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 SUMARY - NOV. 2012 SAMPLES

FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

Sample ID:		A1-64	A1-65	A1-66	A1-67	A1-68	A1-69	A1-70	A1-71	A1-72	A1-73	A1-74	A1-75
Depth (ft bgs):		0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Sample Date:	Units	11/27/12	11/27/12	11/28/12	11/28/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12
PCDDs/PCDFs													
1,2,3,4,6,7,8-HpCDD	pg/g	344	358	1,530	5,010 EJ	296 [317]	205	897	653	269	773 [1,160]	316	817
1,2,3,4,6,7,8-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
1,2,3,4,7,8,9-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
1,2,3,4,7,8-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
1,2,3,4,7,8-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
1,2,3,6,7,8-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
1,2,3,6,7,8-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
1,2,3,7,8,9-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
1,2,3,7,8,9-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
1,2,3,7,8-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
1,2,3,7,8-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
2,3,4,6,7,8-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
2,3,4,7,8-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
2,3,7,8-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
2,3,7,8-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
OCDD	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
OCDF	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
2,3,7,8-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

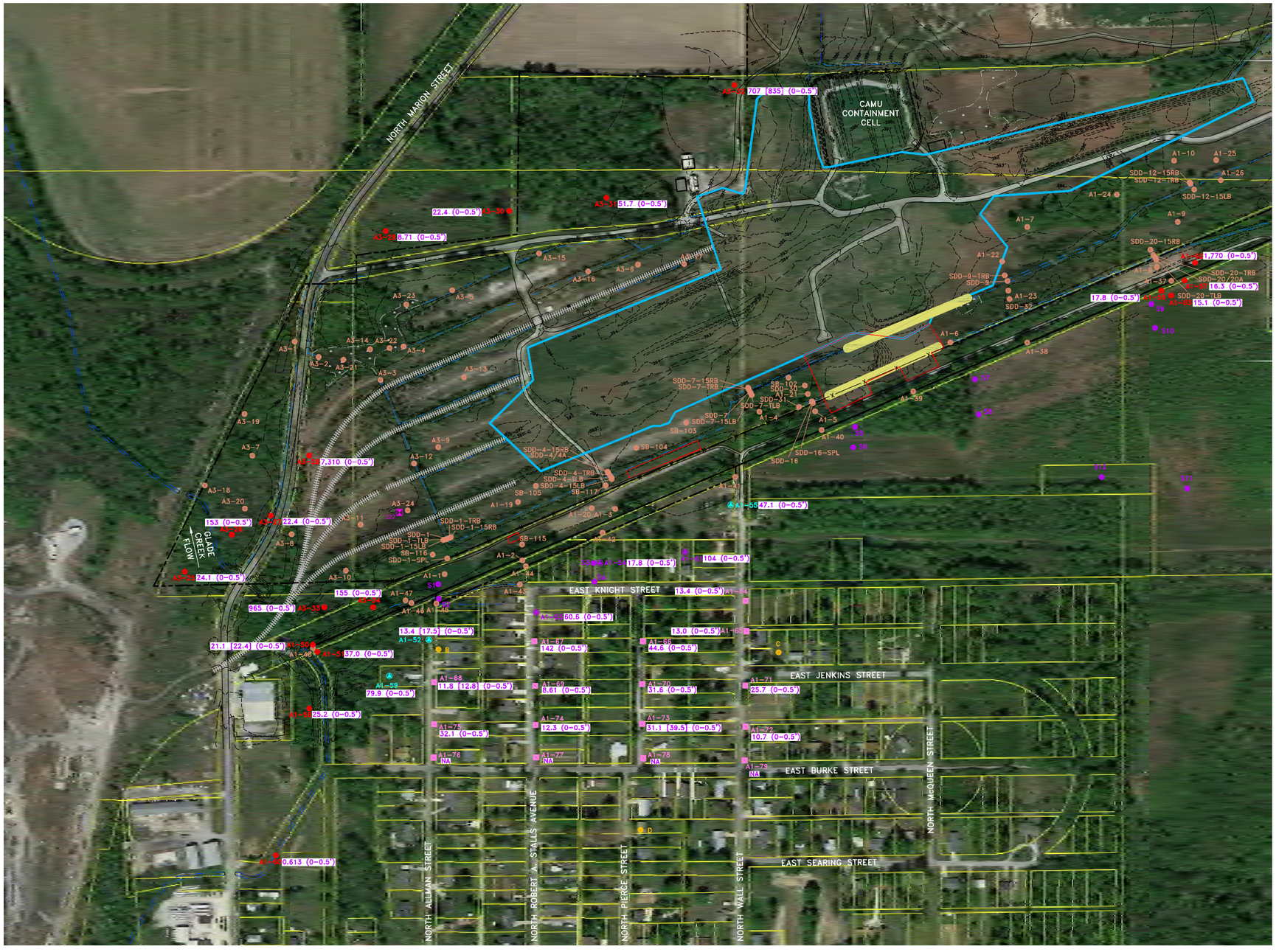
Notes:
1. All 12 samples were composites of five discrete soil sample locations.

Definitions:
PCDDs/PCDFs = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
pg/g = picograms per gram, or parts per trillion (ppt)
ft bgs = feet below ground surface
TEQ = 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



LEGEND:

- EDGE OF WATER
- DRAINAGE DITCH AND DIRECTION OF FLOW
- PROPERTY BOUNDARY (SEE NOTE 2)
- PARCEL BOUNDARY
- FENCELINE
- EXISTING CONTOUR LINE
- FORMER PROCESS AREA SURFACE COVER
- SOIL REMOVAL AREA (SOIL/DEBRIS PILES AND SURFICIAL ASPHALT-LIKE MATERIALS)
- PORTIONS OF SOUTHERN DRAINAGE DITCHES THAT HAVE BEEN FILLED IN PRIOR TO OR DURING SURFACE COVER CONSTRUCTION OR REMOVAL OF SOIL AND DEBRIS PILES.
- S1 2005 RESIDENTIAL SAMPLE LOCATIONS (USEPA)
- SB-102 2005-2010 SAMPLE LOCATIONS (BEAZER)
- B 2006 RESIDENTIAL SAMPLE LOCATIONS (CITY OF CARBONDALE)
- A1-57 AUGUST 2012 GRAB SAMPLE LOCATION
- A1-55 AUGUST 2012 COMPOSITE SAMPLE LOCATION
- A1-66 NOVEMBER 2012 COMPOSITE SAMPLE LOCATION
- 15.1 (0-0.5') TCDD-TEQ CONCENTRATION (ppt) AND SAMPLE DEPTH INTERVAL
- NA NOT ANALYZED

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, 1996 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.

0 200' 400'
GRAPHIC SCALE

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

AUGUST/NOVEMBER 2012 SAMPLE LOCATIONS AND TCDD-TEQ CONCENTRATIONS

ARCADIS

FIGURE 1

COC-BC-12 (2657' DOWNSTREAM OF COC-BC-11) 15.1 (0 - 0.5') - 2010
COC-BC-13 (5671' DOWNSTREAM OF COC-BC-11) 14.7 (0 - 0.5') - 2010
COC-BC-14 (10,707' DOWNSTREAM OF COC-BC-11) 6.66 (0 - 0.5') - 2010
(FOR CLARITY, BCWP SEDIMENT SAMPLE LOCATIONS COC-BC-12 THROUGH COC-BC-14 ARE NOT SHOWN ON THIS FIGURE)

COC-BC-11 22.5 (0 - 0.5') - 2008
COC-BC-09 9.44 [13.8] (0 - 0.5') - 2008
CRAB ORCHARD CREEK FLOW
COC-BC-07 13.6 (0 - 0.5') - 2008 30.7 (0 - 0.5') - 2010
COC-BC-05 2.38 (0 - 0.5') - 2008 5.56 (0 - 0.5') - 2010
COC-BC-04 6.2 [13.4] (0 - 0.5') - 2008 5.48 [5.87] (0 - 0.5') - 2010
COC-BC-01 2.75 (0 - 0.5') - 2008 3.02 (0 - 0.5') - 2010
COC-BC-02 3.68 [1.95] (0 - 0.5') - 2010
PF-BC-04 44.5 (0 - 0.5') - 2008 30.4 (0 - 0.5') - 2010
PF-BC-03 8.2 (0 - 0.5') - 2008 9.84 (0 - 0.5') - 2010
PF-BC-02 0.486 (0 - 0.5') - 2010
PF-BC-01 0.506 (0 - 0.5') - 2008 1.07 (0 - 0.5') - 2010
PILES FORK FLOW
GC-BC-10 66.9 (0 - 0.5') - 2008
GC-BC-11 37 (0 - 0.5') - 2008
GC-BC-12 55 (0 - 0.5') - 2008
GC-BC-13 188 (0 - 0.5') 71.6 (0 - 0.5')
GC-BC-14 81.2 (0 - 0.5') 2,880 (0.5 - 2')
GC-BC-15 2,880 (0.5 - 2')
GC-BC-16 55 (0 - 0.5') - 2008
GC-BC-FPT1-33XL 321 (0.5 - 2')
GC-BC-FPT1-5'L 58.4 (0 - 0.5')
GC-BC-FPT1-5'R 283 (0 - 0.5')
GC-BC-FPT1-33XR 52.1 [58.5] (0.5 - 2')
GC-BC-FPT2-5'L 810 (0 - 0.5')
GC-BC-FPT2-33XL 453 (0 - 0.5')
GC-BC-FPT2-5'R
GC-BC-FPT2-33XR
GC-BC-FPT3-33XL 241 (0.5 - 2')
GC-BC-FPT3-5'L
GC-BC-FPT3-5'R
GC-BC-FPT3-33XR 3.6 [4.52] (0.5 - 2')
GC-BC-FPT4-33XL 59.8 (0 - 0.5') 139 (0.5 - 2')
GC-BC-FPT4-5'L
GC-BC-FPT4-5'R 64.1 (0.5 - 2')
GC-BC-FPT4-33XR 69.8 (0 - 0.5')
GC-BC-FPT5-33XL 238 (0.5 - 2')
GC-BC-FPT5-5'L 84.4 (0 - 0.5')
GC-BC-FPT5-5'R 212 (0 - 0.5')
GC-BC-FPT5-33XR 3.91 (0.5 - 2')
GC-BC-FPT6-33XL 16.7 (0 - 0.5')
GC-BC-FPT6-5'L 165 (0.5 - 2')
GC-BC-FPT6-5'R 50.1 [31.8] (0.5 - 2')
GC-BC-FPT6-33XR 13 (0 - 0.5')
LP-SED-1 0.588 [0.869] (0 - 0.5')
LP-SED-2 0.922 (0 - 0.5')

A6-8 2.49 (0 - 0.5')
A6-7 5.62 (0 - 0.5')
A6-6 13.2 (0 - 0.5')
GC-BC-08 19.5 (0 - 0.5') - 2008
A6-3 15 (0 - 0.5')
A6-2 22 (0 - 0.5')
A6-4 25.2 (0 - 0.5')
A6-5 3.68 [3.27] (0 - 0.5')
A4-10 3.3 (0 - 0.5')
SD-BC-04 143 (0 - 0.5') - 2008
A6-1 60.4 (0 - 0.5')
SMITH DITCH FLOW
A4-9 1.69 (0 - 0.5')
A4-8 19.7 [18.1] (0 - 0.5')
A4-7 4.53 (0 - 0.5')
A5-5 7.87 (0 - 0.5')
A5-1 11.5 [11] (0 - 0.5')
NPL 15.9 (0 - 0.5')
PRIVATE ROAD
CONSTRUCTED WETLANDS
GLADE CREEK FLOW
NORTH MARION STREET
A4-4 31 (0 - 0.5')
A4-5 31.1 (0 - 0.5')
A4-6 47.2 (0 - 0.5')
A5-7 635 (0 - 0.5')
A5-4 18.9 (0 - 0.5')
A5-6 259 [386] (0 - 0.5')
A5-2 2.6 (0 - 0.5')
SD-BC-01 688 (0 - 0.5') - 2008
A3-32 707 [835] (0 - 0.5')
A3-30 22.4 (0 - 0.5')
A3-29 8.71 (0 - 0.5')
A3-15 1,210 (0 - 0.5')
A3-16 730 (0 - 0.5')
A3-31 51.7 (0 - 0.5')
A3-23 771 (0 - 0.5')
A3-22 2,750 (0 - 0.5')
A3-14 35,600 (0 - 0.5') 1,360 (0 - 0.5')
A3-1 2,540 (0 - 0.5')
A3-2 12.1 (0 - 0.5')
A4-1 12.6 (0 - 0.5')
A4-2 6.51 (0 - 0.5')
A4-3 7,310 (0 - 0.5')
A3-28
A3-19 66.8 (0 - 0.5')
A3-7 8.46 (0 - 0.5')
A3-18 3.02 (0 - 0.5')
A3-20 123 [138] (0 - 0.5')
A3-27 22.4 (0 - 0.5')
A3-26 153 (0 - 0.5')
A3-25 24.1 (0 - 0.5')
A3-8 1,280 (0 - 0.5')
A3-11 278 (0 - 0.5')
A3-10 1,660 [1,940] (0 - 0.5')
A3-33 963 (0 - 0.5')
A3-34 155 (0 - 0.5')
A1-50 21.1 [22.4] (0 - 0.5')
A1-48 183 (0 - 0.5')
A1-51 37.0 (0 - 0.5')
A1-58 25.2 (0 - 0.5')
A1-59 79.9 (0 - 0.5')
A1-60 0.613 (0 - 0.5')
GC-BC-01 15.9 (0 - 0.5') - 2008
A3-5 1,230 [526] (0 - 0.5')
A3-4 1,500 (0 - 0.5')
A3-3 375 (0 - 0.5')
A3-21 4,270 (0 - 0.5')
A3-9 1,540 (0 - 0.5')
A3-12 4,830 (0 - 0.5')
A3-24 5,080 (0 - 0.5')
A3-13 126 (0 - 0.5') 1,810 (0 - 0.5')
SDD-7
A1-21 26,100 (0 - 0.5')
A3-6 1,770 (0 - 4')
A3-17 2,390 (0 - 4')
A1-22 6 (0 - 0.5')
A1-24 906 (0 - 0.5')
A1-25 1,870 (0 - 0.5')
A2-1 113 (0 - 5')
A2-2 2,340 (0 - 5')
A2-11 375 (0 - 0.5')
A2-4 23.1 (0 - 0.5')
A2-10 4.86 (0 - 0.5')
A2-3 19.8 (0 - 4')
A5-3 15.9 (0 - 0.5')
A2-16 5,080 (0 - 0.5')
A2-17 3,840 (0 - 0.5')
A2-15 1,560 (0 - 0.5')
A2-7 11,700 (0 - 0.5')
A2-5 8.91 (0 - 0.5')
A2-6 126 [167] (0 - 0.5')
A2-18 1,040 (0 - 0.5')
A1-12 814 (0 - 0.5')
A1-30 5,840 (0 - 0.5')
A1-31 5,840 (0 - 0.5')
A2-14 6,300 (0 - 0.5')
A2-11 2,100 (0 - 0.5')
A2-12 3,120 (0 - 0.5')
A2-19 5,080 (0 - 0.5')
A2-8 8,730 (0 - 0.5')
A2-9 19,600 (0 - 0.5')
A2-17 414.7 [72.9] (0 - 0.5')
A2-13 2,010 (0 - 0.5')
A1-33 3.02 (0 - 0.5')
A1-18 51.8 (0 - 0.5')
A1-16 5,810 (0 - 0.5')
A1-35 11.4 (0 - 0.5')
A1-34 4.67 (0 - 0.5')
GC-BC-10 66.9 (0 - 0.5') - 2008
SDD-26 796 (0 - 0.5') 2.72 (1.5 - 2')
SDD-27 7,930 (0 - 0.5') 1,620 [1,440] (1.5 - 2')
A1-32 28.3 [45.4] (0 - 0.5')
SDD-15 6,290 (0 - 0.5') 3,030 (1.5 - 2')
A1-29 22.2 (0 - 0.5')
A1-28 62.6 (0 - 0.5')
A1-27 4,010 (0 - 0.5')
A1-26 1,700 (0 - 0.5')
A1-36 9.75 (0 - 0.5')
A1-8 5,880 (0 - 0.5')
A1-62 1,770 (0 - 0.5')
A1-57 19.3 (0 - 0.5')
A1-37 238 [398] (0 - 0.5')
A1-63 19.1 (0 - 0.5')
A1-56 17.8 (0 - 0.5')
A1-6 4,840 (0 - 0.5')
SDD-9 5,430 (0 - 0.5') 72.8 [70.3] (1.5 - 2')
A1-35 8.12 (0 - 0.5')
A1-23 7,120 (0 - 0.5')
A1-39 73.4 (0 - 0.5')
A1-5 462 (0 - 0.5')
A1-40 3.1 (0 - 0.5')
SDD-16 13,200 (0 - 0.5') 3,920 (1.5 - 2')
A1-41 71.2 (0 - 0.5')
A1-55 47.1 (0 - 0.5')
A1-38 65 (0 - 0.5')
A1-20 1,030 (0 - 0.5')
A1-61 104 (0 - 0.5')
A1-42 5.56 (0 - 0.5')
A1-17 17.8 (0 - 0.5')
A1-19 704 (0 - 0.5')
A1-44 28.8 (0 - 0.5')
A1-43 2.05 (0 - 0.5')
A1-53 60.8 (0 - 0.5')
SDD-1 2,510 (0 - 0.5') 331 (1.5 - 2')
A1-52 142 (0 - 0.5')
A1-19 820 [5,390] (0 - 0.5')
A1-45 3.07 (0 - 0.5')
A1-64 13.4 (0 - 0.5')
A1-65 13.0 (0 - 0.5')
A1-66 44.6 (0 - 0.5')
A1-68 11.8 [12.8] (0 - 0.5')
A1-69 8.61 (0 - 0.5')
A1-70 31.6 (0 - 0.5')
A1-71 25.7 (0 - 0.5')
A1-75 32.1 (0 - 0.5')
A1-74 12.3 (0 - 0.5')
A1-72 10.7 (0 - 0.5')
A1-22 13.4 [17.5] (0 - 0.5')
A1-73 31.1 [38.5] (0 - 0.5')
A1-46 2.82 (0 - 0.5')
A1-47 20.1 (0 - 0.5')

0 400' 800'
GRAPHIC SCALE

LEGEND:

- EDGE OF WATER
- DRAINAGE DITCH AND DIRECTION OF FLOW
- APPROXIMATE SOUTHERN DRAINAGE DITCH FLOW PATH DOWNSTREAM OF DEFINED CHANNEL
- PROPERTY BOUNDARY (SEE NOTE 2)
- RESIDENTIAL PROPERTY BOUNDARY
- FENCELINE
- EXISTING CONTOUR LINE
- FORMER PROCESS AREA SURFACE COVER
- SOIL REMOVAL AREA (SOIL/DEBRIS PILES AND SURFICIAL ASPHALT-LIKE MATERIALS)
- PORTIONS OF SOUTHERN DRAINAGE DITCHES THAT HAVE BEEN FILLED IN PRIOR TO OR DURING SURFACE COVER CONSTRUCTION OR REMOVAL OF SOIL AND DEBRIS PILES.
- SDD-1 MARCH 2006 SDD SAMPLE LOCATION
- GC-BC-FPT4-5'L FLOODPLAIN SOIL SAMPLE LOCATION
- A1-1 DECEMBER 2009 SAMPLE LOCATION
- A1-36 MARCH 2010 SAMPLE LOCATION
- LP-SED-1 SEDIMENT SAMPLING LOCATION
- BCWP SEDIMENT SAMPLE LOCATION
- A3-33 AUGUST 2012 GRAB SAMPLE LOCATION
- A1-53 AUGUST 2012 COMPOSITE SAMPLE LOCATION
- A1-71 NOVEMBER 2012 COMPOSITE SAMPLE LOCATION
- 51.8 (0 - 0.5') TCDD-TEQ CONCENTRATION (ppt) AND SAMPLE DEPTH INTERVAL

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, 1996 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. THIS FIGURE SHOWS ALL SAMPLE LOCATIONS WHERE DIOXINS/FURANS HAVE BEEN ANALYZED, INCLUDING SOME LOCATIONS THAT HAVE SINCE BEEN REMOVED OR COVERED AS PART OF REMEDIATION ACTIVITIES.

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

SUMMARY OF TCDD-TEQ CONCENTRATIONS

ARCADIS

FIGURE 2

Attachment 3

Data Validation Reports
(includes validated laboratory
data sheets)

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

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 ± 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 ± 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)					
Tier II Validation					
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	
Tier III Validation					
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	Compliancy[1]					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

Vista

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) RAY STEVENSON Date: 11/28/12 Time: 1445 Received by: (Signature and Printed Name) Bethma / 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

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29	
A1-68 (0-0.5')	11/27/12	0855		1	G	So						X										
DUP-1	11/27/12	—		1	G	So						X										
A1-75 (0-0.5')	11/27/12	0940		1	G	So						X										
A1-69 (0-0.5')	11/27/12	1010		1	G	So						X										
A1-69 (0-0.5') MS	11/27/12	1010		1	G	So						X										
A1-69 (0-0.5') MSD	11/27/12	1010		1	G	So						X										
A1-74 (0-0.5')	11/27/12	1100		1	G	So						X										
A1-70 (0-0.5')	11/27/12	1135		1	G	So						X										
A1-73 (0-0.5')	11/27/12	1210		1	G	So						X										
* DUP-2	11/27/12	—		1	G	So						X										* HOLD *

Special Instructions/Comments:
* Sample logged in to Work Order 2110018

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

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

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_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

CHAIN OF CUSTODY

2 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110011

Storage ID: WR-2

Storage Secured: Yes ☑ No ☐

Temp 0.8 °C

TAT: (Check One):

Standard: ~~X~~ 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) RAY STEVENSON Date: 11/28/12 Time: 1445 Received by: (Signature and Printed Name) Bethany Benedict B 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

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 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:_____

* Samples logged in to WorkOrder 2110017

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

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

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_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

CHAIN OF CUSTODY

3 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110011

Storage ID: WR-2

Storage Secured: Yes ☑ No ☐

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	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	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:
RAY STEVENSON	11/28/12	1445	Bethma A Benedict B. Benedict	11/29/12	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

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1668 PBDE	EPA1614 PAH	CARB429 WHO-29	
* A1-66 (0-0.5')	11/28/12	1150		1	G	So						X										* HOLD *
* EB 112812	11/28/12	1400		2	A	Aq						X										

Special Instructions/Comments:

* Sample logged into 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

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

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_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The amount detected is above the High Calibration Limit.**
P	**The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.**
H	**Recovery was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Low Calibration Limit.**
*****	**See Cover Letter**
Conc.	**Concentration**
DL	**Sample-specific estimated detection limit**
MDL	**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.**
EMPC	**Estimated Maximum Possible Concentration**
NA	**Not applicable**
RL	**Reporting Limit – concentrations that correspond to low calibration point**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

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
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 8:55

Sample Data
Matrix: Soil
Sample Size: 10.5 g
% Solids: 77.3

Laboratory Data
Lab Sample: 2110011-01 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 18:11 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.364			J
1,2,3,7,8-PeCDD	2.06			J
1,2,3,4,7,8-HxCDD	3.31			
1,2,3,6,7,8-HxCDD	8.83			
1,2,3,7,8,9-HxCDD	8.04			
1,2,3,4,6,7,8-HpCDD	296			
OCDD	10900			E J
2,3,7,8-TCDF	0.331			J
1,2,3,7,8-PeCDF	0.453			J
2,3,4,7,8-PeCDF	1.04			J
1,2,3,4,7,8-HxCDF	1.51			J
1,2,3,6,7,8-HxCDF	1.26			J
2,3,4,6,7,8-HxCDF	2.12			J
1,2,3,7,8,9-HxCDF	ND	0.483		
1,2,3,4,6,7,8-HpCDF	24.1			
1,2,3,4,7,8,9-HpCDF	1.88			J
OCDF	82.3			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	90.4	40 - 135	
	13C-1,2,3,7,8-PeCDD	66.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	82.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	77.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	77.9	40 - 135	
	13C-OCDD	96.5	40 - 135	
	13C-2,3,7,8-TCDF	83.2	40 - 135	
	13C-1,2,3,7,8-PeCDF	77.1	40 - 135	
	13C-2,3,4,7,8-PeCDF	81.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	80.9	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	78.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	75.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	77.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	81.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	78.9	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: DUP-1

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 0:00

Sample Data
Matrix: Soil
Sample Size: 10.3 g
% Solids: 78.3

Laboratory Data
Lab Sample: 2110011-02 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 18:59 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.372			J
1,2,3,7,8-PeCDD	2.56			J
1,2,3,4,7,8-HxCDD	3.34			
1,2,3,6,7,8-HxCDD	10.7			
1,2,3,7,8,9-HxCDD	9.54			
1,2,3,4,6,7,8-HpCDD	317			
OCDD	11200			E J
2,3,7,8-TCDF	0.287			J
1,2,3,7,8-PeCDF	0.395			J
2,3,4,7,8-PeCDF	1.03			J
1,2,3,4,7,8-HxCDF	1.46			J
1,2,3,6,7,8-HxCDF	ND		1.12	UX
2,3,4,6,7,8-HxCDF	2.21			J
1,2,3,7,8,9-HxCDF	ND	0.505		
1,2,3,4,6,7,8-HpCDF	26.5			
1,2,3,4,7,8,9-HpCDF	1.84			J
OCDF	88.8			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	86.4	40 - 135	
	13C-1,2,3,7,8-PeCDD	74.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	85.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	79.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	84.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	78.6	40 - 135	
	13C-OCDD	99.1	40 - 135	
	13C-2,3,7,8-TCDF	65.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	78.2	40 - 135	
	13C-2,3,4,7,8-PeCDF	78.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	84.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	79.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	78.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	85.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	82.4	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	89.6	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-75 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 9:40

Sample Data
Matrix: Soil
Sample Size: 10.7 g
% Solids: 74.9

Laboratory Data
Lab Sample: 2110011-03 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
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
2,3,7,8-TCDD	1.25			
1,2,3,7,8-PeCDD	8.18			
1,2,3,4,7,8-HxCDD	9.48			
1,2,3,6,7,8-HxCDD	20.8			
1,2,3,7,8,9-HxCDD	33.7			
1,2,3,4,6,7,8-HpCDD	817			
OCDD	21000			E J
2,3,7,8-TCDF	0.760			
1,2,3,7,8-PeCDF	0.682			J
2,3,4,7,8-PeCDF	0.568			J
1,2,3,4,7,8-HxCDF	2.32			J
1,2,3,6,7,8-HxCDF	2.12			J
2,3,4,6,7,8-HxCDF	3.58			
1,2,3,7,8,9-HxCDF	ND	0.277		
1,2,3,4,6,7,8-HpCDF	62.4			
1,2,3,4,7,8,9-HpCDF	4.42			
OCDF	340			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	96.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	77.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	84.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	78.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	78.1	40 - 135	
	13C-OCDD	116	40 - 135	
	13C-2,3,7,8-TCDF	83.0	40 - 135	
	13C-1,2,3,7,8-PeCDF	87.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	88.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	83.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	79.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	81.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	83.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	83.0	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	89.7	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-69 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 10:10

Sample Data
Matrix: Soil
Sample Size: 10.1 g
% Solids: 79.5

Laboratory Data
Lab Sample: 2110011-04 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0009 Date Extracted: 04-Dec-2012 15:00
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
2,3,7,8-TCDD	ND		0.316	UX
1,2,3,7,8-PeCDD	1.53			J
1,2,3,4,7,8-HxCDD	2.15			J
1,2,3,6,7,8-HxCDD	5.83			
1,2,3,7,8,9-HxCDD	5.35			
1,2,3,4,6,7,8-HpCDD	205			
OCDD	9870			E J
2,3,7,8-TCDF	0.555			J
1,2,3,7,8-PeCDF	0.429			J
2,3,4,7,8-PeCDF	0.654			J
1,2,3,4,7,8-HxCDF	1.16			J
1,2,3,6,7,8-HxCDF	ND		0.808	UX
2,3,4,6,7,8-HxCDF	1.24			J
1,2,3,7,8,9-HxCDF	ND	0.390		
1,2,3,4,6,7,8-HpCDF	19.7			
1,2,3,4,7,8,9-HpCDF	1.42			J
OCDF	60.9			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	97.0	40 - 135	
	13C-1,2,3,7,8-PeCDD	83.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	84.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	78.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.0	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	79.3	40 - 135	
	13C-OCDD	108	40 - 135	
	13C-2,3,7,8-TCDF	90.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	86.2	40 - 135	
	13C-2,3,4,7,8-PeCDF	94.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	80.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	76.0	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	75.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	83.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	79.3	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	89.1	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-74 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 11:00

Sample Data
Matrix: Soil
Sample Size: 10.5 g
% Solids: 77.2

Laboratory Data
Lab Sample: 2110011-05 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
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
2,3,7,8-TCDD	0.259			J
1,2,3,7,8-PeCDD	2.03			J
1,2,3,4,7,8-HxCDD	3.19			
1,2,3,6,7,8-HxCDD	7.64			
1,2,3,7,8,9-HxCDD	6.97			
1,2,3,4,6,7,8-HpCDD	316			
OCDD	12400			E J
2,3,7,8-TCDF	0.821			
1,2,3,7,8-PeCDF	0.709			J
2,3,4,7,8-PeCDF	1.00			J
1,2,3,4,7,8-HxCDF	1.98			J
1,2,3,6,7,8-HxCDF	1.65			J
2,3,4,6,7,8-HxCDF	2.17			J
1,2,3,7,8,9-HxCDF	ND	0.375		
1,2,3,4,6,7,8-HpCDF	30.6			
1,2,3,4,7,8,9-HpCDF	2.21			J
OCDF	107			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	86.7	40 - 135	
	13C-1,2,3,7,8-PeCDD	76.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	76.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	72.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	73.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	74.4	40 - 135	
	13C-OCDD	97.0	40 - 135	
	13C-2,3,7,8-TCDF	78.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	81.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	85.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	76.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	71.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	72.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	76.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	74.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	82.8	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-70 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 11:35

Sample Data
Matrix: Soil
Sample Size: 10.4 g
% Solids: 77.4

Laboratory Data
Lab Sample: 2110011-06 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 21:23 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND		0.329	UX
1,2,3,7,8-PeCDD	4.04			
1,2,3,4,7,8-HxCDD	8.26			
1,2,3,6,7,8-HxCDD	29.7			
1,2,3,7,8,9-HxCDD	21.0			
1,2,3,4,6,7,8-HpCDD	897			
OCDD	19900			E J
2,3,7,8-TCDF	0.336			J
1,2,3,7,8-PeCDF	0.721			J
2,3,4,7,8-PeCDF	0.609			J
1,2,3,4,7,8-HxCDF	11.7			
1,2,3,6,7,8-HxCDF	7.16			
2,3,4,6,7,8-HxCDF	14.3			
1,2,3,7,8,9-HxCDF	1.63			J
1,2,3,4,6,7,8-HpCDF	254			
1,2,3,4,7,8,9-HpCDF	26.5			
OCDF	576			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	78.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	68.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	75.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	72.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	74.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	77.9	40 - 135	
	13C-OCDD	108	40 - 135	
	13C-2,3,7,8-TCDF	71.5	40 - 135	
	13C-1,2,3,7,8-PeCDF	73.8	40 - 135	
	13C-2,3,4,7,8-PeCDF	82.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	75.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	73.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	73.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	77.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	79.6	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	85.8	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-73 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 12:10

Sample Data
Matrix: Soil
Sample Size: 10.2 g
% Solids: 78.6

Laboratory Data
Lab Sample: 2110011-07 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
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
2,3,7,8-TCDD	0.667			
1,2,3,7,8-PeCDD	6.58			
1,2,3,4,7,8-HxCDD	9.72			
1,2,3,6,7,8-HxCDD	24.1			
1,2,3,7,8,9-HxCDD	23.7			
1,2,3,4,6,7,8-HpCDD	773			
OCDD	21500			E J
2,3,7,8-TCDF	0.627			
1,2,3,7,8-PeCDF	1.14			J
2,3,4,7,8-PeCDF	1.38			J
1,2,3,4,7,8-HxCDF	5.26			
1,2,3,6,7,8-HxCDF	5.98			
2,3,4,6,7,8-HxCDF	8.06			
1,2,3,7,8,9-HxCDF	ND	0.984		
1,2,3,4,6,7,8-HpCDF	130			
1,2,3,4,7,8,9-HpCDF	9.45			
OCDF	450			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	70.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	62.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	63.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	61.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	61.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	68.0	40 - 135	
	13C-OCDD	84.9	40 - 135	
	13C-2,3,7,8-TCDF	66.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	66.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	71.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	61.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	58.9	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	60.1	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	65.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	64.2	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	73.7	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-71 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 13:30

Sample Data
Matrix: Soil
Sample Size: 10.3 g
% Solids: 77.5

Laboratory Data
Lab Sample: 2110011-08 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
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
2,3,7,8-TCDD	0.561			J
1,2,3,7,8-PeCDD	4.16			
1,2,3,4,7,8-HxCDD	7.01			
1,2,3,6,7,8-HxCDD	17.9			
1,2,3,7,8,9-HxCDD	16.4			
1,2,3,4,6,7,8-HpCDD	653			
OCDD	24000			E J
2,3,7,8-TCDF	1.22			
1,2,3,7,8-PeCDF	1.03			J
2,3,4,7,8-PeCDF	2.48			J
1,2,3,4,7,8-HxCDF	3.85			
1,2,3,6,7,8-HxCDF	3.19			
2,3,4,6,7,8-HxCDF	5.05			
1,2,3,7,8,9-HxCDF	0.275			J
1,2,3,4,6,7,8-HpCDF	82.8			
1,2,3,4,7,8,9-HpCDF	5.77			
OCDF	319			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	87.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	77.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	81.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	79.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	86.1	40 - 135	
	13C-OCDD	116	40 - 135	
	13C-2,3,7,8-TCDF	81.0	40 - 135	
	13C-1,2,3,7,8-PeCDF	83.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	91.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	80.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	78.4	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	77.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	82.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	86.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	94.6	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-72 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 14:00

Sample Data
Matrix: Soil
Sample Size: 10.4 g
% Solids: 77.7

Laboratory Data
Lab Sample: 2110011-09 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 23:47 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND		0.185	UX
1,2,3,7,8-PeCDD	ND		1.22	UX
1,2,3,4,7,8-HxCDD	2.77			J
1,2,3,6,7,8-HxCDD	6.08			
1,2,3,7,8,9-HxCDD	6.66			
1,2,3,4,6,7,8-HpCDD	269			
OCDD	20000			E J
2,3,7,8-TCDF	0.157			J
1,2,3,7,8-PeCDF	ND	0.235		
2,3,4,7,8-PeCDF	ND		0.190	UX
1,2,3,4,7,8-HxCDF	0.844			J
1,2,3,6,7,8-HxCDF	ND		0.685	UX
2,3,4,6,7,8-HxCDF	1.18			J
1,2,3,7,8,9-HxCDF	ND	0.316		
1,2,3,4,6,7,8-HpCDF	19.4			
1,2,3,4,7,8,9-HpCDF	1.39			J
OCDF	78.7			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	90.6	40 - 135	
	13C-1,2,3,7,8-PeCDD	77.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	79.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	74.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	75.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.0	40 - 135	
	13C-OCDD	108	40 - 135	
	13C-2,3,7,8-TCDF	83.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	87.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	88.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	77.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	73.3	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	73.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	78.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	83.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	93.0	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: EB 112712

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 15:40

Sample Data
Matrix: Aqueous
Sample Size: 1.01 L

Laboratory Data
Lab Sample: 2110011-10 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0033 Date Extracted: 12-Dec-2012 10:12
Date Analyzed : 13-Dec-12 20:39 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/L)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND	0.755		
1,2,3,7,8-PeCDD	ND	1.01		
1,2,3,4,7,8-HxCDD	ND	1.15		
1,2,3,6,7,8-HxCDD	ND	1.35		
1,2,3,7,8,9-HxCDD	ND	1.56		
1,2,3,4,6,7,8-HpCDD	ND	1.97		
OCDD	ND	1.78		
2,3,7,8-TCDF	ND	0.858		
1,2,3,7,8-PeCDF	ND	0.728		
2,3,4,7,8-PeCDF	ND	0.684		
1,2,3,4,7,8-HxCDF	ND	0.537		
1,2,3,6,7,8-HxCDF	ND	0.532		
2,3,4,6,7,8-HxCDF	ND	0.559		
1,2,3,7,8,9-HxCDF	ND	0.817		
1,2,3,4,6,7,8-HpCDF	ND	0.639		
1,2,3,4,7,8,9-HpCDF	ND	0.929		
OCDF	ND	2.34		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	81.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	67.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	67.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	71.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	63.4	32 - 141	
	13C-1,2,3,4,6,7,8-HpCDD	60.0	40 - 135	
	13C-OCDD	53.0	40 - 135	
	13C-2,3,7,8-TCDF	85.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	62.9	40 - 135	
	13C-2,3,4,7,8-PeCDF	73.8	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	69.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	71.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	74.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	66.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	61.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	59.4	40 - 135	
	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 specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

Approved By: William Luksemburg 17-Dec-2012 11:44

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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 ± 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 ± 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)					
Tier II Validation					
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	
Tier III Validation					
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	Compliancy[1]					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

CHAIN OF CUSTODY

1 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110012

Storage Secured: Yes ☑ No ☐

Storage ID: WR-2 Temp: 0.9 °C

TAT: (Check One):
Standard: ⊘ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify:

Project I.D.: _____ P.O.# B003975.0000.00002 Sampler: I. STEWART / R. STEVENSON (Name)

Invoice to: Name	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	ARCADIS	16602 EXCELSIOR RD.	BAXTER	MN	56425	218-829-4607	

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
RAY STEVENSON	11/28/12	1445	Nathan D. 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

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

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29	
* A1-68 (0-0.5')	11/27/12	0855		1	G	So						X										
* DUP-1	11/27/12	—		1	G	So						X										
* A1-75 (0-0.5')	11/27/12	0940		1	G	So						X										
* A1-69 (0-0.5')	11/27/12	1010		1	G	So						X										
* A1-69 (0-0.5') MS	11/27/12	1010		1	G	So						X										
* A1-69 (0-0.5') MSD	11/27/12	1010		1	G	So						X										
* A1-74 (0-0.5')	11/27/12	1100		1	G	So						X										
* A1-70 (0-0.5')	11/27/12	1135		1	G	So						X										
* A1-73 (0-0.5')	11/27/12	1210		1	G	So						X										
DUP-2	11/27/12	—		1	G	So						X										* HOLD *

Special Instructions/Comments:
* Samples logged in to Workorder 2110011

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPAS
Company: ARCADIS
Address: 16602 EXCELSIOR RD
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax: _____
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

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_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

CHAIN OF CUSTODY

2 OF 3

FOR LABORATORY USE ONLY — Storage Secured: Yes ☒ No ☐

Laboratory Project ID: 2110012 — 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	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	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:
KAY STEVENSON	11/28/12	1445	[illegible]	11/29/12	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

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

	Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1668 PBDE	EPA1614 PAH	CARB429 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 BESSINGPAS
Company: ARCADIS
Address: 6602 EXCELSIOR RD.
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax: _____
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other _____

*Bottle Preservative Type: T = Thiosulfate,
O = Other _____

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 _____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

Vista

CHAIN OF CUSTODY

3 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110012

Storage ID WR-2

Storage Secured: Yes ☒ No ☐

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	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	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:
RAY STEVENSON	11/28/12	1445	[illegible]	11/29/12	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

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1668 PBDE	EPA1614 PAH	CARB429 WHO-29	
A1-66 (0-0.5')	11/28/12	1150		1	G	So						X										*HOLD*
* EB 112812	11/28/12	1400		2	A	Aq						X										

Special Instructions/Comments:
* Sample logged in to $WorkOrder 2110011
11/30/12 moved "EB112812" to 2110012 as per Bill

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

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

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_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The amount detected is above the High Calibration Limit.**
P	**The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.**
H	**Recovery was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Low Calibration Limit.**
*****	**See Cover Letter**
Conc.	**Concentration**
DL	**Sample-specific estimated detection limit**
MDL	**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.**
EMPC	**Estimated Maximum Possible Concentration**
NA	**Not applicable**
RL	**Reporting Limit – concentrations that correspond to low calibration point**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

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
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 0:00

Sample Data
Matrix: Soil
Sample Size: 13.3 g
% Solids: 76.6

Laboratory Data
Lab Sample: 2110012-01 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
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
2,3,7,8-TCDD	0.579			
1,2,3,7,8-PeCDD	6.47			
1,2,3,4,7,8-HxCDD	12.4			
1,2,3,6,7,8-HxCDD	30.8			
1,2,3,7,8,9-HxCDD	29.5			
1,2,3,4,6,7,8-HpCDD	1160			
OCDD	26800			~~B~~, E J
2,3,7,8-TCDF	0.769			
1,2,3,7,8-PeCDF	1.11			J
2,3,4,7,8-PeCDF	1.54			J
1,2,3,4,7,8-HxCDF	6.94			
1,2,3,6,7,8-HxCDF	7.50			
2,3,4,6,7,8-HxCDF	10.7			
1,2,3,7,8,9-HxCDF	1.59			J
1,2,3,4,6,7,8-HpCDF	186			
1,2,3,4,7,8,9-HpCDF	14.6			
OCDF	871			
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			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	82.3	40 - 135	
	13C-1,2,3,7,8-PeCDD	81.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	80.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	79.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	79.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.3	40 - 135	
	13C-OCDD	209	40 - 135	H
	13C-2,3,7,8-TCDF	79.2	40 - 135	
	13C-1,2,3,7,8-PeCDF	79.0	40 - 135	
	13C-2,3,4,7,8-PeCDF	85.0	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	82.3	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	78.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	80.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	81.9	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	92.4	40 - 135	
	13C-OCDF	107	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	72.3	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	39.5

DL - Sample specifc 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.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-65 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 14:30

Sample Data
Matrix: Soil
Sample Size: 12.9 g
% Solids: 78.4

Laboratory Data
Lab Sample: 2110012-02 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
Date Analyzed : 29-Dec-12 18:14 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND		0.269	UX
1,2,3,7,8-PeCDD	2.04			J
1,2,3,4,7,8-HxCDD	3.52			
1,2,3,6,7,8-HxCDD	10.1			
1,2,3,7,8,9-HxCDD	8.17			
1,2,3,4,6,7,8-HpCDD	358			
OCDD	12700			~~B,~~ E J
2,3,7,8-TCDF	0.408			J
1,2,3,7,8-PeCDF	0.336			J
2,3,4,7,8-PeCDF	0.778			J
1,2,3,4,7,8-HxCDF	1.93			J
1,2,3,6,7,8-HxCDF	1.42			J
2,3,4,6,7,8-HxCDF	2.32			J
1,2,3,7,8,9-HxCDF	0.193			J
1,2,3,4,6,7,8-HpCDF	41.3			
1,2,3,4,7,8,9-HpCDF	3.13			
OCDF	169			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	86.8	40 - 135	
	13C-1,2,3,7,8-PeCDD	85.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	79.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	73.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	74.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	77.2	40 - 135	
	13C-OCDD	176	40 - 135	H
	13C-2,3,7,8-TCDF	79.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	80.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	82.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	88.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	81.7	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	79.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	83.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	83.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	90.5	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-64 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 15:00

Sample Data
Matrix: Soil
Sample Size: 12.7 g
% Solids: 79.4

Laboratory Data
Lab Sample: 2110012-03 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
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
2,3,7,8-TCDD	0.301			J
1,2,3,7,8-PeCDD	1.64			J
1,2,3,4,7,8-HxCDD	2.88			
1,2,3,6,7,8-HxCDD	7.22			
1,2,3,7,8,9-HxCDD	6.96			
1,2,3,4,6,7,8-HpCDD	344			
OCDD	17700			~~B~~, E J
2,3,7,8-TCDF	0.652			
1,2,3,7,8-PeCDF	0.419			J
2,3,4,7,8-PeCDF	0.524			J
1,2,3,4,7,8-HxCDF	1.48			J
1,2,3,6,7,8-HxCDF	1.09			J
2,3,4,6,7,8-HxCDF	1.76			J
1,2,3,7,8,9-HxCDF	0.139			J
1,2,3,4,6,7,8-HpCDF	25.8			
1,2,3,4,7,8,9-HpCDF	1.88			J
OCDF	112			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	79.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	83.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	87.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	80.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	81.6	40 - 135	
	13C-OCDD	201	40 - 135	H
	13C-2,3,7,8-TCDF	75.6	40 - 135	
	13C-1,2,3,7,8-PeCDF	81.6	40 - 135	
	13C-2,3,4,7,8-PeCDF	86.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	90.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	80.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	79.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	82.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	84.0	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	96.4	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-67 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 28-Nov-2012 11:15

Sample Data
Matrix: Soil
Sample Size: 12.3 g
% Solids: 81.7

Laboratory Data
Lab Sample: 2110012-08 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
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
2,3,7,8-TCDD	0.782			
1,2,3,7,8-PeCDD	10.5			
1,2,3,4,7,8-HxCDD	31.4			
1,2,3,6,7,8-HxCDD	95.0			
1,2,3,7,8,9-HxCDD	79.3			
1,2,3,4,6,7,8-HpCDD	5010			E J
OCDD	170000			D, ~~B~~, E J
2,3,7,8-TCDF	0.479			J
1,2,3,7,8-PeCDF	0.807			J
2,3,4,7,8-PeCDF	1.58			J
1,2,3,4,7,8-HxCDF	7.87			
1,2,3,6,7,8-HxCDF	5.54			
2,3,4,6,7,8-HxCDF	11.1			
1,2,3,7,8,9-HxCDF	0.737			J
1,2,3,4,6,7,8-HpCDF	468			
1,2,3,4,7,8,9-HpCDF	29.3			
OCDF	3970			J
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			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	85.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	93.8	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	84.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	80.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	81.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	123	40 - 135	
	13C-OCDD	302	40 - 135	D, H
	13C-2,3,7,8-TCDF	72.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	84.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	83.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	98.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	89.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	87.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	90.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	93.6	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	98.6	40 - 135	
	13C-OCDF	170	40 - 135	H
CRS	37Cl-2,3,7,8-TCDD	79.1	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	142

DL - Sample specifc 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.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-66 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 28-Nov-2012 11:50

Sample Data
Matrix: Soil
Sample Size: 13.1 g
% Solids: 77.5

Laboratory Data
Lab Sample: 2110012-09 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
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
2,3,7,8-TCDD	0.870			
1,2,3,7,8-PeCDD	4.85			
1,2,3,4,7,8-HxCDD	11.5			
1,2,3,6,7,8-HxCDD	44.5			
1,2,3,7,8,9-HxCDD	27.1			
1,2,3,4,6,7,8-HpCDD	1530			
OCDD	30900			~~B,~~E J
2,3,7,8-TCDF	1.65			
1,2,3,7,8-PeCDF	2.29			J
2,3,4,7,8-PeCDF	3.86			J
1,2,3,4,7,8-HxCDF	7.81			
1,2,3,6,7,8-HxCDF	5.86			
2,3,4,6,7,8-HxCDF	9.08			
1,2,3,7,8,9-HxCDF	0.745			J
1,2,3,4,6,7,8-HpCDF	189			J
1,2,3,4,7,8,9-HpCDF	13.1			
OCDF	718			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	75.2	40 - 135	
	13C-1,2,3,7,8-PeCDD	85.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	67.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	64.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	64.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	72.8	40 - 135	
	13C-OCDD	198	40 - 135	H
	13C-2,3,7,8-TCDF	66.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	76.8	40 - 135	
	13C-2,3,4,7,8-PeCDF	79.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	82.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	74.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	71.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	74.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	75.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	80.0	40 - 135	
	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 specifc 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.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: EB 112812

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 28-Nov-2012 14:00

Sample Data
Matrix: Aqueous
Sample Size: 0.996 L

Laboratory Data
Lab Sample: 2110012-10 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0077 Date Extracted: 20-Dec-2012 8:01
Date Analyzed : 27-Dec-12 14:05 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/L)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND	1.70		
1,2,3,7,8-PeCDD	ND	1.41		
1,2,3,4,7,8-HxCDD	ND	2.03		
1,2,3,6,7,8-HxCDD	ND	2.39		
1,2,3,7,8,9-HxCDD	ND	2.37		
1,2,3,4,6,7,8-HpCDD	ND	2.18		
OCDD	ND	3.11		
2,3,7,8-TCDF	ND	0.616		
1,2,3,7,8-PeCDF	ND	1.41		
2,3,4,7,8-PeCDF	ND	1.39		
1,2,3,4,7,8-HxCDF	ND	1.20		
1,2,3,6,7,8-HxCDF	ND	1.33		
2,3,4,6,7,8-HxCDF	ND	1.52		
1,2,3,7,8,9-HxCDF	ND	1.83		
1,2,3,4,6,7,8-HpCDF	ND	1.26		
1,2,3,4,7,8,9-HpCDF	ND	1.47		
OCDF	ND	2.89		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	88.2	40 - 135	
	13C-1,2,3,7,8-PeCDD	105	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	81.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	81.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.6	32 - 141	
	13C-1,2,3,4,6,7,8-HpCDD	80.0	40 - 135	
	13C-OCDD	99.5	40 - 135	
	13C-2,3,7,8-TCDF	86.2	40 - 135	
	13C-1,2,3,7,8-PeCDF	86.0	40 - 135	
	13C-2,3,4,7,8-PeCDF	86.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	87.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	82.4	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	84.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	89.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	77.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	90.5	40 - 135	
	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 specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

Approved By: William Luksemburg 04-Jan-2013 8:19