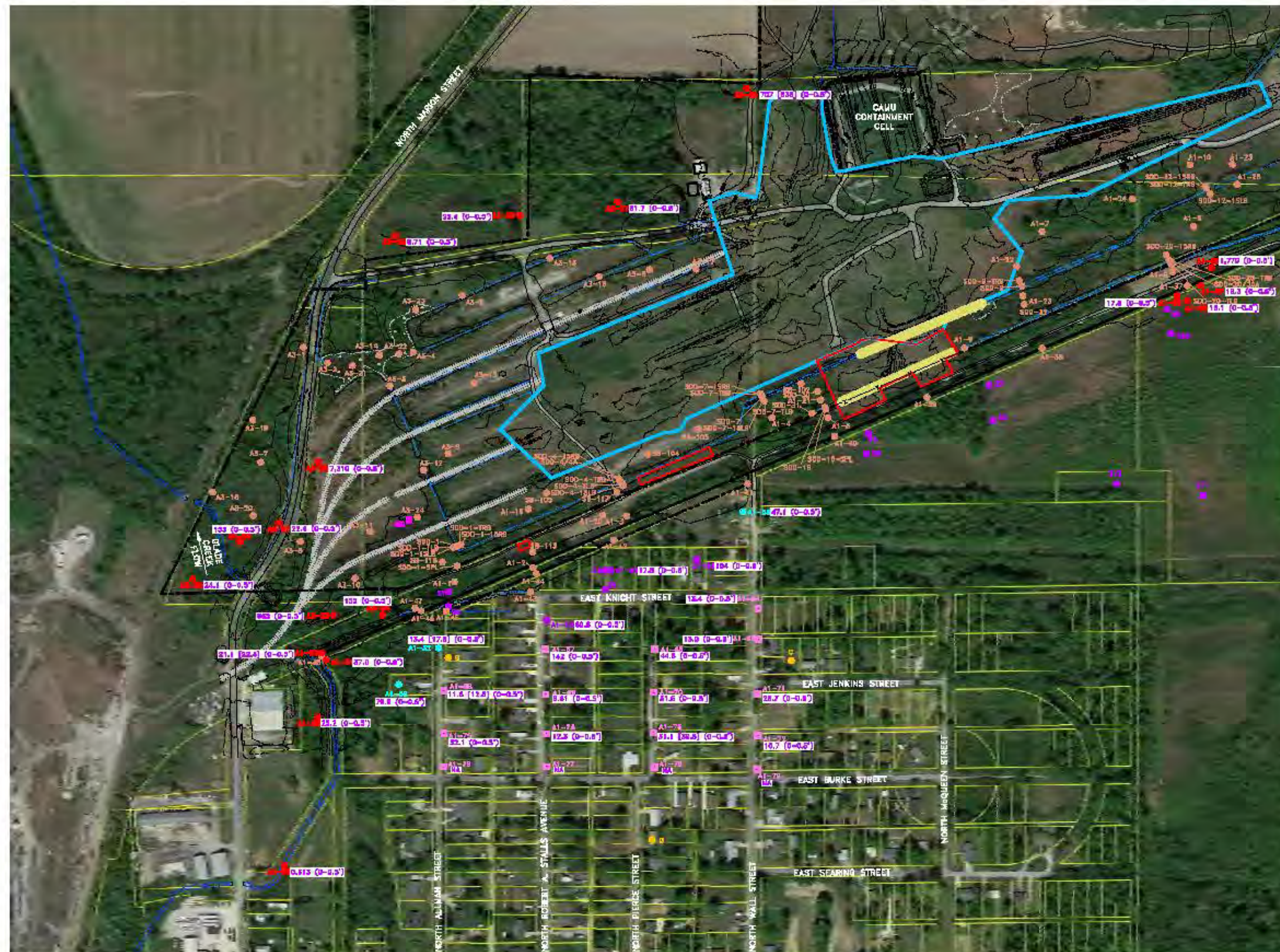
J = the amount detected is below the Low Calibration Limit; or estimated value based on data validation

U = compound not detected; reported value is the sample specific estimated detection limit

UX = non-detect; reported value is the estimated maximum possible concentration

**Attachment 2**

Sample Location Maps



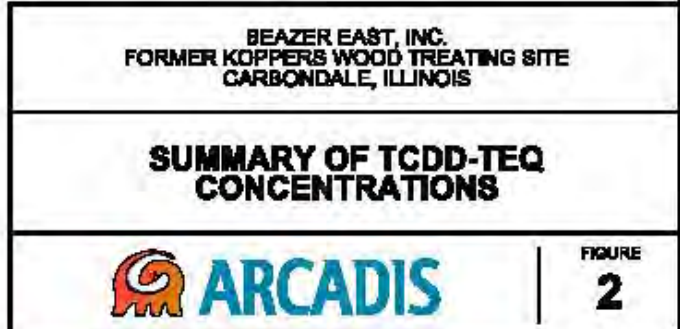
## NOTES:

1. SITE FEATURES AND TOPOGRAPHY OBTAINED FROM PHOTOGRAMMETRIC MAPPING PROVIDED BY LOCKWOOD MAPPING COMPANY IN SEPTEMBER 2001 AND SURVEY DATA PROVIDED BY ENGINEERING DESIGN SOURCE, INC. IN JANUARY 2004, AND BASED ON AERIAL PHOTOGRAPHY PROVIDED BY LOCKWOOD MAPPING, INC. TAKEN ON NOVEMBER 22, 1999 AT AN APPROXIMATE SCALE OF 1"=500'. TOPOGRAPHY IN THE EASTERN SOUTHERN DRAINAGE DITCHES AREA BASED ON TOPOGRAPHIC FIELD SURVEY CONDUCTED IN AUGUST 2007.
2. PROPERTY BOUNDARY IS APPROXIMATE; OBTAINED FROM A COMBINATION OF SITE SURVEY DATA, HISTORICAL MAPS AND TAX MAPS.
3. THE 2006 RESIDENTIAL SAMPLE LOCATIONS ARE APPROXIMATE.
4. AERIAL IMAGE OBTAINED FROM GOOGLE EARTH AND DATED APRIL 2, 2012.

BEAZER EAST, INC.  
FORMER KOPPERS WOOD TREATING SITE  
CARBONDALE, ILLINOIS

**AUGUST/NOVEMBER 2012 SAMPLE  
LOCATIONS AND TCDD-TEQ  
CONCENTRATIONS**





**Attachment 3**

Data Validation Reports  
(includes validated laboratory  
data sheets)

**Beazer East Inc.**

**Former Koppers Wood-Treating Site**

**Data Review**

CARBONDALE, ILLINOIS

Polychlorinated Dibenzo-Dioxins and Polychlorinated  
Dibenzo-Furans (PCDDs/PCDFs) Analyses

SDG #: 2110011

Analyses Performed By:  
Vista Analytical Laboratory  
El Dorado Hills, California

Report #: 18268R  
Review Level: Tier III  
Project: B0039275.0000.00003

## SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 2110011 for samples collected in association with the Beazer East Inc. Former Koppers Wood-Treating site. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	PCDDs/ PCDFs	MET	MISC
A1-68 (0-0.5')	2110011-01	Soil	11/27/2012				X		
DUP-1	2110011-02	Soil	11/27/2012	A1-68 (0-0.5')			X		
A1-75 (0-0.5')	2110011-03	Soil	11/27/2012				X		
A1-69 (0-0.5')	2110011-04	Soil	11/27/2012				X		
A1-74 (0-0.5')	2110011-05	Soil	11/27/2012				X		
A1-70 (0-0.5')	2110011-06	Soil	11/27/2012				X		
A1-73 (0-0.5')	2110011-07	Soil	11/27/2012				X		
A1-71 (0-0.5')	2110011-08	Soil	11/27/2012				X		
A1-72 (0-0.5')	2110011-09	Soil	11/27/2012				X		
EB 112712	2110011-10	Water	11/27/2012				X		

Note: Soil sample results were reported on a dry weight basis.

Sample location A1-73 (0-0.5') is the parent sample of field duplicate sample DUP 2 which is included in SDG 2110012 (data validation report 19269R); the field duplicate sample results were evaluated within this data validation report.

## ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

## ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8290 as referenced in NYSDEC-ASP. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999 and USEPA Region II SOP associated with USEPA SW-846 Method 8290 Validating Polychlorinated Dibenzo-Dioxins and Polychlorinated Dibenzo-Furans by High Resolution GC/MS (SOP HW-19 Revision 1, October 2006).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected as unusable. The compound may or may not be present in the sample.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## POLYCHLORINATED DIBENZODIOXINS AND POLYCHLORINATED DIBENZOFURANS (PCDD/PCDF) ANALYSES

### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8290	Water	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C
	Soil	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C

All samples were extracted and analyzed within the specified holding time criteria.

### 2. Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Target compounds were not detected above the MDL in the associated laboratory method blank; therefore detected sample results were not associated with blank contamination.

### 3. Mass Spectrometer Tuning

Mass spectrometer performance including instrument sensitivity and mass resolution were acceptable.

Overall system performance and gas chromatographic column resolution were acceptable.

### 4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

#### 4.1 Initial Calibration

All compounds associated with the initial calibration standards must exhibit signal-to-noise ratios (S/N) of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent relative standard deviations (%RSDs) of the relative response factors (RRFs) less than 20% for the labeled standards and less than 30% for the target compounds.

## 4.2 Continuing Calibration

Instrument performance must be verified at 12 hour periods after successful tune verifications. All compounds associated with the continuing calibration standard must exhibit S/N of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent differences (%D) of the RRFs less than 30% for the labeled standards and less than 20% for the target compounds..

All initial and continuing calibration criteria were within the control limits.

## 5. Injection Internal Standard Performance

Injection internal standards are added to all extracts prior to instrumental analysis. The injection internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria require the injection internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within  $\pm$  fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each injection internal standard exhibit a ratio of the two identifying masses (m/z) within the method specified limits.

All injection internal standard S/N, RT, and m/z ratios were within established limits.

## 6. Surrogate Internal Standard Compounds

All field samples, blanks, LCS, and MS/MSD are spiked with surrogate internal standard compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The acceptance criteria require that the surrogate internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within  $\pm$  fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each surrogate internal standard exhibit a calculated recovery and a ratio of the two identifying masses (m/z) within the method specified limits.

All samples exhibited surrogate internal standard acceptance criteria within the control limits.

## 7. Clean-up Recovery Surrogate Performance

All field samples, blanks, LCS, and MS/MSD are spiked with recovery surrogates prior to extract clean-up. Recovery surrogate acceptance criteria require that their calculated recoveries, S/N, m/z ratios, and relative retention times (RRTs) be within the method-specified acceptance limits.

All recovery surrogate recoveries S/N, m/z ratios, and RRTs were within the control limits.

## 8. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the (optional) MS/MSD analysis should exhibit recoveries within the method-specified acceptance limits of 80-120%. The relative percent difference (RPD) between the MS and MSD results should be within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater. Sample results associated with MS/MSD exceedances where the parent samples are not site-specific are not qualified.

Sample location A1-69(0-0.5') was used for the MS/MSD analysis. All compounds associated with the MS/MSD analyses exhibited acceptable recoveries and RPDs between the MS and MSD results.

## 9. Ongoing Precision and Recovery (OPR) Sample Analysis

The OPR analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the OPR analysis must exhibit a percent recovery within the method-specified acceptance limits.

All compounds associated with the OPR analysis exhibited recoveries within the control limits.

## 10. Field Duplicate Sample Analysis

Field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 50% for water matrices and 100% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to five times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

Results (in pg/g) for the field duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
A1-68 (0-0.5') / DUP-1	2,3,7,8-TCDD	0.364 J	0.372 J	2.2 %
	1,2,3,7,8-PeCDD	2.06 J	2.56 J	21.6 %
	1,2,3,4,7,8-HxCDD	3.31	3.34	0.9 %
	1,2,3,6,7,8-HxCDD	8.83	10.7	19.2 %
	1,2,3,7,8,9-HxCDD	8.04	9.54	17.1 %
	1,2,3,4,6,7,8-HpCDD	296	317	6.9 %
	OCDD	10900 E	11200 E	2.7 %
	2,3,7,8-TCDF	0.331 J	0.287 J	14.2 %
	1,2,3,7,8-PeCDF	0.453 J	0.395 J	13.7 %
	2,3,4,7,8-PeCDF	1.04 J	1.03 J	1.0 %
	1,2,3,4,7,8-HxCDF	1.51 J	1.46 J	3.4 %
	1,2,3,6,7,8-HxCDF	1.26 J	1.12 U	AC
	2,3,4,6,7,8-HxCDF	2.12 J	2.21 J	4.2 %
	1,2,3,4,6,7,8-HpCDF	24.1	26.5	9.5 %
	1,2,3,4,7,8,9-HpCDF	1.88 J	1.84 J	2.2 %
	OCDF	82.3	88.8	7.6 %
	Total TCDD	2.11	2.33	9.9 %
	Total PeCDD	13.6	16.5	19.3 %
	Total HxCDD	73.5	84.3	13.7 %
	Total HpCDD	583	656	11.8 %
	Total TCDF	9.05	6.87	27.4 %

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
A1-68 (0-0.5') / DUP-1	Total PeCDF	22.3	19.6	12.9 %
	Total HxCDF	38.1	37.9	0.5 %
	Total HpCDF	82.7	80.6	2.6 %
	TEQ	11.8	12.8	8.1 %
A1-73 (0-0.5') / DUP 2	2,3,7,8-TCDD	0.667	0.579	14.1 %
	1,2,3,7,8-PeCDD	6.58	6.47	1.7 %
	1,2,3,4,7,8-HxCDD	9.72	12.4	24.2 %
	1,2,3,6,7,8-HxCDD	24.1	30.8	24.4 %
	1,2,3,7,8,9-HxCDD	23.7	29.5	21.8 %
	1,2,3,4,6,7,8-HpCDD	773	1160	40.0 %
	OCDD	21500 E	26800 E	21.9 %
	2,3,7,8-TCDF	0.627	0.769	20.3 %
	1,2,3,7,8-PeCDF	1.14 J	1.11 J	2.7 %
	2,3,4,7,8-PeCDF	1.38 J	1.54 J	11.0 %
	1,2,3,4,7,8-HxCDF	5.26	6.94	27.5 %
	1,2,3,6,7,8-HxCDF	5.98	7.50	22.6 %
	2,3,4,6,7,8-HxCDF	8.06	10.7	28.1 %
	1,2,3,7,8,9-HxCDF	0.984 U	1.59 J	AC
	1,2,3,4,6,7,8-HpCDF	130	186	35.4 %
	1,2,3,4,7,8,9-HpCDF	9.45	14.6	42.8 %
	OCDF	450	871	63.7 %
	Total TCDD	7.27	9.10	22.4 %
	Total PeCDD	36.2	47.1	26.2 %
	Total HxCDD	208	274	27.4 %
	Total HpCDD	1480	2150	36.9 %
	Total TCDF	16.9	20.7	20.2 %
	Total PeCDF	40.7	58.5	35.9 %
	Total HxCDF	139	205	38.4 %
	Total HpCDF	397	633	45.8 %
	TEQ	31.1	39.5	23.8 %

AC Acceptable  
J Estimated (result is < RL)  
U Not detected

The field duplicate sample results are acceptable.

## 11. Compound Identification

PCDD/PCDF compounds are identified by using the compound's ion abundance ratios, signal-to-noise

values, and relative retention times.

An estimated maximum possible concentration (EMPC) designation is given to compounds which have signals eluting within the established retention time window which would, if positively identified, be greater than the detection limit. The signals do not, however, meet the ion abundance ratio criteria and therefore cannot be identified as the compound of interest. The EMPC value is the estimated concentration of the interferant quantitated "as the compound of interest". This value should be considered an elevated detection limit based on potential compound identification and quantitation interference. The "UX" qualifier has been added to the following sample results (in pg/g) to indicate the elevated detection limit as EMPC.

Sample ID	Compound	Laboratory Result	Reported Result
DUP-1	1,2,3,6,7,8-HxCDF	1.12 EMPC	1.12 UX
A1-69 (0-0.5')	2,3,7,8-TCDD	0.316 EMPC	0.316 UX
	1,2,3,6,7,8-HxCDF	0.808 EMPC	0.808 UX
A1-70 (0-0.5')	2,3,7,8-TCDD	0.329 EMPC	0.329 UX
A1-72 (0-0.5')	2,3,7,8-TCDD	0.185 EMPC	0.185 UX
	1,2,3,7,8-PeCDD	1.22 EMPC	1.22 UX
	2,3,4,7,8-PeCDF	0.190 EMPC	0.190 UX
	1,2,3,6,7,8-HxCDF	0.685 EMPC	0.685 UX

Sample results associated with compound that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table.

Sample ID	Compound	Original Analysis	Diluted Analysis	Reported Analysis
A1-68 (0-0.5')	OCDD	10900 E	---	10900 EJ
DUP-1	OCDD	11200 E	---	11200 EJ
A1-75 (0-0.5')	OCDD	21000 E	---	21000 EJ
A1-69 (0-0.5')	OCDD	9870 E	---	9870 EJ
A1-74 (0-0.5')	OCDD	12400 E	---	12400 EJ
A1-70 (0-0.5')	OCDD	19900 E	---	19900 EJ
A1-73 (0-0.5')	OCDD	21500 E	---	21500 EJ
A1-71 (0-0.5')	OCDD	24000 E	---	24000 EJ
A1-72 (0-0.5')	OCDD	20000 E	---	20000 EJ

Note: In the instance where both the original analysis and the diluted analysis sample results exhibited a concentration greater than and/or less than the calibration linear range of the instrument; the sample result exhibiting the greatest concentration will be reported as the final result.

Sample results associated with compounds exhibiting concentration greater than the linear range qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within the calibration range	D
Diluted sample result < the calibration range	DJ
Diluted sample result > the calibration range	EDJ
Original sample result > the calibration range	EJ

The analyzing laboratory noted that the compounds in the following table exhibited interference by a co-eluting furan isomer and may have concentrations that are biased high. Therefore, the following results were qualified as estimated.

Sample Location	Analyte
A1-68 (0-0.5') DUP-1 A1-75 (0-0.5') A1-69 (0-0.5') A1-74 (0-0.5') A1-73 (0-0.5')	2,3,4,7,8-PeCDF
A1-70 (0-0.5') A1-71 (0-0.5')	2,3,4,7,8-PeCDF 1,2,3,7,8,9-HxCDF

## 12. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

## DATA VALIDATION CHECKLIST FOR PCDD/PCDF

PCDDs/PCDFs; SW-846 8290	Reported		Performance Acceptable		Not Required	
	No	Yes	No	Yes		
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)						
<b>Tier II Validation</b>						
Holding times		X		X		
Reporting limits (units)		X		X		
Blanks						
A. Method blanks		X		X		
B. Equipment blanks		X		X		
Ongoing Precision and Accuracy (OPR) Accuracy (%R)		X		X		
Matrix Spike (MS) %R		X		X		
Matrix Spike Duplicate (MSD) %R		X		X		
MS/MSD RPD		X		X		
Field/Laboratory Duplicate Sample RPD		X		X		
Surrogate Internal Standard Spike %R		X		X		
Recovery Surrogate Standard Spike %R		X		X		
Dilution Factor		X		X		
Moisture Content		X		X		
<b>Tier III Validation</b>						
System performance and column resolution		X		X		
Initial calibration %RSD		X		X		
Continuing calibration %D		X		X		
Instrument tune and performance check		X		X		
Ion abundance criteria for each instrument used		X		X		
Signal-to-noise ratio		X		X		
Injection Internal Standard performance		X		X		
Recovery standard performance		X		X		
Compound identification and quantitation						
A. Reconstructed ion chromatograms		X		X		
B. Quantitation Reports		X		X		
C. RT of sample compounds within the established RT windows		X		X		
D. Transcription/calculation errors present		X		X		
E. Reporting limits adjusted for sample dilutions		X		X		
F. Compound quantification		X	X			

RSD – relative standard deviation

%R - percent recovery

RPD - relative percent difference

%D – difference

## SAMPLE COMPLIANCE REPORT

Sample Delivery Group (SDG)	Sampling Date	Protocol	Sample ID	Matrix	Compliance <sup>1</sup>					Noncompliance
					VOC	SVOC	PCDDs/PCDFs	MET	MISC	
2110011	11/27/2012	SW846	A1-68 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	DUP-1	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-75 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-69 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-74 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-70 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-73 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-71 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-72 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	EB 112712	Water	---	---	Yes	---	---	

1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable

Validation Performed By: Dennis Dyke

Signature: \_\_\_\_\_

Date: January 18, 2013

Peer Review: Dennis Capria

Date: January 24, 2013

**CHAIN OF CUSTODY /  
LABORATORY QUALIFIERS /  
CORRECTED SAMPLE ANALYSIS DATA SHEETS**



# CHAIN OF CUSTODY

1 OF 3

FOR LABORATORY USE ONLY

Storage  
Secured

Laboratory Project ID: 2110011

Yes ☒ No ☐

Storage ID: WR-2

Temp 0.8 °C

TAT: (Check One):

Standard: ☒ 21 Days

Rush (surcharge may apply):

☐ 14 days ☐ 7 days Specify: \_\_\_\_\_

Project I.D.: \_\_\_\_\_ P.O.# B0039275.0000.00002 Sampler: I. STEWART & R. STEVENSON

(Name)

Invoice to: Name DAVID BESSINGPAS Company ARCADIS Address 6602 EXCELSIOR RD City BAXTER State MN Zip 56425 Ph# 218-829-4607 Fax# \_\_\_\_\_  
Relinquished by: (Signature and Printed Name) DAVID BESSINGPAS Date: 11/28/12 Time: 1445 Received by: (Signature and Printed Name) Betha Benedict B. Benedict Date: 11/29/12 Time: 1039  
Relinquished by: (Signature and Printed Name) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Received by: (Signature and Printed Name) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

## See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory  
1104 Windfield Way  
El Dorado Hills, CA 95762  
(916) 673-1520 • Fax (916) 673-0106

Method of Shipment: \_\_\_\_\_

ATTN: \_\_\_\_\_

Tracking No.: \_\_\_\_\_

Add Analysis(es) Requested

Container(s)

Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	TOTALS	COPLANAR PCB's	209 CONGENERS	PBDE	PAH	WHO-29
A1-68 (0-0.5')	11/27/12	0855		1	G	So															
DUP-1	11/27/12	—		1	G	So															
A1-75 (0-0.5')	11/27/12	0940		1	G	So															
A1-69 (0-0.5')	11/27/12	1010		1	G	So															
A1-69 (0-0.5') MS	11/27/12	1010		1	G	So															
A1-69 (0-0.5') MSD	11/27/12	1010		1	G	So															
A1-74 (0-0.5')	11/27/12	1100		1	G	So															
A1-70 (0-0.5')	11/27/12	1135		1	G	So															
A1-73 (0-0.5')	11/27/12	1210		1	G	So															
* DUP-2	11/27/12	—		1	G	So															

\*HOLD\*

Special Instructions/Comments:

\* Sample logged in to WorkOrder 2110012

SEND  
DOCUMENTATION  
AND RESULTS TO:

Name: DAVID BESSINGPAS

Company: ARCADIS

Address: 6602 EXCELSIOR RD

City: BAXTER State: MN Zip: 56425

Phone: 218-829-4607 Fax: \_\_\_\_\_

Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,

SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum

AQ = Aqueous, O = Other \_\_\_\_\_

Container Types: A = 1 Liter Amber, G = Glass Jar

P = PUF, T = MMS Train, O = Other \_\_\_\_\_

\*Bottle Preservative Type: T = Thiosulfate,

O = Other \_\_\_\_\_

WHITE - ORIGINAL

YELLOW - ARCHIVE

PINK - COPY



# CHAIN OF CUSTODY

2 of 3

FOR LABORATORY USE ONLY

Storage  
Secured

Laboratory Project ID: 2110011

Yes ☒ No ☐

Storage ID: WR-2

Temp 0.8 °C

TAT: (Check One):

Standard: ☒ 21 Days

Rush (surcharge may apply):

☐ 14 days ☐ 7 days Specify: \_\_\_\_\_

Project I.D.: \_\_\_\_\_ P.O.# B0039275.0000.00002 Sampler: I. STEWART

(Name)

Invoice to: Name DAVID BESSINGPAS Company ARCADIS Address 6602 EXCELSIOR RD. City BAXTER State MN Zip 56425 Ph# 218-829-4607 Fax# \_\_\_\_\_

Relinquished by: (Signature and Printed Name) RAY STEVENSON Date: 11/28/12 Time: 1445 Received by: (Signature and Printed Name) Benedict Date: 11/29/12 Time: 1040

Relinquished by: (Signature and Printed Name) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Received by: (Signature and Printed Name) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

## See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory  
1104 Windfield Way  
El Dorado Hills, CA 95762  
(916) 673-1520 • Fax (916) 673-0106

Method of Shipment: \_\_\_\_\_

ATTN: \_\_\_\_\_

Tracking No.: \_\_\_\_\_

Add Analysis(es) Requested

Container(s)

Quantity

Type

Matrix

EPA1613

EPA8290

EPA8280

EPA1668

EPA1614

CARB429

2378-TCDD

2378-TCDD/TCDF

PCDD/PCDF

2378-TCDD

2378-TCDD/TCDF

PCDD/PCDF

2378-TCDD

2378-TCDD/TCDF

PCDD/PCDF

2378-TCDD

2378-TCDD/TCDF

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2378-TCDD/TCDF

PCDD/PCDF

2378-TCDD

2378-TCDD/TCDF

PCDD/PCDF

2378-TCDD

2378-TCDD/TCDF

PCDD/PCDF

Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	TOTALS	COPLANAR PCB's	209 CONGENERS	PBDE	PAH	WHO-29	
A1-71 (0-0.5')	11/27/12	1330		1	G	So																
A1-72 (0-0.5')	11/27/12	1400		1	G	So																
A1-65 (0-0.5')	11/27/12	1430		1	G	So																* HOLD *
A1-64 (0-0.5')	11/27/12	1500		1	G	So																* HOLD *
ETB 112712	11/27/12	1540		2	A	AQ																
A1-79 (0-0.5')	11/28/12	0900		1	G	So																* HOLD *
A1-78 (0-0.5')	11/28/12	0925		1	G	So																* HOLD *
A1-77 (0-0.5')	11/28/12	0950		1	G	So																* HOLD *
A1-76 (0-0.5')	11/28/12	1020		1	G	So																* HOLD *
A1-67 (0-0.5')	11/28/12	1115		1	G	So																* HOLD *

Special Instructions/Comments: \_\_\_\_\_

SEND  
DOCUMENTATION  
AND RESULTS TO:

Name: DAVID BESSINGPAS  
Company: ARCADIS  
Address: 6602 EXCELSIOR RD.  
City: BAXTER State: MN Zip: 56425  
Phone: 218-829-4607 Fax: \_\_\_\_\_  
Email: DAVID.BESSINGPAS@ARCADIS-US.COM  
Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,  
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum  
AQ = Aqueous, O = Other \_\_\_\_\_

Container Types: A = 1 Liter Amber, G = Glass Jar

P = PUF, T = MM5 Train, O = Other \_\_\_\_\_

\*Bottle Preservative Type: T = Thiosulfate,

O = Other \_\_\_\_\_

WHITE - ORIGINAL

YELLOW - ARCHIVE

PINK - COPY

US EPA ARCHIVE DOCUMENT



## DATA QUALIFIERS & ABBREVIATIONS

<b>B</b>	<b>This compound was also detected in the method blank.</b>
<b>D</b>	<b>Dilution</b>
<b>E</b>	<b>The amount detected is above the High Calibration Limit.</b>
<b>P</b>	<b>The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.</b>
<b>H</b>	<b>Recovery was outside laboratory acceptance limits.</b>
<b>I</b>	<b>Chemical Interference</b>
<b>J</b>	<b>The amount detected is below the Low Calibration Limit.</b>
<b>*</b>	<b>See Cover Letter</b>
<b>Conc.</b>	<b>Concentration</b>
<b>DL</b>	<b>Sample-specific estimated detection limit</b>
<b>MDL</b>	<b>The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero in the matrix tested.</b>
<b>EMPC</b>	<b>Estimated Maximum Possible Concentration</b>
<b>NA</b>	<b>Not applicable</b>
<b>RL</b>	<b>Reporting Limit – concentrations that correspond to low calibration point</b>
<b>ND</b>	<b>Not Detected</b>
<b>TEQ</b>	<b>Toxic Equivalency</b>

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Sample ID: A1-68 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-01	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.5 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 8:55		% Solids:	77.3	Date Analyzed :	06-Dec-12 18:11	Column:	ZB-5 Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.364			J	IS	13C-2,3,7,8-TCDD	90.4	40 - 135	
1,2,3,7,8-PeCDD	2.06			J		13C-1,2,3,7,8-PeCDD	66.1	40 - 135	
1,2,3,4,7,8-HxCDD	3.31					13C-1,2,3,4,7,8-HxCDD	82.3	40 - 135	
1,2,3,6,7,8-HxCDD	8.83					13C-1,2,3,6,7,8-HxCDD	77.5	40 - 135	
1,2,3,7,8,9-HxCDD	8.04					13C-1,2,3,7,8,9-HxCDD	80.6	40 - 135	
1,2,3,4,6,7,8-HpCDD	296					13C-1,2,3,4,6,7,8-HpCDD	77.9	40 - 135	
OCDD	10900			E J		13C-OCDD	96.5	40 - 135	
2,3,7,8-TCDF	0.331			J		13C-2,3,7,8-TCDF	83.2	40 - 135	
1,2,3,7,8-PeCDF	0.453			J		13C-1,2,3,7,8-PeCDF	77.1	40 - 135	
2,3,4,7,8-PeCDF	1.04			J		13C-2,3,4,7,8-PeCDF	81.2	40 - 135	
1,2,3,4,7,8-HxCDF	1.51			J		13C-1,2,3,4,7,8-HxCDF	80.9	40 - 135	
1,2,3,6,7,8-HxCDF	1.26			J		13C-1,2,3,6,7,8-HxCDF	78.2	40 - 135	
2,3,4,6,7,8-HxCDF	2.12			J		13C-2,3,4,6,7,8-HxCDF	75.5	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.483				13C-1,2,3,7,8,9-HxCDF	77.7	40 - 135	
1,2,3,4,6,7,8-HpCDF	24.1					13C-1,2,3,4,6,7,8-HpCDF	81.7	40 - 135	
1,2,3,4,7,8,9-HpCDF	1.88			J		13C-1,2,3,4,7,8,9-HpCDF	78.9	40 - 135	
OCDF	82.3					13C-OCDF	83.8	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	87.1	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		11.8		
TOTALS									
Total TCDD	2.11		3.15						
Total PeCDD	13.6		14.3						
Total HxCDD	73.5								
Total HpCDD	583								
Total TCDF	9.05		9.16						
Total PeCDF	22.3								
Total HxCDF	38.1								
Total HpCDF	82.7								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: DUP-1					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-02	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.3 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 0:00		% Solids:	78.3	Date Analyzed :	06-Dec-12 18:59	Column:	ZB-5 Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.372			J	IS	13C-2,3,7,8-TCDD	86.4	40 - 135	
1,2,3,7,8-PeCDD	2.56			J		13C-1,2,3,7,8-PeCDD	74.4	40 - 135	
1,2,3,4,7,8-HxCDD	3.34					13C-1,2,3,4,7,8-HxCDD	85.4	40 - 135	
1,2,3,6,7,8-HxCDD	10.7					13C-1,2,3,6,7,8-HxCDD	79.2	40 - 135	
1,2,3,7,8,9-HxCDD	9.54					13C-1,2,3,7,8,9-HxCDD	84.4	40 - 135	
1,2,3,4,6,7,8-HpCDD	317					13C-1,2,3,4,6,7,8-HpCDD	78.6	40 - 135	
OCDD	11200			E J		13C-OCDD	99.1	40 - 135	
2,3,7,8-TCDF	0.287			J		13C-2,3,7,8-TCDF	65.4	40 - 135	
1,2,3,7,8-PeCDF	0.395			J		13C-1,2,3,7,8-PeCDF	78.2	40 - 135	
2,3,4,7,8-PeCDF	1.03			J		13C-2,3,4,7,8-PeCDF	78.7	40 - 135	
1,2,3,4,7,8-HxCDF	1.46			J		13C-1,2,3,4,7,8-HxCDF	84.4	40 - 135	
1,2,3,6,7,8-HxCDF	ND		1.12	UX		13C-1,2,3,6,7,8-HxCDF	79.5	40 - 135	
2,3,4,6,7,8-HxCDF	2.21			J		13C-2,3,4,6,7,8-HxCDF	78.0	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.505				13C-1,2,3,7,8,9-HxCDF	85.6	40 - 135	
1,2,3,4,6,7,8-HpCDF	26.5					13C-1,2,3,4,6,7,8-HpCDF	82.4	40 - 135	
1,2,3,4,7,8,9-HpCDF	1.84			J		13C-1,2,3,4,7,8,9-HpCDF	89.6	40 - 135	
OCDF	88.8					13C-OCDF	86.9	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	82.5	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		12.8		
TOTALS									
Total TCDD	2.33		2.83						
Total PeCDD	16.5		17.4						
Total HxCDD	84.3								
Total HpCDD	656								
Total TCDF	6.87		8.15						
Total PeCDF	19.6		19.7						
Total HxCDF	37.9		39.0						
Total HpCDF	80.6		81.4						

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-75 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-03	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.7 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 9:40		% Solids:	74.9	Date Analyzed :	06-Dec-12 19:47	Column: ZB-5	Analyst: MAS	
						07-Dec-12 11:50	Column: DB-225	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	1.25				IS	13C-2,3,7,8-TCDD	96.1	40 - 135	
1,2,3,7,8-PeCDD	8.18					13C-1,2,3,7,8-PeCDD	77.3	40 - 135	
1,2,3,4,7,8-HxCDD	9.48					13C-1,2,3,4,7,8-HxCDD	84.4	40 - 135	
1,2,3,6,7,8-HxCDD	20.8					13C-1,2,3,6,7,8-HxCDD	78.3	40 - 135	
1,2,3,7,8,9-HxCDD	33.7					13C-1,2,3,7,8,9-HxCDD	80.5	40 - 135	
1,2,3,4,6,7,8-HpCDD	817					13C-1,2,3,4,6,7,8-HpCDD	78.1	40 - 135	
OCDD	21000			E J		13C-OCDD	116	40 - 135	
2,3,7,8-TCDF	0.760					13C-2,3,7,8-TCDF	83.0	40 - 135	
1,2,3,7,8-PeCDF	0.682			J		13C-1,2,3,7,8-PeCDF	87.7	40 - 135	
2,3,4,7,8-PeCDF	0.568			J		13C-2,3,4,7,8-PeCDF	88.4	40 - 135	
1,2,3,4,7,8-HxCDF	2.32			J		13C-1,2,3,4,7,8-HxCDF	83.0	40 - 135	
1,2,3,6,7,8-HxCDF	2.12			J		13C-1,2,3,6,7,8-HxCDF	79.2	40 - 135	
2,3,4,6,7,8-HxCDF	3.58					13C-2,3,4,6,7,8-HxCDF	81.0	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.277				13C-1,2,3,7,8,9-HxCDF	83.5	40 - 135	
1,2,3,4,6,7,8-HpCDF	62.4					13C-1,2,3,4,6,7,8-HpCDF	83.0	40 - 135	
1,2,3,4,7,8,9-HpCDF	4.42					13C-1,2,3,4,7,8,9-HpCDF	89.7	40 - 135	
OCDF	340					13C-OCDF	94.1	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	91.7	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		32.1		
TOTALS									
Total TCDD	7.82		8.06						
Total PeCDD	37.4								
Total HxCDD	204								
Total HpCDD	1730								
Total TCDF	16.3		17.7						
Total PeCDF	40.6								
Total HxCDF	64.4								
Total HpCDF	227								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-69 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-04	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.1 g	QC Batch:	B2L0009	Date Extracted:	04-Dec-2012 15:00	
Date Collected:	27-Nov-2012 10:10		% Solids:	79.5	Date Analyzed :	07-Dec-12 00:35	Column: ZB-5	Analyst: MAS	
						07-Dec-12 13:59	Column: DB-225	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	ND		0.316	UX	IS	13C-2,3,7,8-TCDD	97.0	40 - 135	
1,2,3,7,8-PeCDD	1.53			J		13C-1,2,3,7,8-PeCDD	83.2	40 - 135	
1,2,3,4,7,8-HxCDD	2.15			J		13C-1,2,3,4,7,8-HxCDD	84.5	40 - 135	
1,2,3,6,7,8-HxCDD	5.83					13C-1,2,3,6,7,8-HxCDD	78.3	40 - 135	
1,2,3,7,8,9-HxCDD	5.35					13C-1,2,3,7,8,9-HxCDD	80.0	40 - 135	
1,2,3,4,6,7,8-HpCDD	205					13C-1,2,3,4,6,7,8-HpCDD	79.3	40 - 135	
OCDD	9870			E J		13C-OCDD	108	40 - 135	
2,3,7,8-TCDF	0.555			J		13C-2,3,7,8-TCDF	90.1	40 - 135	
1,2,3,7,8-PeCDF	0.429			J		13C-1,2,3,7,8-PeCDF	86.2	40 - 135	
2,3,4,7,8-PeCDF	0.654			J		13C-2,3,4,7,8-PeCDF	94.3	40 - 135	
1,2,3,4,7,8-HxCDF	1.16			J		13C-1,2,3,4,7,8-HxCDF	80.8	40 - 135	
1,2,3,6,7,8-HxCDF	ND		0.808	UX		13C-1,2,3,6,7,8-HxCDF	76.0	40 - 135	
2,3,4,6,7,8-HxCDF	1.24			J		13C-2,3,4,6,7,8-HxCDF	75.7	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.390				13C-1,2,3,7,8,9-HxCDF	83.4	40 - 135	
1,2,3,4,6,7,8-HpCDF	19.7					13C-1,2,3,4,6,7,8-HpCDF	79.3	40 - 135	
1,2,3,4,7,8,9-HpCDF	1.42			J		13C-1,2,3,4,7,8,9-HpCDF	89.1	40 - 135	
OCDF	60.9					13C-OCDF	92.0	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	91.7	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		8.61		
TOTALS									
Total TCDD	3.73		5.11						
Total PeCDD	15.9								
Total HxCDD	61.3								
Total HpCDD	439								
Total TCDF	7.12		9.14						
Total PeCDF	9.72								
Total HxCDF	19.3		20.1						
Total HpCDF	58.5								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-74 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-05	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.5 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 11:00		% Solids:	77.2	Date Analyzed :	06-Dec-12 20:35	Column: ZB-5	Analyst: MAS	
						07-Dec-12 12:22	Column: DB-225	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.259			J	IS	13C-2,3,7,8-TCDD	86.7	40 - 135	
1,2,3,7,8-PeCDD	2.03			J		13C-1,2,3,7,8-PeCDD	76.1	40 - 135	
1,2,3,4,7,8-HxCDD	3.19					13C-1,2,3,4,7,8-HxCDD	76.2	40 - 135	
1,2,3,6,7,8-HxCDD	7.64					13C-1,2,3,6,7,8-HxCDD	72.9	40 - 135	
1,2,3,7,8,9-HxCDD	6.97					13C-1,2,3,7,8,9-HxCDD	73.8	40 - 135	
1,2,3,4,6,7,8-HpCDD	316					13C-1,2,3,4,6,7,8-HpCDD	74.4	40 - 135	
OCDD	12400			E J		13C-OCDD	97.0	40 - 135	
2,3,7,8-TCDF	0.821					13C-2,3,7,8-TCDF	78.1	40 - 135	
1,2,3,7,8-PeCDF	0.709			J		13C-1,2,3,7,8-PeCDF	81.4	40 - 135	
2,3,4,7,8-PeCDF	1.00			J		13C-2,3,4,7,8-PeCDF	85.2	40 - 135	
1,2,3,4,7,8-HxCDF	1.98			J		13C-1,2,3,4,7,8-HxCDF	76.4	40 - 135	
1,2,3,6,7,8-HxCDF	1.65			J		13C-1,2,3,6,7,8-HxCDF	71.5	40 - 135	
2,3,4,6,7,8-HxCDF	2.17			J		13C-2,3,4,6,7,8-HxCDF	72.3	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.375				13C-1,2,3,7,8,9-HxCDF	76.3	40 - 135	
1,2,3,4,6,7,8-HpCDF	30.6					13C-1,2,3,4,6,7,8-HpCDF	74.5	40 - 135	
1,2,3,4,7,8,9-HpCDF	2.21			J		13C-1,2,3,4,7,8,9-HpCDF	82.8	40 - 135	
OCDF	107					13C-OCDF	86.0	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	83.7	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		12.3		
TOTALS									
Total TCDD	1.87		5.43						
Total PeCDD	16.4		18.2						
Total HxCDD	81.9		84.0						
Total HpCDD	709								
Total TCDF	16.1		17.1						
Total PeCDF	19.7								
Total HxCDF	36.4								
Total HpCDF	97.7		98.6						

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-70 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-06	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.4 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 11:35		% Solids:	77.4	Date Analyzed :	06-Dec-12 21:23	Column:	ZB-5 Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	ND		0.329	UX	IS	13C-2,3,7,8-TCDD	78.5	40 - 135	
1,2,3,7,8-PeCDD	4.04					13C-1,2,3,7,8-PeCDD	68.6	40 - 135	
1,2,3,4,7,8-HxCDD	8.26					13C-1,2,3,4,7,8-HxCDD	75.7	40 - 135	
1,2,3,6,7,8-HxCDD	29.7					13C-1,2,3,6,7,8-HxCDD	72.6	40 - 135	
1,2,3,7,8,9-HxCDD	21.0					13C-1,2,3,7,8,9-HxCDD	74.1	40 - 135	
1,2,3,4,6,7,8-HpCDD	897					13C-1,2,3,4,6,7,8-HpCDD	77.9	40 - 135	
OCDD	19900			E J		13C-OCDD	108	40 - 135	
2,3,7,8-TCDF	0.336			J		13C-2,3,7,8-TCDF	71.5	40 - 135	
1,2,3,7,8-PeCDF	0.721			J		13C-1,2,3,7,8-PeCDF	73.8	40 - 135	
2,3,4,7,8-PeCDF	0.609			J		13C-2,3,4,7,8-PeCDF	82.3	40 - 135	
1,2,3,4,7,8-HxCDF	11.7					13C-1,2,3,4,7,8-HxCDF	75.3	40 - 135	
1,2,3,6,7,8-HxCDF	7.16					13C-1,2,3,6,7,8-HxCDF	73.2	40 - 135	
2,3,4,6,7,8-HxCDF	14.3					13C-2,3,4,6,7,8-HxCDF	73.8	40 - 135	
1,2,3,7,8,9-HxCDF	1.63			J		13C-1,2,3,7,8,9-HxCDF	77.3	40 - 135	
1,2,3,4,6,7,8-HpCDF	254					13C-1,2,3,4,6,7,8-HpCDF	79.6	40 - 135	
1,2,3,4,7,8,9-HpCDF	26.5					13C-1,2,3,4,7,8,9-HpCDF	85.8	40 - 135	
OCDF	576					13C-OCDF	92.2	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	79.1	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		31.6		
TOTALS									
Total TCDD	1.46		3.03						
Total PeCDD	21.9		22.6						
Total HxCDD	157								
Total HpCDD	1450								
Total TCDF	2.86		5.74						
Total PeCDF	25.7								
Total HxCDF	281		281						
Total HpCDF	849								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-73 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-07	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.2 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 12:10		% Solids:	78.6	Date Analyzed :	06-Dec-12 22:11	Column: ZB-5	Analyst: MAS	
						07-Dec-12 12:54	Column: DB-225	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.667				IS	13C-2,3,7,8-TCDD	70.5	40 - 135	
1,2,3,7,8-PeCDD	6.58					13C-1,2,3,7,8-PeCDD	62.7	40 - 135	
1,2,3,4,7,8-HxCDD	9.72					13C-1,2,3,4,7,8-HxCDD	63.1	40 - 135	
1,2,3,6,7,8-HxCDD	24.1					13C-1,2,3,6,7,8-HxCDD	61.3	40 - 135	
1,2,3,7,8,9-HxCDD	23.7					13C-1,2,3,7,8,9-HxCDD	61.2	40 - 135	
1,2,3,4,6,7,8-HpCDD	773					13C-1,2,3,4,6,7,8-HpCDD	68.0	40 - 135	
OCDD	21500			E J		13C-OCDD	84.9	40 - 135	
2,3,7,8-TCDF	0.627					13C-2,3,7,8-TCDF	66.3	40 - 135	
1,2,3,7,8-PeCDF	1.14			J		13C-1,2,3,7,8-PeCDF	66.4	40 - 135	
2,3,4,7,8-PeCDF	1.38			J		13C-2,3,4,7,8-PeCDF	71.6	40 - 135	
1,2,3,4,7,8-HxCDF	5.26					13C-1,2,3,4,7,8-HxCDF	61.4	40 - 135	
1,2,3,6,7,8-HxCDF	5.98					13C-1,2,3,6,7,8-HxCDF	58.9	40 - 135	
2,3,4,6,7,8-HxCDF	8.06					13C-2,3,4,6,7,8-HxCDF	60.1	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.984				13C-1,2,3,7,8,9-HxCDF	65.5	40 - 135	
1,2,3,4,6,7,8-HpCDF	130					13C-1,2,3,4,6,7,8-HpCDF	64.2	40 - 135	
1,2,3,4,7,8,9-HpCDF	9.45					13C-1,2,3,4,7,8,9-HpCDF	73.7	40 - 135	
OCDF	450					13C-OCDF	69.7	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	70.1	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		31.1		
TOTALS									
Total TCDD	7.27		8.45						
Total PeCDD	36.2		39.7						
Total HxCDD	208								
Total HpCDD	1480								
Total TCDF	16.9		17.8						
Total PeCDF	40.7		42.2						
Total HxCDF	139		140						
Total HpCDF	397								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-71 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-08	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.3 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 13:30		% Solids:	77.5	Date Analyzed :	06-Dec-12 22:59	Column: ZB-5	Analyst: MAS	
						07-Dec-12 13:27	Column: DB-225	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.561			J	IS	13C-2,3,7,8-TCDD	87.1	40 - 135	
1,2,3,7,8-PeCDD	4.16					13C-1,2,3,7,8-PeCDD	77.4	40 - 135	
1,2,3,4,7,8-HxCDD	7.01					13C-1,2,3,4,7,8-HxCDD	81.8	40 - 135	
1,2,3,6,7,8-HxCDD	17.9					13C-1,2,3,6,7,8-HxCDD	79.0	40 - 135	
1,2,3,7,8,9-HxCDD	16.4					13C-1,2,3,7,8,9-HxCDD	78.9	40 - 135	
1,2,3,4,6,7,8-HpCDD	653					13C-1,2,3,4,6,7,8-HpCDD	86.1	40 - 135	
OCDD	24000			E J		13C-OCDD	116	40 - 135	
2,3,7,8-TCDF	1.22					13C-2,3,7,8-TCDF	81.0	40 - 135	
1,2,3,7,8-PeCDF	1.03			J		13C-1,2,3,7,8-PeCDF	83.7	40 - 135	
2,3,4,7,8-PeCDF	2.48			J		13C-2,3,4,7,8-PeCDF	91.1	40 - 135	
1,2,3,4,7,8-HxCDF	3.85					13C-1,2,3,4,7,8-HxCDF	80.4	40 - 135	
1,2,3,6,7,8-HxCDF	3.19					13C-1,2,3,6,7,8-HxCDF	78.4	40 - 135	
2,3,4,6,7,8-HxCDF	5.05					13C-2,3,4,6,7,8-HxCDF	77.3	40 - 135	
1,2,3,7,8,9-HxCDF	0.275			J		13C-1,2,3,7,8,9-HxCDF	82.7	40 - 135	
1,2,3,4,6,7,8-HpCDF	82.8					13C-1,2,3,4,6,7,8-HpCDF	86.7	40 - 135	
1,2,3,4,7,8,9-HpCDF	5.77					13C-1,2,3,4,7,8,9-HpCDF	94.6	40 - 135	
OCDF	319					13C-OCDF	94.8	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	84.2	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		25.7		
TOTALS									
Total TCDD	12.2		13.3						
Total PeCDD	34.2								
Total HxCDD	162								
Total HpCDD	1570								
Total TCDF	27.0		27.5						
Total PeCDF	38.2								
Total HxCDF	91.3		91.9						
Total HpCDF	273								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-72 (0-0.5')					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110011-09	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	10.4 g	QC Batch:	B2L0001	Date Extracted:	03-Dec-2012 8:36	
Date Collected:	27-Nov-2012 14:00		% Solids:	77.7	Date Analyzed :	06-Dec-12 23:47	Column:	ZB-5 Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	ND		0.185	UX	IS	13C-2,3,7,8-TCDD	90.6	40 - 135	
1,2,3,7,8-PeCDD	ND		1.22	UX		13C-1,2,3,7,8-PeCDD	77.5	40 - 135	
1,2,3,4,7,8-HxCDD	2.77			J		13C-1,2,3,4,7,8-HxCDD	79.0	40 - 135	
1,2,3,6,7,8-HxCDD	6.08					13C-1,2,3,6,7,8-HxCDD	74.7	40 - 135	
1,2,3,7,8,9-HxCDD	6.66					13C-1,2,3,7,8,9-HxCDD	75.7	40 - 135	
1,2,3,4,6,7,8-HpCDD	269					13C-1,2,3,4,6,7,8-HpCDD	84.0	40 - 135	
OCDD	20000			E J		13C-OCDD	108	40 - 135	
2,3,7,8-TCDF	0.157			J		13C-2,3,7,8-TCDF	83.4	40 - 135	
1,2,3,7,8-PeCDF	ND	0.235				13C-1,2,3,7,8-PeCDF	87.7	40 - 135	
2,3,4,7,8-PeCDF	ND		0.190	UX		13C-2,3,4,7,8-PeCDF	88.3	40 - 135	
1,2,3,4,7,8-HxCDF	0.844			J		13C-1,2,3,4,7,8-HxCDF	77.7	40 - 135	
1,2,3,6,7,8-HxCDF	ND		0.685	UX		13C-1,2,3,6,7,8-HxCDF	73.3	40 - 135	
2,3,4,6,7,8-HxCDF	1.18			J		13C-2,3,4,6,7,8-HxCDF	73.2	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.316				13C-1,2,3,7,8,9-HxCDF	78.2	40 - 135	
1,2,3,4,6,7,8-HpCDF	19.4					13C-1,2,3,4,6,7,8-HpCDF	83.7	40 - 135	
1,2,3,4,7,8,9-HpCDF	1.39			J		13C-1,2,3,4,7,8,9-HpCDF	93.0	40 - 135	
OCDF	78.7					13C-OCDF	84.0	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	87.9	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		10.7		
TOTALS									
Total TCDD	1.25		2.11						
Total PeCDD	9.91		11.7						
Total HxCDD	57.5								
Total HpCDD	588								
Total TCDF	1.78		2.49						
Total PeCDF	4.96		5.35						
Total HxCDF	20.4		21.1						
Total HpCDF	62.4								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: EB 112712					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Aqueous	Lab Sample:	2110011-10	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	1.01 L	QC Batch:	B2L0033	Date Extracted:	12-Dec-2012 10:12	
Date Collected:	27-Nov-2012 15:40				Date Analyzed :	13-Dec-12 20:39	Column: ZB-5	Analyst: MAS	
Analyte	Conc. (pg/L)	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	ND	0.755			IS	13C-2,3,7,8-TCDD	81.5	40 - 135	
1,2,3,7,8-PeCDD	ND	1.01				13C-1,2,3,7,8-PeCDD	67.4	40 - 135	
1,2,3,4,7,8-HxCDD	ND	1.15				13C-1,2,3,4,7,8-HxCDD	67.1	40 - 135	
1,2,3,6,7,8-HxCDD	ND	1.35				13C-1,2,3,6,7,8-HxCDD	71.7	40 - 135	
1,2,3,7,8,9-HxCDD	ND	1.56				13C-1,2,3,7,8,9-HxCDD	63.4	32 - 141	
1,2,3,4,6,7,8-HpCDD	ND	1.97				13C-1,2,3,4,6,7,8-HpCDD	60.0	40 - 135	
OCDD	ND	1.78				13C-OCDD	53.0	40 - 135	
2,3,7,8-TCDF	ND	0.858				13C-2,3,7,8-TCDF	85.3	40 - 135	
1,2,3,7,8-PeCDF	ND	0.728				13C-1,2,3,7,8-PeCDF	62.9	40 - 135	
2,3,4,7,8-PeCDF	ND	0.684				13C-2,3,4,7,8-PeCDF	73.8	40 - 135	
1,2,3,4,7,8-HxCDF	ND	0.537				13C-1,2,3,4,7,8-HxCDF	69.0	40 - 135	
1,2,3,6,7,8-HxCDF	ND	0.532				13C-1,2,3,6,7,8-HxCDF	71.2	40 - 135	
2,3,4,6,7,8-HxCDF	ND	0.559				13C-2,3,4,6,7,8-HxCDF	74.7	40 - 135	
1,2,3,7,8,9-HxCDF	ND	0.817				13C-1,2,3,7,8,9-HxCDF	66.2	40 - 135	
1,2,3,4,6,7,8-HpCDF	ND	0.639				13C-1,2,3,4,6,7,8-HpCDF	61.7	40 - 135	
1,2,3,4,7,8,9-HpCDF	ND	0.929				13C-1,2,3,4,7,8,9-HpCDF	59.4	40 - 135	
OCDF	ND	2.34				13C-OCDF	55.4	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	96.6	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		0.00		
TOTALS									
Total TCDD	ND	0.755							
Total PeCDD	ND	1.01							
Total HxCDD	ND	1.56							
Total HpCDD	ND	1.97							
Total TCDF	ND	0.858							
Total PeCDF	ND	0.728							
Total HxCDF	ND	0.817							
Total HpCDF	ND	0.929							

DL - Sample specific estimated detection limit

LCL-UCL- Lower control limit - upper control limit

EMPC - Estimated maximum possible concentration

**Beazer East Inc.**

**Former Koppers Wood-Treating Site**

**Data Review**

CARBONDALE, ILLINOIS

Polychlorinated Dibenzo-Dioxins and Polychlorinated  
Dibenzo-Furans (PCDDs/PCDFs) Analyses

SDG #: 2110012

Analyses Performed By:  
Vista Analytical Laboratory  
El Dorado Hills, California

Report #: 18269R  
Review Level: Tier III  
Project: B0039275.0000.00003

## SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 2110012 for samples collected in association with the Beazer East Inc. Former Koppers Wood-Treating site. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	PCDDs/ PCDFs	MET	MISC
DUP 2	2110012-01	Soil	11/27/2012	A1-73 (0-0.5')			X		
A1-65 (0-0.5)	2110012-02	Soil	11/27/2012				X		
A1-64 (0-0.5)	2110012-03	Soil	11/27/2012				X		
A1-67 (0-0.5)	2110012-08	Soil	11/28/2012				X		
A1-66 (0-0.5)	2110012-09	Soil	11/28/2012				X		
EB 112812	2110012-10	Water	11/28/2012				X		

Note: Soil sample results were reported on a dry weight basis.

The parent sample of field duplicate sample DUP 2 (sample location A1-73 (0-0.5')) is from SDG 2110011; the field duplicate sample results were evaluated with SDG 2110011 in data validation report 18268R.

## ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

## ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8290 as referenced in NYSDEC-ASP. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999 and USEPA Region II SOP associated with USEPA SW-846 Method 8290 Validating Polychlorinated Dibenzo-Dioxins and Polychlorinated Dibenzo-Furans by High Resolution GC/MS (SOP HW-19 Revision 1, October 2006).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected as unusable. The compound may or may not be present in the sample.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## POLYCHLORINATED DIBENZODIOXINS AND POLYCHLORINATED DIBENZOFURANS (PCDD/PCDF) ANALYSES

### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8290	Water	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C
	Soil	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C

All samples were extracted and analyzed within the specified holding time criteria.

### 2. Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Target compounds were detected in the associated QA blanks; however, the associated sample results were greater than the BA. Therefore, sample results greater than the BAL resulted in the removal of the laboratory qualifier (B). No other qualification of the sample results was required.

### 3. Mass Spectrometer Tuning

Mass spectrometer performance including instrument sensitivity and mass resolution were acceptable.

Overall system performance and gas chromatographic column resolution were acceptable.

### 4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

#### 4.1 Initial Calibration

All compounds associated with the initial calibration standards must exhibit signal-to-noise ratios (S/N) of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent relative

standard deviations (%RSDs) of the relative response factors (RRFs) less than 20% for the labeled standards and less than 30% for the target compounds.

## 4.2 Continuing Calibration

Instrument performance must be verified at 12 hour periods after successful tune verifications. All compounds associated with the continuing calibration standard must exhibit S/N of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent differences (%D) of the RRFs less than 30% for the labeled standards and less than 20% for the target compounds..

All initial and continuing calibration criteria were within the control limits.

## 5. Injection Internal Standard Performance

Injection internal standards are added to all extracts prior to instrumental analysis. The injection internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria require the injection internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within  $\pm$  fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each injection internal standard exhibit a ratio of the two identifying masses (m/z) within the method specified limits.

All injection internal standard S/N, RT, and m/z ratios were within established limits.

## 6. Surrogate Internal Standard Compounds

All field samples, blanks, LCS, and MS/MSD are spiked with surrogate internal standard compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The acceptance criteria require that the surrogate internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within  $\pm$  fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each surrogate internal standard exhibit a calculated recovery and a ratio of the two identifying masses (m/z) within the method specified limits.

Sample locations associated with surrogate internal standard compounds exhibiting recoveries outside of the control limits presented in the following table.

Sample Location	Surrogate	Recovery
DUP 2 A1-65 (0-0.5) A1-64 (0-0.5) A1-66 (0-0.5)	13C-OCDD	> UL
A1-67 (0-0.5)	13C-OCDD 13C-OCDF	> UL

UL Upper control limit

The criteria used to evaluate the surrogate recoveries are presented in the following table. In the case of any surrogate internal standard compound deviations, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> UL	Non-detect	No Action
	Detect	J
< LL but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J

## 7. Clean-up Recovery Surrogate Performance

All field samples, blanks, LCS, and MS/MSD are spiked with recovery surrogates prior to extract clean-up. Recovery surrogate acceptance criteria require that their calculated recoveries, S/N, m/z ratios, and relative retention times (RRTs) be within the method-specified acceptance limits.

All recovery surrogate recoveries S/N, m/z ratios, and RRTs were within the control limits.

## 8. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the (optional) MS/MSD analysis should exhibit recoveries within the method-specified acceptance limits of 80-120%. The relative percent difference (RPD) between the MS and MSD results should be within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater. Sample results associated with MS/MSD exceedances where the parent samples are not site-specific are not qualified.

Sample location A1-67(0-0.5) was used for the MS/MSD analysis. All compounds associated with the MS/MSD analyses exhibited acceptable recoveries and RPDs between the MS and MSD results.

## 9. Ongoing Precision and Recovery (OPR) Sample Analysis

The OPR analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the OPR analysis must exhibit a percent recovery within the method-specified acceptance limits.

All compounds associated with the OPR analysis exhibited recoveries within the control limits.

## 10. Field Duplicate Sample Analysis

Field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 50% for water matrices and 100% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to five times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

The field duplicate sample results were evaluated with SDG 2110011 in Data Validation Report 18268R.

## 11. Compound Identification

PCDD/PCDF compounds are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

An estimated maximum possible concentration (EMPC) designation is given to compounds which have signals eluting within the established retention time window which would, if positively identified, be greater than the detection limit. The signals do not, however, meet the ion abundance ratio criteria and therefore cannot be identified as the compound of interest. The EMPC value is the estimated concentration of the interferant quantitated "as the compound of interest". This value should be considered an elevated detection limit based on potential compound identification and quantitation interference. The "UX" qualifier has been added to the following sample results (in pg/g) to indicate the elevated detection limit as EMPC.

Sample ID	Compound	Laboratory Result	Reported Result
A1-65 (0-0.5)	2,3,7,8-TCDD	0.269 EMPC	0.269 UX

Sample results associated with compound that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table.

Sample ID	Compound	Original Analysis	Diluted Analysis	Reported Analysis
DUP 2	OCDD	26800 E	---	26800 EJ
A1-65 (0-0.5)	OCDD	12700 E	---	12700 EJ
A1-64 (0-0.5)	OCDD	17700 E	---	17700 EJ
A1-67 (0-0.5)	1,2,3,4,6,7,8-HpCDD	5010 E	---	5010 EJ
	OCDD	170000 DE	---	170000 DEJ
A1-66 (0-0.5)	OCDD	30900 E	---	30900 EJ

Note: In the instance where both the original analysis and the diluted analysis sample results exhibited a concentration greater than and/or less than the calibration linear range of the instrument; the sample result exhibiting the greatest concentration will be reported as the final result.

Sample results associated with compounds exhibiting concentration greater than the linear range qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within the calibration range	D
Diluted sample result < the calibration range	DJ
Diluted sample result > the calibration range	EDJ
Original sample result > the calibration range	EJ

The analyzing laboratory noted that the compounds in the following table exhibited interference by a co-eluting furan isomer and may have concentrations that are biased high. Therefore, the following results were qualified as estimated.

Sample Location	Analyte
DUP 2 A1-65 (0-0.5)	2,3,4,7,8-PeCDF
A1-64 (0-0.5) A1-67 (0-0.5) A1-66 (0-0.5)	2,3,4,7,8-PeCDF 1,2,3,7,8,9-HxCDF

## 12. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

## DATA VALIDATION CHECKLIST FOR PCDD/PCDF

PCDDs/PCDFs; SW-846 8290	Reported		Performance Acceptable		Not Required	
	No	Yes	No	Yes		
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)						
<b>Tier II Validation</b>						
Holding times		X		X		
Reporting limits (units)		X		X		
Blanks						
A. Method blanks		X		X		
B. Equipment blanks		X		X		
Ongoing Precision and Accuracy (OPR) Accuracy (%R)		X		X		
Matrix Spike (MS) %R		X		X		
Matrix Spike Duplicate (MSD) %R		X		X		
MS/MSD RPD		X		X		
Field/Laboratory Duplicate Sample RPD		X		X		
Surrogate Internal Standard Spike %R		X	X			
Recovery Surrogate Standard Spike %R		X		X		
Dilution Factor		X		X		
Moisture Content		X		X		
<b>Tier III Validation</b>						
System performance and column resolution		X		X		
Initial calibration %RSD		X		X		
Continuing calibration %D		X		X		
Instrument tune and performance check		X		X		
Ion abundance criteria for each instrument used		X		X		
Signal-to-noise ratio		X		X		
Injection Internal Standard performance		X		X		
Recovery standard performance		X		X		
Compound identification and quantitation						
A. Reconstructed ion chromatograms		X		X		
B. Quantitation Reports		X		X		
C. RT of sample compounds within the established RT windows		X		X		
D. Transcription/calculation errors present		X		X		
E. Reporting limits adjusted for sample dilutions		X		X		
F. Compound quantification		X	X			

RSD – relative standard deviation

%R - percent recovery

RPD - relative percent difference

%D – difference

## SAMPLE COMPLIANCE REPORT

Sample Delivery Group (SDG)	Sampling Date	Protocol	Sample ID	Matrix	Compliance <sup>1</sup>					Noncompliance
					VOC	SVOC	PCDDs/PCDFs	MET	MISC	
2110012	11/27/2012	SW846	DUP 2	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance
	11/27/2012	SW846	A1-65 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-64 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance
	11/28/2012	SW846	A1-67 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance
	11/28/2012	SW846	A1-66 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance; Analyte interference
	11/28/2012	SW846	EB 112812	Water	---	---	Yes	---	---	

- 1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable

Validation Performed By: Dennis Dyke

Signature: \_\_\_\_\_

Date: January 18, 2013

Peer Review: Dennis Capria

Date: January 24, 2013

**CHAIN OF CUSTODY /  
LABORATORY QUALIFIERS /  
CORRECTED SAMPLE ANALYSIS DATA SHEETS**



1 OF 3

Storage  
Secured

Yes ☒ No ☐

Temp 0.5 °°C

☐ 14 days ☐ 7 days Specify: \_\_\_\_\_

1. STEWART  
R. STEVENSON  
(Name)

Invoice to: Name	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGROS	ARCADIS	6602 EXCELSIOR RD.	BAKTER	MN	56425	218-829-4607	
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:		
KAY STEVENSON	11/28/12	1445	Thomas J. Benedict	11/29/12	1039		
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:		

**See “Sample Log-in Checklist” for additional sample information**

Tracking No.:

[illegible]

\* Samples logged into Workorder 2110011

SEND  
DOCUMENTATION  
AND RESULTS TO:

Name: DAVID BESSINGROS  
Company: ARCADIS  
Address: 1402 Excelsior Rd.  
City: BAXTER State: MN Zip: 56425  
Phone: 218-829-4607 Fax:

Email: DAVID.BESSINGDALE@ARCADIS-US.COM

**Matrix Types:** DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,

SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum  
AQ = Aqueous, O = Other

\*Bottle Preservative Type: T = Thiosulfate,

0 = Other

PINK - COPY



# CHAIN OF CUSTODY

2 of 3

FOR LABORATORY USE ONLY

Storage  
Secured

Laboratory Project ID: 2110012

Yes ☒ No ☐

Storage ID: WR-2

Temp: 0.8 °C

TAT: (Check One):

Standard: ☒ 21 Days

Rush (surcharge may apply):

☐ 14 days ☐ 7 days Specify: \_\_\_\_\_

Project I.D.: \_\_\_\_\_ P.O.# B0039275.0000.00002 Sampler: I. STEWART

(Name)

Invoice to: Name	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGRAS	ARCADIS	6602 EXCELSIOR RD.	BAXTER	MN	56425	218-829-4607	
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:		
<u>RAY STEVENSON</u>	<u>11/28/12</u>	<u>1445</u>	<u>RAY STEVENSON</u>	<u>11/29/12</u>	<u>1040</u>		
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:		

## See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory  
1104 Windfield Way  
El Dorado Hills, CA 95762  
(916) 673-1520 • Fax (916) 673-0106

Method of Shipment: \_\_\_\_\_

Add Analysis(es) Requested

ATTN: \_\_\_\_\_

Tracking No.: \_\_\_\_\_

Container(s)

Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	2378-TCDD	2378-TCDD/TCDF	PCDD/PCDF	TOTALS	COPPLANAR PCB's	209 CONGENERS	PBDE	PAH	WHO-29
* A1-71 (0-0.5')	11/27/12	1330		1	G	So					X										
* A1-72 (0-0.5')	11/27/12	1400		1	G	So					X										
A1-65 (0-0.5')	11/27/12	1430		1	G	So					X										* HOLD *
A1-64 (0-0.5')	11/27/12	1500		1	G	So					X										* HOLD *
* EB 112712	11/27/12	1540		2	A	AQ					X										
A1-79 (0-0.5')	11/28/12	0900		1	G	So					X										* HOLD *
A1-78 (0-0.5')	11/28/12	0925		1	G	So					X										* HOLD *
A1-77 (0-0.5')	11/28/12	0950		1	G	So					X										* HOLD *
A1-76 (0-0.5')	11/28/12	1020		1	G	So					X										* HOLD *
A1-67 (0-0.5')	11/28/12	1115		1	G	So					X										* HOLD *

Special Instructions/Comments:

\* Sample logged in to Work Order 2110011

SEND  
DOCUMENTATION  
AND RESULTS TO:

Name: DAVID BESSINGRAS

Company: ARCADIS

Address: 6602 EXCELSIOR RD.

City: BAXTER State: MN Zip: 56425

Phone: 218-829-4607 Fax: \_\_\_\_\_

Email: DAVID.BESSINGRAS@ARCADIS-US.COM

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,

SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum

AQ = Aqueous, O = Other

Container Types: A = 1 Liter Amber, G = Glass Jar

P = PUF, T = MMS Train, O = Other

\*Bottle Preservative Type: T = Thiosulfate,

O = Other

WHITE - ORIGINAL

YELLOW - ARCHIVE

PINK - COPY



## DATA QUALIFIERS & ABBREVIATIONS

<b>B</b>	<b>This compound was also detected in the method blank.</b>
<b>D</b>	<b>Dilution</b>
<b>E</b>	<b>The amount detected is above the High Calibration Limit.</b>
<b>P</b>	<b>The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.</b>
<b>H</b>	<b>Recovery was outside laboratory acceptance limits.</b>
<b>I</b>	<b>Chemical Interference</b>
<b>J</b>	<b>The amount detected is below the Low Calibration Limit.</b>
<b>*</b>	<b>See Cover Letter</b>
<b>Conc.</b>	<b>Concentration</b>
<b>DL</b>	<b>Sample-specific estimated detection limit</b>
<b>MDL</b>	<b>The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero in the matrix tested.</b>
<b>EMPC</b>	<b>Estimated Maximum Possible Concentration</b>
<b>NA</b>	<b>Not applicable</b>
<b>RL</b>	<b>Reporting Limit – concentrations that correspond to low calibration point</b>
<b>ND</b>	<b>Not Detected</b>
<b>TEQ</b>	<b>Toxic Equivalency</b>

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Sample ID: DUP 2					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110012-01	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	13.3 g	QC Batch:	B2L0072	Date Extracted:	19-Dec-2012 14:30	
Date Collected:	27-Nov-2012 0:00		% Solids:	76.6	Date Analyzed :	02-Jan-13 17:57	Column: DB-225	Analyst: MAS	
						29-Dec-12 17:26	Column: ZB-5	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.579				IS	13C-2,3,7,8-TCDD	82.3	40 - 135	
1,2,3,7,8-PeCDD	6.47					13C-1,2,3,7,8-PeCDD	81.7	40 - 135	
1,2,3,4,7,8-HxCDD	12.4					13C-1,2,3,4,7,8-HxCDD	80.3	40 - 135	
1,2,3,6,7,8-HxCDD	30.8					13C-1,2,3,6,7,8-HxCDD	79.9	40 - 135	
1,2,3,7,8,9-HxCDD	29.5					13C-1,2,3,7,8,9-HxCDD	79.2	40 - 135	
1,2,3,4,6,7,8-HpCDD	1160					13C-1,2,3,4,6,7,8-HpCDD	84.3	40 - 135	
OCDD	26800			<del>B</del> , E J		13C-OCDD	209	40 - 135	H
2,3,7,8-TCDF	0.769					13C-2,3,7,8-TCDF	79.2	40 - 135	
1,2,3,7,8-PeCDF	1.11			J		13C-1,2,3,7,8-PeCDF	79.0	40 - 135	
2,3,4,7,8-PeCDF	1.54			J		13C-2,3,4,7,8-PeCDF	85.0	40 - 135	
1,2,3,4,7,8-HxCDF	6.94					13C-1,2,3,4,7,8-HxCDF	89.1	40 - 135	
1,2,3,6,7,8-HxCDF	7.50					13C-1,2,3,6,7,8-HxCDF	82.3	40 - 135	
2,3,4,6,7,8-HxCDF	10.7					13C-2,3,4,6,7,8-HxCDF	78.6	40 - 135	
1,2,3,7,8,9-HxCDF	1.59			J		13C-1,2,3,7,8,9-HxCDF	80.3	40 - 135	
1,2,3,4,6,7,8-HpCDF	186					13C-1,2,3,4,6,7,8-HpCDF	81.9	40 - 135	
1,2,3,4,7,8,9-HpCDF	14.6					13C-1,2,3,4,7,8,9-HpCDF	92.4	40 - 135	
OCDF	871					13C-OCDF	107	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	72.3	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		39.5		
TOTALS									
Total TCDD	9.10		10.2						
Total PeCDD	47.1								
Total HxCDD	274								
Total HpCDD	2150								
Total TCDF	20.7		23.7						
Total PeCDF	58.5								
Total HxCDF	205								
Total HpCDF	633								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-65 (0-0.5)					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110012-02	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	12.9 g	QC Batch:	B2L0072	Date Extracted:	19-Dec-2012 14:30	
Date Collected:	27-Nov-2012 14:30		% Solids:	78.4	Date Analyzed :	29-Dec-12 18:14	Column:	ZB-5 Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	ND		0.269	UX	IS	13C-2,3,7,8-TCDD	86.8	40 - 135	
1,2,3,7,8-PeCDD	2.04			J		13C-1,2,3,7,8-PeCDD	85.9	40 - 135	
1,2,3,4,7,8-HxCDD	3.52					13C-1,2,3,4,7,8-HxCDD	79.2	40 - 135	
1,2,3,6,7,8-HxCDD	10.1					13C-1,2,3,6,7,8-HxCDD	73.6	40 - 135	
1,2,3,7,8,9-HxCDD	8.17					13C-1,2,3,7,8,9-HxCDD	74.5	40 - 135	
1,2,3,4,6,7,8-HpCDD	358					13C-1,2,3,4,6,7,8-HpCDD	77.2	40 - 135	
OCDD	12700			<del>B</del> , E J		13C-OCDD	176	40 - 135	H
2,3,7,8-TCDF	0.408			J		13C-2,3,7,8-TCDF	79.1	40 - 135	
1,2,3,7,8-PeCDF	0.336			J		13C-1,2,3,7,8-PeCDF	80.4	40 - 135	
2,3,4,7,8-PeCDF	0.778			J		13C-2,3,4,7,8-PeCDF	82.9	40 - 135	
1,2,3,4,7,8-HxCDF	1.93			J		13C-1,2,3,4,7,8-HxCDF	88.1	40 - 135	
1,2,3,6,7,8-HxCDF	1.42			J		13C-1,2,3,6,7,8-HxCDF	81.7	40 - 135	
2,3,4,6,7,8-HxCDF	2.32			J		13C-2,3,4,6,7,8-HxCDF	79.8	40 - 135	
1,2,3,7,8,9-HxCDF	0.193			J		13C-1,2,3,7,8,9-HxCDF	83.2	40 - 135	
1,2,3,4,6,7,8-HpCDF	41.3					13C-1,2,3,4,6,7,8-HpCDF	83.7	40 - 135	
1,2,3,4,7,8,9-HpCDF	3.13					13C-1,2,3,4,7,8,9-HpCDF	90.5	40 - 135	
OCDF	169					13C-OCDF	97.7	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	85.0	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		13.0		
TOTALS									
Total TCDD	5.82		6.85						
Total PeCDD	17.9								
Total HxCDD	89.8								
Total HpCDD	832								
Total TCDF	8.38		9.37						
Total PeCDF	14.8								
Total HxCDF	47.4								
Total HpCDF	138								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-64 (0-0.5)					EPA Method 8290				
<b>Client Data</b>			<b>Sample Data</b>		<b>Laboratory Data</b>				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110012-03	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	12.7 g	QC Batch:	B2L0072	Date Extracted:	19-Dec-2012 14:30	
Date Collected:	27-Nov-2012 15:00		% Solids:	79.4	Date Analyzed :	02-Jan-13 18:29	Column: DB-225	Analyst: MAS	
						29-Dec-12 19:03	Column: ZB-5	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.301			J	IS	13C-2,3,7,8-TCDD	79.5	40 - 135	
1,2,3,7,8-PeCDD	1.64			J		13C-1,2,3,7,8-PeCDD	83.1	40 - 135	
1,2,3,4,7,8-HxCDD	2.88					13C-1,2,3,4,7,8-HxCDD	87.0	40 - 135	
1,2,3,6,7,8-HxCDD	7.22					13C-1,2,3,6,7,8-HxCDD	80.9	40 - 135	
1,2,3,7,8,9-HxCDD	6.96					13C-1,2,3,7,8,9-HxCDD	80.4	40 - 135	
1,2,3,4,6,7,8-HpCDD	344					13C-1,2,3,4,6,7,8-HpCDD	81.6	40 - 135	
OCDD	17700			B, E J		13C-OCDD	201	40 - 135	H
2,3,7,8-TCDF	0.652					13C-2,3,7,8-TCDF	75.6	40 - 135	
1,2,3,7,8-PeCDF	0.419			J		13C-1,2,3,7,8-PeCDF	81.6	40 - 135	
2,3,4,7,8-PeCDF	0.524			J		13C-2,3,4,7,8-PeCDF	86.5	40 - 135	
1,2,3,4,7,8-HxCDF	1.48			J		13C-1,2,3,4,7,8-HxCDF	90.7	40 - 135	
1,2,3,6,7,8-HxCDF	1.09			J		13C-1,2,3,6,7,8-HxCDF	80.5	40 - 135	
2,3,4,6,7,8-HxCDF	1.76			J		13C-2,3,4,6,7,8-HxCDF	79.9	40 - 135	
1,2,3,7,8,9-HxCDF	0.139			J		13C-1,2,3,7,8,9-HxCDF	82.6	40 - 135	
1,2,3,4,6,7,8-HpCDF	25.8					13C-1,2,3,4,6,7,8-HpCDF	84.0	40 - 135	
1,2,3,4,7,8,9-HpCDF	1.88			J		13C-1,2,3,4,7,8,9-HpCDF	96.4	40 - 135	
OCDF	112					13C-OCDF	105	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	69.4	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		13.4		
TOTALS									
Total TCDD	9.13		10.5						
Total PeCDD	18.4								
Total HxCDD	75.2								
Total HpCDD	759								
Total TCDF	9.56		11.8						
Total PeCDF	13.3								
Total HxCDF	31.5								
Total HpCDF	88.7								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-67 (0-0.5)					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110012-08	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	12.3 g	QC Batch:	B2L0072	Date Extracted:	19-Dec-2012 14:30	
Date Collected:	28-Nov-2012 11:15		% Solids:	81.7	Date Analyzed :	29-Dec-12 20:39	Column: ZB-5	Analyst: MAS	
						29-Dec-12 21:27	Column: ZB-5	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.782				IS	13C-2,3,7,8-TCDD	85.5	40 - 135	
1,2,3,7,8-PeCDD	10.5					13C-1,2,3,7,8-PeCDD	93.8	40 - 135	
1,2,3,4,7,8-HxCDD	31.4					13C-1,2,3,4,7,8-HxCDD	84.2	40 - 135	
1,2,3,6,7,8-HxCDD	95.0					13C-1,2,3,6,7,8-HxCDD	80.3	40 - 135	
1,2,3,7,8,9-HxCDD	79.3					13C-1,2,3,7,8,9-HxCDD	81.7	40 - 135	
1,2,3,4,6,7,8-HpCDD	5010			E J		13C-1,2,3,4,6,7,8-HpCDD	123	40 - 135	
OCDD	170000			D, <del>E</del> , E J		13C-OCDD	302	40 - 135	D, H
2,3,7,8-TCDF	0.479			J		13C-2,3,7,8-TCDF	72.4	40 - 135	
1,2,3,7,8-PeCDF	0.807			J		13C-1,2,3,7,8-PeCDF	84.4	40 - 135	
2,3,4,7,8-PeCDF	1.58			J		13C-2,3,4,7,8-PeCDF	83.9	40 - 135	
1,2,3,4,7,8-HxCDF	7.87					13C-1,2,3,4,7,8-HxCDF	98.5	40 - 135	
1,2,3,6,7,8-HxCDF	5.54					13C-1,2,3,6,7,8-HxCDF	89.1	40 - 135	
2,3,4,6,7,8-HxCDF	11.1					13C-2,3,4,6,7,8-HxCDF	87.3	40 - 135	
1,2,3,7,8,9-HxCDF	0.737			J		13C-1,2,3,7,8,9-HxCDF	90.9	40 - 135	
1,2,3,4,6,7,8-HpCDF	468					13C-1,2,3,4,6,7,8-HpCDF	93.6	40 - 135	
1,2,3,4,7,8,9-HpCDF	29.3					13C-1,2,3,4,7,8,9-HpCDF	98.6	40 - 135	
OCDF	3970			J		13C-OCDF	170	40 - 135	H
					CRS	37Cl-2,3,7,8-TCDD	79.1	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		142		
TOTALS									
Total TCDD	4.51		5.46						
Total PeCDD	52.5								
Total HxCDD	601								
Total HpCDD	8240								
Total TCDF	9.56		10.2						
Total PeCDF	34.4		38.6						
Total HxCDF	327								
Total HpCDF	2250								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: A1-66 (0-0.5)					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Soil	Lab Sample:	2110012-09	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	13.1 g	QC Batch:	B2L0072	Date Extracted:	19-Dec-2012 14:30	
Date Collected:	28-Nov-2012 11:50		% Solids:	77.5	Date Analyzed :	02-Jan-13 19:01	Column: DB-225	Analyst: MAS	
						29-Dec-12 19:51	Column: ZB-5	Analyst: MAS	
Analyte	Conc. (pg/g )	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	0.870				IS	13C-2,3,7,8-TCDD	75.2	40 - 135	
1,2,3,7,8-PeCDD	4.85					13C-1,2,3,7,8-PeCDD	85.6	40 - 135	
1,2,3,4,7,8-HxCDD	11.5					13C-1,2,3,4,7,8-HxCDD	67.6	40 - 135	
1,2,3,6,7,8-HxCDD	44.5					13C-1,2,3,6,7,8-HxCDD	64.3	40 - 135	
1,2,3,7,8,9-HxCDD	27.1					13C-1,2,3,7,8,9-HxCDD	64.8	40 - 135	
1,2,3,4,6,7,8-HpCDD	1530					13C-1,2,3,4,6,7,8-HpCDD	72.8	40 - 135	
OCDD	30900			<del>B</del> , E J		13C-OCDD	198	40 - 135	H
2,3,7,8-TCDF	1.65					13C-2,3,7,8-TCDF	66.3	40 - 135	
1,2,3,7,8-PeCDF	2.29			J		13C-1,2,3,7,8-PeCDF	76.8	40 - 135	
2,3,4,7,8-PeCDF	3.86			J		13C-2,3,4,7,8-PeCDF	79.7	40 - 135	
1,2,3,4,7,8-HxCDF	7.81					13C-1,2,3,4,7,8-HxCDF	82.5	40 - 135	
1,2,3,6,7,8-HxCDF	5.86					13C-1,2,3,6,7,8-HxCDF	74.1	40 - 135	
2,3,4,6,7,8-HxCDF	9.08					13C-2,3,4,6,7,8-HxCDF	71.6	40 - 135	
1,2,3,7,8,9-HxCDF	0.745			J		13C-1,2,3,7,8,9-HxCDF	74.6	40 - 135	
1,2,3,4,6,7,8-HpCDF	189			J		13C-1,2,3,4,6,7,8-HpCDF	75.5	40 - 135	
1,2,3,4,7,8,9-HpCDF	13.1					13C-1,2,3,4,7,8,9-HpCDF	80.0	40 - 135	
OCDF	718					13C-OCDF	95.0	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	76.1	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		44.6		
TOTALS									
Total TCDD	7.00		7.30						
Total PeCDD	36.3								
Total HxCDD	257								
Total HpCDD	2610								
Total TCDF	30.5								
Total PeCDF	52.9								
Total HxCDF	170								
Total HpCDF	639								

DL - Sample specific estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Sample ID: EB 112812					EPA Method 8290				
Client Data			Sample Data		Laboratory Data				
Name:	ARCADIS		Matrix:	Aqueous	Lab Sample:	2110012-10	Date Received:	29-Nov-2012 10:23	
Project:	Carbondale		Sample Size:	0.996 L	QC Batch:	B2L0077	Date Extracted:	20-Dec-2012 8:01	
Date Collected:	28-Nov-2012 14:00				Date Analyzed :	27-Dec-12 14:05	Column:	ZB-5	Analyst: MAS
Analyte	Conc. (pg/L)	DL	EMPC	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
2,3,7,8-TCDD	ND	1.70			IS	13C-2,3,7,8-TCDD	88.2	40 - 135	
1,2,3,7,8-PeCDD	ND	1.41				13C-1,2,3,7,8-PeCDD	105	40 - 135	
1,2,3,4,7,8-HxCDD	ND	2.03				13C-1,2,3,4,7,8-HxCDD	81.5	40 - 135	
1,2,3,6,7,8-HxCDD	ND	2.39				13C-1,2,3,6,7,8-HxCDD	81.4	40 - 135	
1,2,3,7,8,9-HxCDD	ND	2.37				13C-1,2,3,7,8,9-HxCDD	80.6	32 - 141	
1,2,3,4,6,7,8-HpCDD	ND	2.18				13C-1,2,3,4,6,7,8-HpCDD	80.0	40 - 135	
OCDD	ND	3.11				13C-OCDD	99.5	40 - 135	
2,3,7,8-TCDF	ND	0.616				13C-2,3,7,8-TCDF	86.2	40 - 135	
1,2,3,7,8-PeCDF	ND	1.41				13C-1,2,3,7,8-PeCDF	86.0	40 - 135	
2,3,4,7,8-PeCDF	ND	1.39				13C-2,3,4,7,8-PeCDF	86.6	40 - 135	
1,2,3,4,7,8-HxCDF	ND	1.20				13C-1,2,3,4,7,8-HxCDF	87.7	40 - 135	
1,2,3,6,7,8-HxCDF	ND	1.33				13C-1,2,3,6,7,8-HxCDF	82.4	40 - 135	
2,3,4,6,7,8-HxCDF	ND	1.52				13C-2,3,4,6,7,8-HxCDF	84.2	40 - 135	
1,2,3,7,8,9-HxCDF	ND	1.83				13C-1,2,3,7,8,9-HxCDF	89.7	40 - 135	
1,2,3,4,6,7,8-HpCDF	ND	1.26				13C-1,2,3,4,6,7,8-HpCDF	77.5	40 - 135	
1,2,3,4,7,8,9-HpCDF	ND	1.47				13C-1,2,3,4,7,8,9-HpCDF	90.5	40 - 135	
OCDF	ND	2.89				13C-OCDF	92.7	40 - 135	
					CRS	37Cl-2,3,7,8-TCDD	86.3	40 - 135	
					Toxic Equivalent Quotient (TEQ) Data				
					TEQMinWHO2005Dioxin		0.00		
TOTALS									
Total TCDD	ND	3.01							
Total PeCDD	ND	1.41							
Total HxCDD	ND	3.23							
Total HpCDD	ND	2.18							
Total TCDF	ND	0.616							
Total PeCDF	ND	1.77							
Total HxCDF	ND	2.60							
Total HpCDF	ND	1.12							

DL - Sample specific estimated detection limit

LCL-UCL- Lower control limit - upper control limit

EMPC - Estimated maximum possible concentration