

October 31, 2013

Ms. Amy Hensley  
Work Assignment Manager  
Office of Resource Conservation and Recovery  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW  
Washington, D.C. 20460

**Contract No. EP-W-09-024**  
**Work Assignment No. 4-05**  
**Blue Lightning PCB Sample Results**

Dear Amy:

Enclosed please find a summary report documenting the analytical results for the soil samples collected during the sampling event conducted on September 12, 2013, as part of the Blue Lightning PCB Disposal Demonstration. The summary report is a deliverable under Task 3 of the work assignment statement of work. The summary report provides the PCB analysis results of the soil samples, as well as a summary of the Quality Assurance/Quality Control (QA/QC) procedures and the final analytical data tables. If additional information on the analysis of the samples is required, a full laboratory data package can be provided.

If you have any questions, please contact me at (614) 424-5547.

Sincerely,



Kenneth Cowen

Enclosure

cc: Cynthia Bowie (EPA Project Officer)  
Gail Hansen (Alternate EPA WAM)  
Bruce Buxton (Battelle Program Manager)

**Blue Lightning PCB Disposal Demonstration  
Intermediate Soil Sampling Event  
Analytical Results Summary**

An intermediate sampling event for the Blue Lightning PCB Disposal Demonstration was conducted on September 12, 2013. Three soil samples were collected during the sampling event. The samples were received at the Battelle Duxbury analytical laboratory on September 14 and immediately logged into the Battelle Laboratory Information Management System (LIMS).

The soil samples were extracted by manual Soxhlet Method 3540C, and analyzed for PCB Aroclors by gas chromatography/electron capture detection (GC/ECD) in accordance with EPA Method 8082A. Table 1 provides a summary of the analytical results in units of nanogram per gram (ng/g or parts per billion [ppb]) on a dry basis for each Aroclor analyzed in the soil samples. Table 1 also provides the total PCB concentration, in units of parts per million (ppm), as the sum of the Aroclor concentrations for each sample. These results provide the most conservative total PCB concentrations for the samples. That is, for the Aroclors resulting in a non-detect, the method detection limit (MDL) for that Aroclor was used to determine the total PCB concentration for each sample shown in Table 1.

Attachment A provides a narrative of the extraction and analysis procedures performed on the soil samples. Attachment B provides the final analytical data tables for the samples, which were created from a direct transfer of the authorized LIMS data. Attachment C provides the Sample Custody Documentation related to sample receipt and handling. A full laboratory data package related to the analysis of the samples is available upon request.

**TABLE 1. BLUE LIGHTNING SOIL SAMPLE RESULTS**

<b>Client ID</b>	<b>PMP-245E-SI</b>	<b>PMP-235E-VS</b>	<b>PMP-225E-VS</b>
Battelle ID	M0252-P	M0253-P	M0254-P
Collection Date	09/12/13	09/12/13	09/12/13
Extraction Date	09/25/13	09/25/13	09/25/13
Analysis Date	09/28/13	09/28/13	09/28/13
Analytical Instrument	ECD	ECD	ECD
% Moisture	14.01	4.85	4.48
Matrix	SOIL	SOIL	SOIL
Sample Size	4.37	19.05	19.12
Size Unit-Basis	G_DRY	G_DRY	G_DRY
Units	NG/G_DRY	NG/G_DRY	NG/G_DRY
Aroclor 1016	3.2 U	3.2 U	3.2 U
Aroclor 1221	3.2 U	3.2 U	3.2 U
Aroclor 1232	3.2 U	3.2 U	3.2 U
Aroclor 1242	337,052.25 D	58.78	196.92 D
Aroclor 1248	245,157.55 D	43.02	132.64 D
Aroclor 1254	104,650.63 D	25.68 J	83.97 D
Aroclor 1260	8,274.55	0.9 U	0.9 U
<b>Total (ppm)</b>	<b>695.1</b>	<b>0.14</b>	<b>0.42</b>

U Analyte not detected at 3:1 signal:noise ratio. The method detection limit (MDL) is reported.

D Dilution Run. Initial run outside linear range of instrument.

J Analyte detected below the sample-specific Reporting Limit (RL).

**ATTACHMENT A**  
**SAMPLE ANALYSIS NARRATIVE**

Project:	PCB Disposal Demonstrations – EPS Demo
Parameters:	PCB Aroclor
Laboratory:	Battelle-Duxbury, MA
Matrix:	Soil
Data Set:	DP-13-0690
Analytical SOP:	5-128
Method Reference:	EPA 8082A modified

### Sample Custody

Collection Date	Receipt Date	Temp (°C)
9/12/2013	9/14/2013	2.4
Corrective Actions	None	
Sample Storage	The samples were stored in freezer conditions (approx. -10° C) until extraction.	
Related samples	NA	

### METHOD SUMMARIES

Sample Preparation	Between approximately 5 and 20 g of soil was spiked with surrogates and extracted in methylene chloride using Soxhlet apparatus. The extract was dried over anhydrous sodium sulfate and concentrated over a water bath. The extracts were cleaned with copper (for sulfur removal), then processed through a pre-packed Forisil cleanup column, and concentrated. The samples were fortified with internal standards (IS) just prior to analysis.
Prep comments	None.

Analysis	Extracts intended for PCB analysis were analyzed using gas chromatography/electron capture detection (GC/ECD), following Battelle SOP 5-128 which is based on key components described in EPA Method 8082A. Sample data were quantified by the method of internal standards, using the IS compounds. Calibration verification was performed at the beginning and end of each 24-hr period in which samples were analyzed. The instrument was calibrated using a multi-level Aroclor 1016:1260 solution. A single point calibration of the identified Aroclor(s) was used to quantify the samples.
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Holding Times	Extraction Date(s)		Analysis Date(s)	
		9/25/2013	-	9/27/2013

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
<5 X MDL Samples >5 X PB	No exceedances noted. No comments.
Laboratory Control	An LCS was prepared with this analytical batch. The percent recoveries of target

Spike (LCS)	analytes were calculated to measure accuracy.
40-120% recovery	No exceedances noted. No comments.

Matrix Spike (MS)	An MS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
40-120% recovery	No exceedances. No comments.

Laboratory Duplicates	One duplicate sample was prepared with this analytical batch. The relative percent difference of each target compound was calculated to measure data quality in terms of precision (extraction efficiency).
<30% RPD	No exceedances noted. No comments.

Note: RPD is the relative percent difference.

Surrogate Recoveries	Two surrogate compounds were added prior to extraction, including PCB 34 and PCB 152. The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).
40 – 120%	One exceedance noted. The surrogate recovery for PCB 34 in M0252-P was masked by an interfering peak eluting at the same retention time as the surrogate. The recovery of the second surrogate was within QC criteria. The elevated recovery for PCB 34 is appropriately qualified “MI” indicating matrix interference. No further corrective actions were taken.

Initial Calibration (ICAL)	The GC/ECD was calibrated with six-level quadratic calibration curve for Aroclor 1016:1260.
$R^2 \geq 0.995$	No exceedances noted. No comments.

Note:  $R^2$  is the co-efficient of determination.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
$\leq 20\%$ difference individual. $\leq 20\%$ difference mean.	No exceedances noted. No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were run every 24 hours to ensure that initial calibration is still valid.
≤ 20% difference individual. ≤ 15% difference mean.	No exceedances noted.
	No comments.

**ATTACHMENT B**  
**FINAL ANALYTICAL DATA TABLES**



# Battelle

The Business of Innovation

**Project Client:** Battelle Columbus Operations

**Project Name:** PCB Disposal Demonstration - Blue Lightning

**Project Number:** 100030883-01

Client ID	PMP-245E-SI	PMP-235E-VS	PMP-225E-VS
Battelle ID	M0252-P	M0253-P	M0254-P
Sample Type	SA	SA	SA
Collection Date	09/12/13	09/12/13	09/12/13
Extraction Date	09/25/13	09/25/13	09/25/13
Analysis Date	09/28/13	09/28/13	09/28/13
Analytical Instrument	ECD	ECD	ECD
% Moisture	14.01	4.85	4.48
% Lipid	NA	NA	NA
Matrix	SOIL	SOIL	SOIL
Sample Size	4.37	19.05	19.12
Size Unit-Basis	G_DRY	G_DRY	G_DRY
Units	NG/G_DRY	NG/G_DRY	NG/G_DRY
Aroclor 1016	3.2 U	3.2 U	3.2 U
Aroclor 1221	3.2 U	3.2 U	3.2 U
Aroclor 1232	3.2 U	3.2 U	3.2 U
Aroclor 1242	337052.25 D	58.78	196.92 D
Aroclor 1248	245157.55 D	43.02	132.64 D
Aroclor 1254	104650.63 D	25.68 J	83.97 D
Aroclor 1260	8274.55	0.9 U	0.9 U

### Surrogate Recoveries (%)

Cl3(34)	0 NMI	105	110
Cl6(152)	98	97	93

# Battelle

The Business of Innovation

**Project Client:** Battelle Columbus Operations

**Project Name:** PCB Disposal Demonstration - Blue Lightning

**Project Number:** 100030883-01

Client ID Procedural Blank

Battelle ID	CA124PB-P
Sample Type	PB
Collection Date	09/25/13
Extraction Date	09/25/13
Analysis Date	09/27/13
Analytical Instrument	ECD
% Moisture	7.78
% Lipid	NA
Matrix	SEDIMENT
Sample Size	18.51
Size Unit-Basis	G_DRY
Units	NG/G_DRY

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Aroclor 1016	3.2 U
Aroclor 1221	3.2 U
Aroclor 1232	3.2 U
Aroclor 1242	3.2 U
Aroclor 1248	0.9 U
Aroclor 1254	0.9 U
Aroclor 1260	0.9 U

### Surrogate Recoveries (%)

Cl3(34)	97
Cl6(152)	95

# Battelle

The Business of Innovation

**Project Client:** Battelle Columbus Operations

**Project Name:** PCB Disposal Demonstration - Blue Lightning

**Project Number:** 100030883-01

Client ID	120911-03: Sand Sable			
Battelle ID	CA125LCS-P			
Sample Type	LCS			
Collection Date	09/25/13			
Extraction Date	09/25/13			
Analysis Date	09/28/13			
Analytical Instrument	ECD			
% Moisture	NA			
% Lipid	NA			
Matrix	SEDIMENT			
Sample Size	20.04			
Size Unit-Basis	G_DRY			
Units	NG/G_DRY	Target	% Recovery	Qualifier
Aroclor 1016	39.13	39.96	98	
Aroclor 1221	3.2 U			
Aroclor 1232	3.2 U			
Aroclor 1242	3.2 U			
Aroclor 1248	0.9 U			
Aroclor 1254	0.9 U			
Aroclor 1260	33.7	40.12	84	

### Surrogate Recoveries (%)

Cl3(34)	112
Cl6(152)	97

# Battelle

The Business of Innovation

**Project Client:** Battelle Columbus Operations

**Project Name:** PCB Disposal Demonstration - Blue Lightning

**Project Number:** 100030883-01

Client ID	PMP-235E-VS	PMP-235E-VS			
Battelle ID	M0253-P	M0253MS-P			
Sample Type	SA	MS			
Collection Date	09/12/13	9/12/2013			
Extraction Date	09/25/13	9/25/2013			
Analysis Date	09/28/13	9/28/2013			
Analytical Instrument	ECD	ECD			
% Moisture	4.85	5.29			
% Lipid	NA	NA			
Matrix	SOIL	SOIL			
Sample Size	19.05	4.8			
Size Unit-Basis	G_DRY	G_DRY			
Units	NG/G_DRY	NG/G_DRY	Target	% Recovery	Qualifier
Aroclor 1016	3.2 U	686.3	834.08	82	
Aroclor 1221	3.2 U	3.2 U			
Aroclor 1232	3.2 U	3.2 U			
Aroclor 1242	58.78	3.2 U			
Aroclor 1248	43.02	0.9 U			
Aroclor 1254	25.68 J	0.9 U			
Aroclor 1260	0.9 U	698.8	837.50	83	

### Surrogate Recoveries (%)

Cl3(34)	105	105
Cl6(152)	97	92

# Battelle

The Business of Innovation

**Project Client:** Battelle Columbus Operations

**Project Name:** PCB Disposal Demonstration - Blue Lightning

**Project Number:** 100030883-01

Client ID	PMP-225E-VS	PMP-225E-VS		
Battelle ID	M0254-P	M0254DUP-P		
Sample Type	SA	QADU		
Collection Date	09/12/13	9/12/2013		
Extraction Date	09/25/13	9/25/2013		
Analysis Date	09/28/13	9/28/2013		
Analytical Instrument	ECD	ECD		
% Moisture	4.48	5.2		
% Lipid	NA	NA		
Matrix	SOIL	SOIL		
Sample Size	19.12	18.99		
Size Unit-Basis	G_DRY	G_DRY		
Units	NG/G_DRY	NG/G_DRY	RPD	Qualifier
Aroclor 1016	3.2 U	3.2 U	NA	
Aroclor 1221	3.2 U	3.2 U	NA	
Aroclor 1232	3.2 U	3.2 U	NA	
Aroclor 1242	196.92 D	166.61 D	16.7	
Aroclor 1248	132.64 D	113.75 D	15.3	
Aroclor 1254	83.97 D	71.46 D	16.1	
Aroclor 1260	0.9 U	0.9 U	NA	

## Surrogate Recoveries (%)

Cl3(34)	110	110		
Cl6(152)	93	92		

**ATTACHMENT C**  
**SAMPLE CUSTODY DOCUMENTATION**

## Sample Receipt Form

Approved:  Authorized:

Project Number: \_\_\_\_\_ Client: \_\_\_\_\_  
Received by: Schumitz, Matt Date/Time Received: Saturday, September 14, 2013 12:00 AM  
No. of Shipping Containers: 1

### SHIPMENT

Method of Delivery: Commercial Carrier Tracking Number: 8627 4292 1373  
COC Forms:  Shipped with samples  No Forms

### Cooler(s)/Box(es)

Cntr	Type	Tracking No.	Seal	Seal Condition	Container Condition	Temp C	Smps
1 of 1	Cooler	8627 4292 1373	Custody Seal	Intact	Intact	2.4	3

### Samples

Sample Labels:  Sample labels agree with COC forms  
 Discrepancies (see Sample Custody Corrective Action Form)

Container Seals:  Tape  Custody Seals  Other Seals (See sample Log)  
 Seals intact for each shipping container  
 Seals broken (See sample log for impacted samples)

Condition of Samples:  Sample containers intact  
 Sample containers broken/leaking (See Custody Corrective Action Form)

Temperature upon receipt (°C): 2.4 Temperature Blank used  Yes  No  
*(Note: If temperature upon receipt differs from required conditions, see sample log comment field)*

Samples Acidified:  Yes  No  Unknown

Initial pH 5-9?:  Yes  No  NA  
*If no, individual sample adjustments on the Auxiliary Sample Receipt Form*

Total Residual Chlorine Present?:  Yes  No  NA  
*If yes, individual sample adjustments on the Auxiliary Sample Receipt Form*

Head Space <1% in samples for water VOC analysis:  Yes  No  NA  
*Individual sample deviations noted on sample log*

Samples Containers:  
Samples returned in PC-grade jars:  Yes  No  Unknown /Lot No.: UnKnown

Storage Location: Chem North: Freezer - F0002 (Walk-in) BDO IDs Assigned: M0252 - M0254

Samples logged in by: Schumitz, Matt Date/Time: 09/14/2013 12:00 AM

Approved By: \_\_\_\_\_ Approved On: \_\_\_\_\_

Authorized By: \_\_\_\_\_ Authorized On: \_\_\_\_\_

## Sample Receipt Form Details

Approved:  Authorized

Project Number: \_\_\_\_\_ Client: \_\_\_\_\_  
Received by: Schumitz, Matt Date/Time Received: Saturday, September 14, 2013 12:00 AM  
No. of Shipping Containers: **1**

BDO Id:	Client Sample ID:	Collection Date:	Login Date:	Ctrs:	Matrix:	Temp:	pH:	TRC:	VOC:	Stored In:	Loc:	No:	Comments:
M0252	PMP-245E-SI	09/12/13 15:05	09/16/13 13:31	1	SOIL	2.4	NA	NA	NA	F0002 (Walk-in)			Estimate 1500 PPM PCB
M0253	PMP-235E-VS	09/12/13 16:20	09/16/13 13:31	1	SOIL	2.4	NA	NA	NA	F0002 (Walk-in)			Estimate <50 PPM PCB
M0254	PMP-225E-VS	09/12/13 16:05	09/16/13 13:32	1	SOIL	2.4	NA	NA	NA	F0002 (Walk-in)			Estimate <50 PPM PCB

Total Samples: 3



### Chain of Custody

397 Washington Street  
Duxbury, MA 02332  
Phone: 781-952-5200  
Fax: 781-934-2124

Proj. No	Proj. Name
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SAMPLERS: Signature

*Molly Finn*

DATE	TIME	BATTELLE ID	CLIENT ID	SAMPLE DESCRIPTION	ANALYSIS REQUESTED → "NUMBER OF CONTAINERS"	PEST	PCB	TPH FINGERPRINT	PAH	VOA	TBT	METALS	OTHER	ACIDIFIED	PRESERVED	Total Number of Containers
11/2/13	3:05 PM			PMP-24SE-SIT Estimate 1500PPM PCBs in 301			X									MO252
11/2/13	4:20 PM (4:20 PM) ME			PMP-22SE-VS Estimate 250 PPM			X									MO253
11/2/13	4:08 PM			PMP-22SE-VS Estimate 250 PPM			X									MO254
Relinquished by: <i>Molly Finn</i>																
Date/Time: 9/13/13 10:45AM																
Received by: <i>MJ</i>																
Date/Time: 9/14/13 1200																
Relinquished by:																
Date/Time:																
Received by:																
Date/Time:																
Comments:																

ORIGIN ID:APGA (781) 952-5326  
BATTELLE DUXBURY OPS GOVT

397 WASHINGTON ST  
DUXBURY, MA 023324546  
UNITED STATES US

SHIP DATE: 13SEP13  
ACTWGT: 21.2 LB  
CAD: /OFFFC1400  
DIMS: 18x16x9 IN

BILL SENDER

TO **MATT SCHUMITZ**  
**BATTELLE**  
**397 WASHINGTON ST**

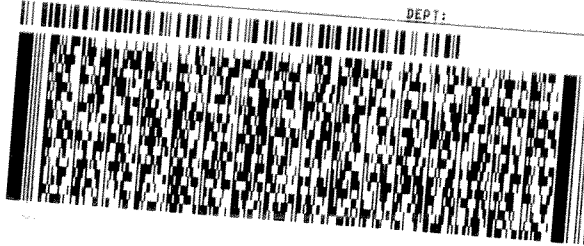
**DUXBURY MA 02332**

(781) 952-5253

INV:  
PO:

REF:

DEPT:



**FedEx**  
Express



J13111 302120126

TRK# 8627 4292 1373  
0200

**SATURDAY 12:00P**  
**PRIORITY OVERNIGHT**

**X0 XPUA**

**02332**

MA-US **BOS**



2.4°

41796674 06/11/13 10:06:10 AM # 1023