Appendix G
Sediment Quality Evaluation Technical Memorandum

LEEDCo Sediment Evaluation, Icebreaker Demonstration Wind Project, Lake Erie near Cleveland, Ohio

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PREPARED BY: CH2M HILL, Inc.

DATE: March 10, 2017

This technical memorandum summarizes the screening evaluation performed on sediment analytical data collected as part of the environmental baseline study for the Icebreaker Demonstration Wind Project proposed by Lake Erie Energy Development Corporation (LEEDCo). This evaluation was conducted to determine sediment quality within the project area, which is in Lake Erie near Cleveland, Ohio.

Project Background

The Icebreaker Demonstration Wind Project proposed by LEEDCo is the first offshore wind demonstration project within freshwater of the Great Lakes. The project location is 8 to 10 miles offshore from Cleveland, Ohio and will include six 3.45-megawatt wind turbine generators spaced approximately 756 meters apart.

A baseline environmental study was performed for this project and included collecting sediment samples within the project area to determine sediment quality. TDI Brooks International (TDI) conducted the field sampling from September 12 through October 10, 2016. The sampling report is included as Attachment 1. TDI collected three piston core composites and one box core composite for a total of four samples for analysis of grain size, total organic carbon, trace metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and organochlorine pesticides.

Sediment Quality Evaluation Approach

The sediment analytical results were evaluated to determine the existing sediment quality within the project area. The evaluation followed the Tier I screening outlined in G*uidance on Evaluating Sediment Contaminant Results* (Ohio Environmental Protection Agency 2010). The screening evaluation included comparisons to threshold effects concentrations (TECs) and probable effects concentrations (PECs) (MacDonald et al. 2000). Threshold effect levels such as TECs are conservative screening values that represent a level below which there would be a high confidence of no adverse effects, but above which unacceptable risk is uncertain. Constituent concentrations that exceeded TECs were then compared to PECs. The PECs represent a level above which there is a reasonable likelihood of adverse effects.

Subsequently, samples also were evaluated on a sample-by-sample basis to look at combined effects of chemical mixtures. Ingersoll et al. (2001) evaluated the ability of consensus-based sediment quality guidelines and compared approaches for evaluating the combined effects of chemical mixtures on the toxicity of field-collected sediment. Ingersoll et al. (2001) showed that because field-collected sediment contains chemical mixtures, the predictability of sediment assessments increases when sediment quality guidelines, such as PECs, are used in combination to classify toxicity.

Using this approach for each detected constituent, a probable effect concentration quotient (PEC-Q) was developed by dividing the concentration of each constituent by the PEC. A mean quotient was then calculated for each sample by summing the individual quotient for each constituent and dividing this sum by the number of PECs evaluated. Ingersoll et al. (2001) demonstrated that the incidence of toxicity increases with increasing mean PEC-Qs. For example, in the *Hyallela azteca* (amphipod) 28- to 40-day tests, the incidence of toxicity was 10 percent for samples with mean PEC-Qs less than 0.1; 31 percent for samples with mean PEC-Qs between 0.1 and 1; 96 percent for samples with mean PEC-Qs between 1 and 5; and 100 percent for samples with mean PEC-Qs greater than 5.

Similar increase in incidence of toxicity was encountered in *Chironomus dilutus* (midge) 10- to 14-day toxicity tests, where the incidence in toxicity was 20 percent for samples with mean PEC-Qs less than 0.1; 21 percent for mean PEC-Qs between 0.1 and 1; 43 percent for samples with mean PEC-Qs between 1 and 5; and 68 percent for samples with mean PEC-Qs greater than 5 (Ingersoll et al. 2001). Based on these results, the incidence of toxicity can be classified as minimal for PEC-Qs less than 0.1, low to moderate for mean PEC-Qs between 0.1 and 1, moderate to high for mean PEC-Qs between 1 and 5, and high for mean PEC-Qs greater than 5.

Sediment Quality Evaluation Results

TEC and PEC Screening Results

Tables 1, 2, and 3 summarize the screening evaluation for metals, PAHs, PCBs, and organochlorine pesticides. For metals, the TEC was exceeded in one or more samples for all metals with nickel exceeding the respective screening value in all four samples. Nickel was the only metal detected above the respective PEC screening value (Table 1).

PAHs were evaluated individually and based on a total PAH concentration (calculated using the high-priority 16 PAHs). The TEC for total PAHs was exceeded in three of the four composite samples; however, the PEC was not exceeded in any composite samples (Table 2).

Total PCBs were detected in two of the four composite samples above the TEC but did not exceed the PEC for any sample (Table 3).

Total dichlorodiphenyl trichloroethane (DDT) and sum dichlorodiphenyl dichloroethylene (DDE) (the summation of 2,4'-DDE and 4,4'-DDE) exceeded their respective TEC in one sample each; however, no constituent exceeded the respective PEC.

Mean PEC-Quotient Evaluation

Table 4 presents the mean PEC-Q results. The results indicate that no stations pose a moderate to high or high incidence of toxicity to aquatic organisms. Three stations had mean PEC-Qs between 0.1 and 1 (indication low to moderate incidence of toxicity), and one station had mean PEC-Q less than 0.1, indicating minimal incidence of toxicity. Overall, the incidence of toxicity for sediments within the project area would be considered low.

Summary

The sediment quality evaluation was performed on four composite samples collected from the proposed LEEDCo project area within Lake Erie. Only nickel exceeded its respective PEC in one composite sample. Overall, there is low potential for toxicity in the project area, based on the low frequency of PEC exceedance and the mean PEC-Q evaluation results. As a result, aquatic receptors will not likely be impacted by disturbed sediment during the construction activities within the project area.

References

Ingersoll, C.G., D.D. MacDonald, N. Wang, J.L. Crane, L.J. Field, P.S. Haverland, N.E. Kemble, R.A. Lindskoog, C.G. Severn, D.E. Smorong. 2001. Predictions of sediment toxicity using consensus-based freshwater sediment quality guidelines. *Arch Environ Contam Toxicol* 41:8-21.

MacDonald. D.D., C.G. Ingersoll, and T. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Arch Environ Contam Toxicol* 39:20-31.

Tables

Table 1. Comparison of Sediment Metals Results to Freshwater Sediment Quality Guidelines

LEEDCo Sediment Evaluation, Icebreaker Demonstration Wind Project, Lake Erie near Cleveland, Ohio

Laboratory ID Laboratory ID Sample ID(s) Sample Extraction Date	LED0043 XX-3122 PC01R, PC02, PC03 10/12/16	LED0044 XX-3123 PC04, PC05R1, PC06R2, PC07 10/12/16	LED0045 XX-3124 PC09, PC10 10/12/16	LED0046 XX-3125 BC01, BC02, BC03 10/12/16	Consensus Based TEC* (mg/kg DW)	Consensus Based PEC* (mg/kg DW)
Metals (mg/kg DW)						
Arsenic	**13.1**	**13.9**	**14.6**	8.21	9.79	33
Cadmium	0.17	0.24	0.51	**1.94**	0.99	4.98
Chromium	18.6	19	26.1	**53.1**	43.4	111
Copper	22.6	26.8	**42.4**	**47.7**	31.6	149
Lead	11.8	16	24	**44.9**	35.8	128
Mercury	0.0138	0.0173	0.0354	**0.335**	0.18	1.06
Nickel	**30.3**	**30.2**	**34.1**	**51.4**	22.7	48.6
Zinc	72.7	111	116	**204**	121	459

Notes:

* MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Arch. Environ. Contam. Toxicol.* 39, 20-31.

Bolded values > TEC

Bolded and shaded values > PEC

TEC = threshold effects concentration

PEC = probable effects concentration

mg/kg DW = milligrams per kilogram, dry weight

Table 2. Comparison of Sediment PAH and PCB Results to Freshwater Sediment Quality Guidelines

LEEDCo Sediment Evaluation, Icebreaker Demonstration Wind Project, Lake Erie near Cleveland, Ohio

Laboratory ID Sample ID(s)	LED0037,D PC01R, PC02, PC03	LED0038 PC04, PC05R1, PC06R2, PC07	LED0039 PC09, PC10	LED0046 BC01, BC02, BC03	Consensus Based TEC* (µg/kg DW)	Consensus Based PEC* (µg/kg DW)
Polycyclic aromatic hydrocarbons (µg/kg DW)						
Sample Extraction Date	**11/7/16**	**11/7/16**	**11/7/16**	**11/7/16**		
Acenaphthylene[1]	1.22	**237**	**55.8**	**32.4**	5.87	NSV
Acenapthene[1]	2.03	**66.5**	**37.9**	**8.7**	6.71	NSV
Anthracene	0.546	**435**	**140**	49.4	57.2	845
Benz[a]anthracene	1.65	**1860**	**242**	**135**	108	1,050
Benzo[a]pyrene	2.64	**1807**	**187**	**154**	150	1,450
Benzo[b]fluoranthene[2]	10.3	**1264**	**254**	**214**	27.2	NSV
Benzo[k]fluoranthene[1]	0.9	**767**	150	177	240	NSV
Benzo[ghi]perylene[1]	10.5	**932**	108	128	170	NSV
Chrysene	63.9	**2243**	**333**	**208**	166	1,290
Dibenz[a,h]anthracene	1.16	**376**	**35.8**	**37.1**	33	140
Fluoranthene	6.94	**1838**	**514**	279	423	2,230
Fluorene	13	71.3	61.5	26.5	77.4	536
Indeno[1,2,3-cd]pyrene[1]	0.981	**629**	100	122	200	NSV
Naphthalene	4.47	84.9	66.8	50.2	176	561
Phenanthrene	82.4	**500**	**359**	**122**	204	1,170
Pyrene	8.51	**2,198**	**411**	**228**	195	1,520
Total PAHs[3]	211	**15,309**	**3056**	**1971**	1,610	22,800
Polychlorinated biphenyls (µg/kg DW)						
Sample Extraction Date	**11/9/16**	**11/9/16**	**11/9/16**	**11/9/16**		
Total PCBs	0.98 J	15.9	**401.17**	**77.05**	59.8	676

Notes:

* MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems.*Arch. Environ. Contam. Toxicol.* 39, 20-31.

Bolded values > TEC

Bolded and shaded values > PEC

[1] TEC Value selected from: U.S. EPA 2003. USEPA Region V Ecological Screeing Levels. August.

[2] TEC value selected from: U.S. Environmental Protection Agency. 2006. Region 3 BTAG Freshwater Sediment Screening Benchmarks. http://www.epa.gov/reg3hwmd/risk/eco/index.htm. August.

[3] Total PAHs calculated uising the 16 PAHs

NSV = no screeing value

µg/kg DW = micrograms per kilogram, dry weight

Table 3. Comparison of Sediment Organochlorine Pesticide Results to Freshwater Sediment Quality Guidelines

LEEDCo Sediment Evaluation, Icebreaker Demonstration Wind Project, Lake Erie near Cleveland, Ohio

Laboratory ID Sample ID(s) Sample Extraction Date	LED0037 PC01R, PC02, PC03 11/9/16	LED0038 PC04, PC05R1, PC06R2, PC07 11/9/16	LED0039 PC09, PC10 11/9/16	LED0046 BC01, BC02, BC03 11/9/16	Consensus Based TEC* (µg/kg DW)	Consensus Based PEC* (µg/kg DW)
Organochlorine pesticides (µg/kg DW)						
Alpha- Chlordane [1]	0.02 J	0.32	<0.05 U	0.38	3.24	17.6
Dieldrin	<0.05 U	<0.05 U	<0.05 U	0.18	1.90	61.8
Sum DDD [2]	0.23	0.455	<0.05 U	0.635	4.88	28
Sum DDE [3]	0.035	0.21	2.13	**3.92**	3.16	31.3
Sum DDT [4]	0.12	0.05	0.05	0.12	4.16	62.9
Total DDTs [5]	0.385	**0.715**	2.23	4.67	5.28	572
Endrin	<0.06 U	<0.06 U	<0.06 U	<0.06 U	2.22	207
Heptachlor epoxide	<0.06 U	<0.06 U	<0.06 U	0.11	2.47	16
Gamma-HCH [6]	0.20	<0.04 U	<0.04 U	0.85	2.37	4.99

Notes:

* MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems.*Arch. Environ. Contam. Toxicol.* 39, 20-31.

Bolded values > TEC

[1] Compared to screening guideline for chlordane

[2] Sum of 2,4'-DDD and 4,4'-DDD compared to Sum DDD screening value

[3] Sum of 2,4'-DDE and 4,4'-DDE compared to Sum DDE screening value

[4] Sum of 2,4'-DDT and 4,4'-DDT compared to Sum DDT screening value

[5] Sum of DDD, DDE, and DDT isomers compared to Total DDT screening value

[6] Compared to screening guideline for gamma-BHC (lindane)

µg/kg DW = micrograms per kilogram, dry weight

Table 4. Mean PEC-Q Evaluation

LEEDCo Sediment Evaluation, Icebreaker Demonstration Wind Project, Lake Erie near Cleveland, Ohio

Laboratory ID	LED0043		LED0044		LED0045		LED0046		Consensus
Laboratory ID	XX-3122		XX-3123		XX-3124		XX-3125		Based PEC*
Sample ID(s)	PC01R, PC02, PC03	PEC-Q	PC04, PC05R1, PC06R2, PC07	PEC-Q	PC09, PC10	PEC-Q	BC01, BC02, BC03	PEC-Q	(µg/kg DW)
Metals (mg/kg DW)									
Arsenic	13.1	0.397	13.9	0.42	14.6	0.442	8.21	0.249	33
Cadmium	0.17	0.034	0.24	0.05	0.51	0.102	1.94	0.390	4.98
Chromium	18.6	0.168	19	0.17	26.1	0.235	53.1	0.478	111
Copper	22.6	0.152	26.8	0.18	42.4	0.285	47.7	0.320	149
Lead	11.8	0.092	16	0.13	24	0.188	44.9	0.351	128
Mercury	0.0138	0.013	0.0173	0.02	0.0354	0.033	0.335	0.316	1.06
Nickel	30.3	0.623	30.2	0.62	34.1	0.702	51.4	1.058	48.6
Zinc	72.7	0.158	111	0.24	116	0.253	204	0.444	459
Polycyclic aromatic hydrocarbons (µg/kg DW)									
Total PAHs	211	0.009	15,309	0.67	3,056	0.134	1,971	0.086	22,800
Polychlorinated biphenyls (µg/kg DW)									
Total PCBs	0.98 J	0.001	15.9	0.02	401.17	0.593	77.05	0.114	676
Organochlorine pesticides (µg/kg DW)									
Alpha- Chlordane	0.02 J	0.001	0.32	0.02	<0.05 U	0.003	0.38	0.022	17.6
Dieldrin	<0.05 U	0.001	<0.05 U	0.00	<0.05 U	0.001	0.18	0.003	61.8
Sum DDD	0.23	0.008	0.455	0.02	<0.05 U	0.002	0.635	0.023	28
Sum DDE	0.035	0.001	0.21	0.01	2.13	0.068	3.92	0.125	31.3
Sum DDT	0.12	0.002	0.05	0.00	0.05	0.001	0.12	0.002	62.9
Total DDTs	0.385	0.001	0.715	0.00	2.23	0.004	4.67	0.008	572
Endrin	<0.06 U	0.000	<0.06 U	0.00	<0.06 U	0.000	<0.06 U	0.000	207
Heptachlor epoxide	<0.06 U	0.004	<0.06 U	0.00	<0.06 U	0.004	0.11	0.007	16
Gamma-HCH	0.20	0.040	<0.04 U	0.01	<0.04 U	0.008	0.85	0.170	4.99
Mean PEC-Q		0.09		0.14		0.16		0.22	

Notes:

* MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems.*Arch. Environ. Contam. Toxicol.* 39, 20-31.

For nondetected constituents, the detection limit was used.

PEC-Q = Probable effect concentration quotients

No Highlights = Mean PEC-Q < 0.1 = minimal incidence of toxicity

Highlighted Yellow = Mean PEC-Q between 0.1 and 1.0 = low to moderate toxicity

Mean PEC-Q between 1.0 and 5.0 - moderate to high incidence of toxicity (no samples identified in this category)

Mean PEC-Q greater than 5 = high incidence of toxicity (no samples identified in this category)

µg/kg DW = micrograms per kilogram, dry weight

mg/kg DW = milligrams per kilogram, dry weight

Attachment 1
Environmental Baseline Survey Data Report, January 2016

Scientific Services on a Global Basis
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Environmental Baseline Survey Data Report

Wind Turbine Generator Alignment
Icebreaker Wind Demonstration Project
Lake Erie

Technical Report 16-3634

Submitted by

TDI-Brooks International, Inc.
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College Station, TX 77845
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LEEDCo
Lake Erie Energy Development Corporation

McNeilan & Associates

January 2016

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1 INTRODUCTION

This document presents the results from the environmental baseline study (EBS) completed by TDI-Brooks International (TDI) for the Lake Erie Energy Development Corporation (LEEDCo). The field operations were performed from 12 September through 10 October 2016. The EBS program consisted of the following samples/acquisitions:

- Three (3) piston core composites
  - PC01R, PC02, PC03
  - PC04, PC05R1, PC06R2, PC07
  - PC09, PC10
- One (1) box core composite
  - BC01, BC02, BC03

The EBS investigation was conducted from the **Salvage Chief**, mobilized and demobilized in Cleveland, Ohio. The field work was conducted in water depths ranging from 22 to 66 ft. TDI-Brooks mobilized and operated the sample collection equipment.

1.1 PROJECT BACKGROUND

The Icebreaker Demonstration Wind Project is proposed by Lake Erie Energy Development Company (LEEDCo) as the first offshore wind demonstration project in the freshwater Great Lakes. The Icebreaker project is located approximately 13.1 to 17.8 km offshore from Cleveland.

The project will include six, 3.45-MW wind turbine generators (WTGs) spaced about 756 meters apart and located along a north- northwest to south-southeast alignment.

The planned six WTG positions are designated as ICE1 through ICE6 (numbered from southeast to northwest) and one alternate position (to the northwest of ICE6) is designated as ICE7. Each of the WTGs will be supported by a mono-pole substructure founded on a suction bucket foundation (mono-bucket).

Energy generated from the WTGs will be transmitted through an export cable from the offshore project area to shore. The in-harbor portion of the export cable will be installed within a horizontally directional drilled (HDD) casing Water depths at test locations increase from southeast to northwest and vary from about 17.4 to 18.8 meters relative to IGLD85 low water datum (LWD). The surveyed area surrounding the seven investigated turbine locations is about 0.3 km wide by 6.5 km long.

1.2 SCOPE OF WORK

LEEDCo required environmental data collection, processing and reporting together with geotechnical exploration and interpretation **(Figure 1-1, Figure 1-2 and Figure 1-3)**.

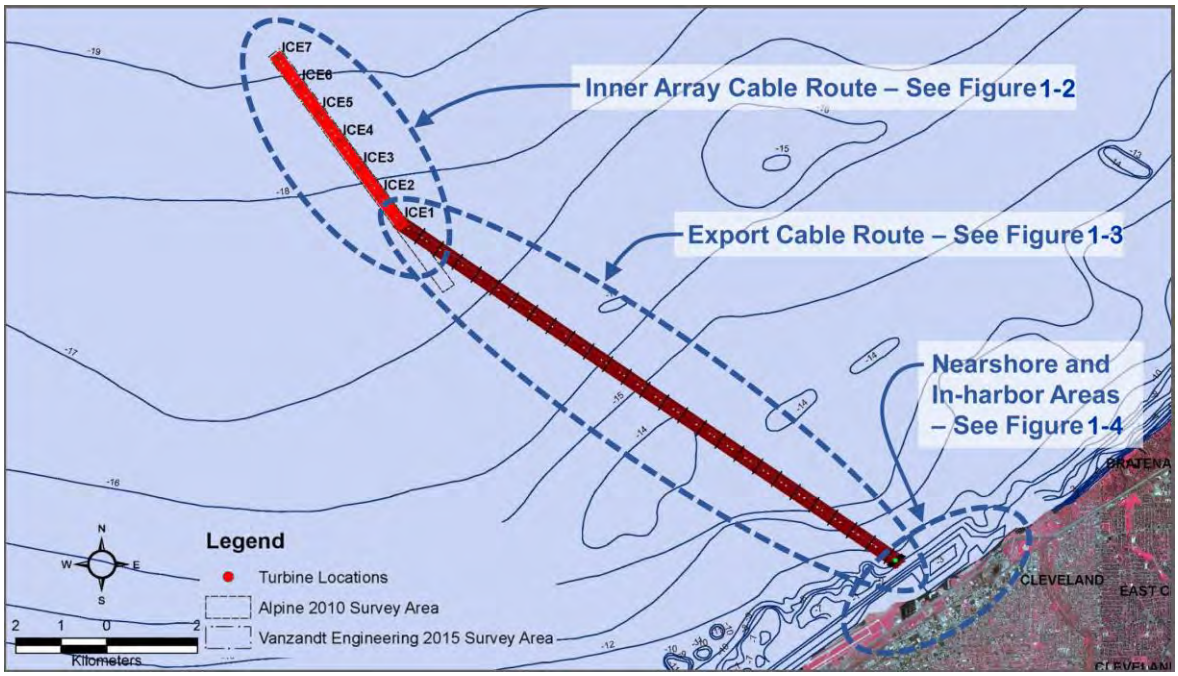


Figure 1-1. Project location.

The scope of work was intended to provide suitable lake-bottom and subsurface definition to finalize cable route alignments, design and plan for the cable route installation. In addition, the activities in the Cleveland Harbor and immediately to the north of the Cleveland Breakwater will be used for the evaluation, design and construction of the Horizontally Directionally Drilled (HDD) shore crossing.

This document provides the information on the collection of the data, the tools used, the procedures completed and the data results for the EBS investigation at this site.

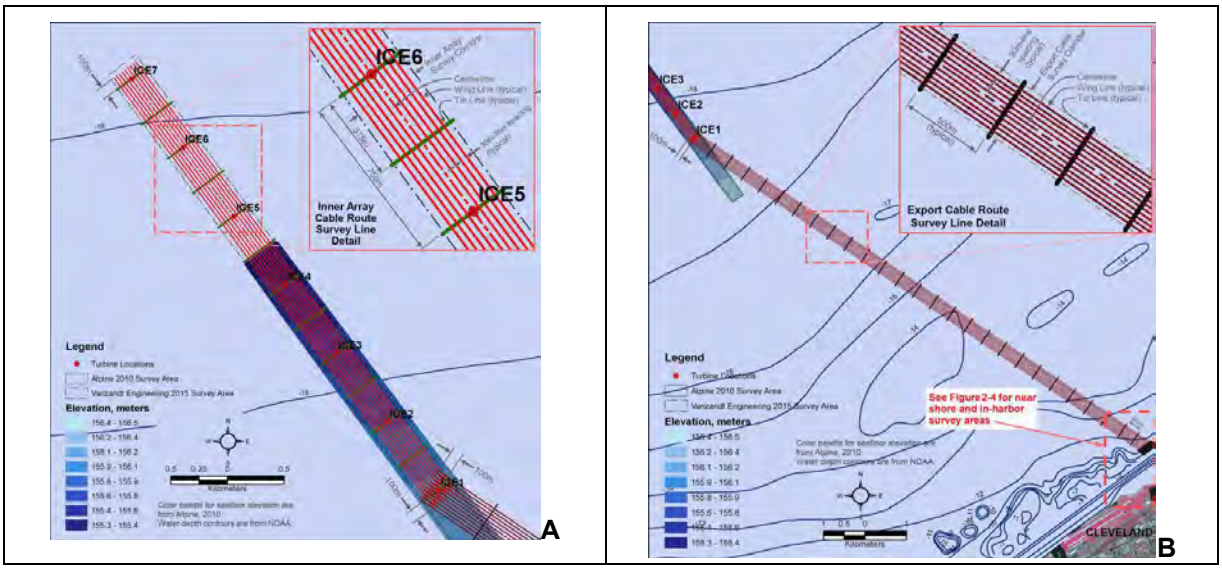


Figure 1-2. Inner array (A) and Export cable route (B).

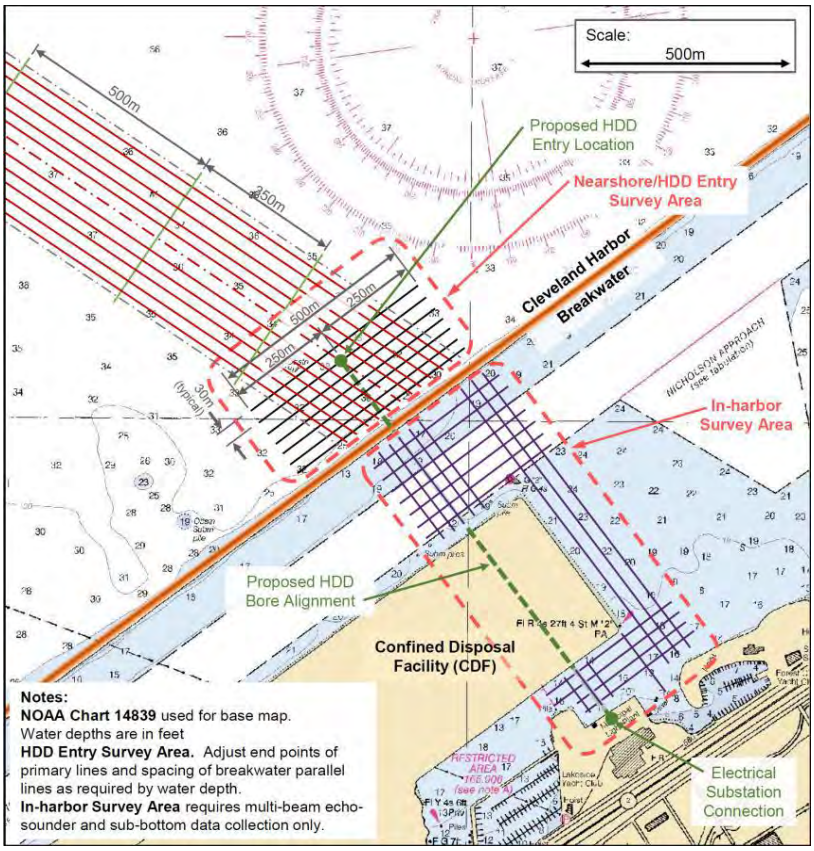


Figure 1-3. Inshore and In-Harbor.

1.3 SURVEY GEAR

The survey gear mobilized by TDI-Brooks for this EBS field campaign, together with the tool barrel lengths and sampling depths for the set of seabed sampling tools used for this project are presented in **Table 1-2**.

Table 1-1. Seabed Tool Sampling Dimensions.

TDI-Brooks Seabed Tool Name	Tool Acronym	Tool Length (ft)	Typical Depth Reached BML (ft)
Coring Tools			
Extended Box Core (1.6x1.6x3.3-ft)	XBC	Box: 3.3	3.0
Piston Core (3-in. dia.)	PC	20	18

These systems were mobilized with sufficient redundancy of components for replacement of damaged parts and/or for complete replacement of a tool. A minimum 50% redundancy of core barrel sections was onboard. Consumables sufficient for at least 120% of the samples proposed to be collected were also mobilized. Further details on the Survey Gear can be found in TDI's "*LEEDCo- Geotechnical Survey- Lake Erie- Technical Report 16-3585*".

1.4 FIELD PROGRAM

An overview of the seabed sampling locations for this program is presented in **Figure 1-4** and sediment characteristics at the sites in **Figure 1-5**

1.5 PROJECT DATUMS AND WTG LOCATIONS

The project datums are:

- Horizontal – WGS84, UTM Zone 17N, meters
- Vertical – International Great Lakes Datum (IGLD) 1985, LWD meters

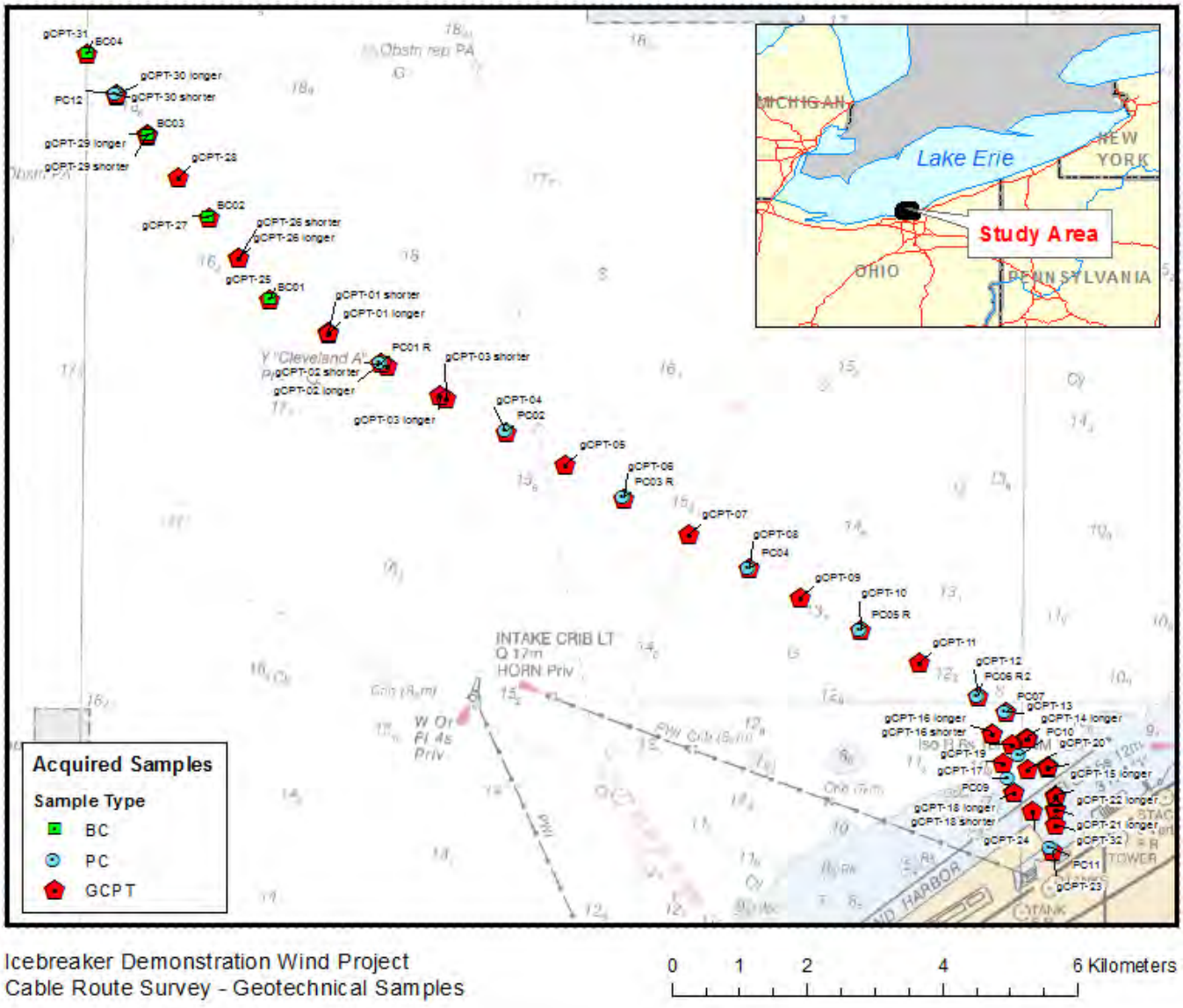


Figure 1-4. Sampling locations for the field effort.

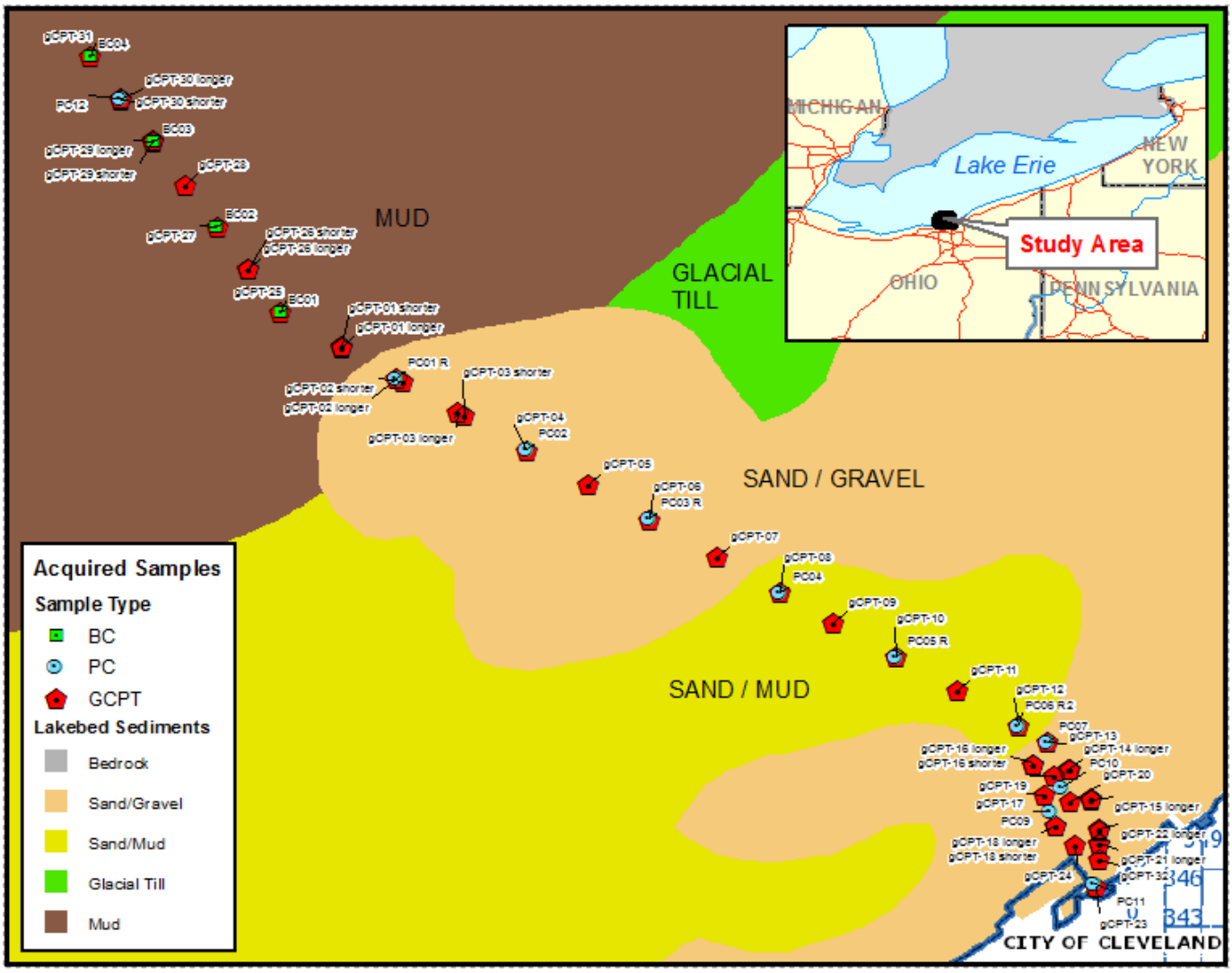
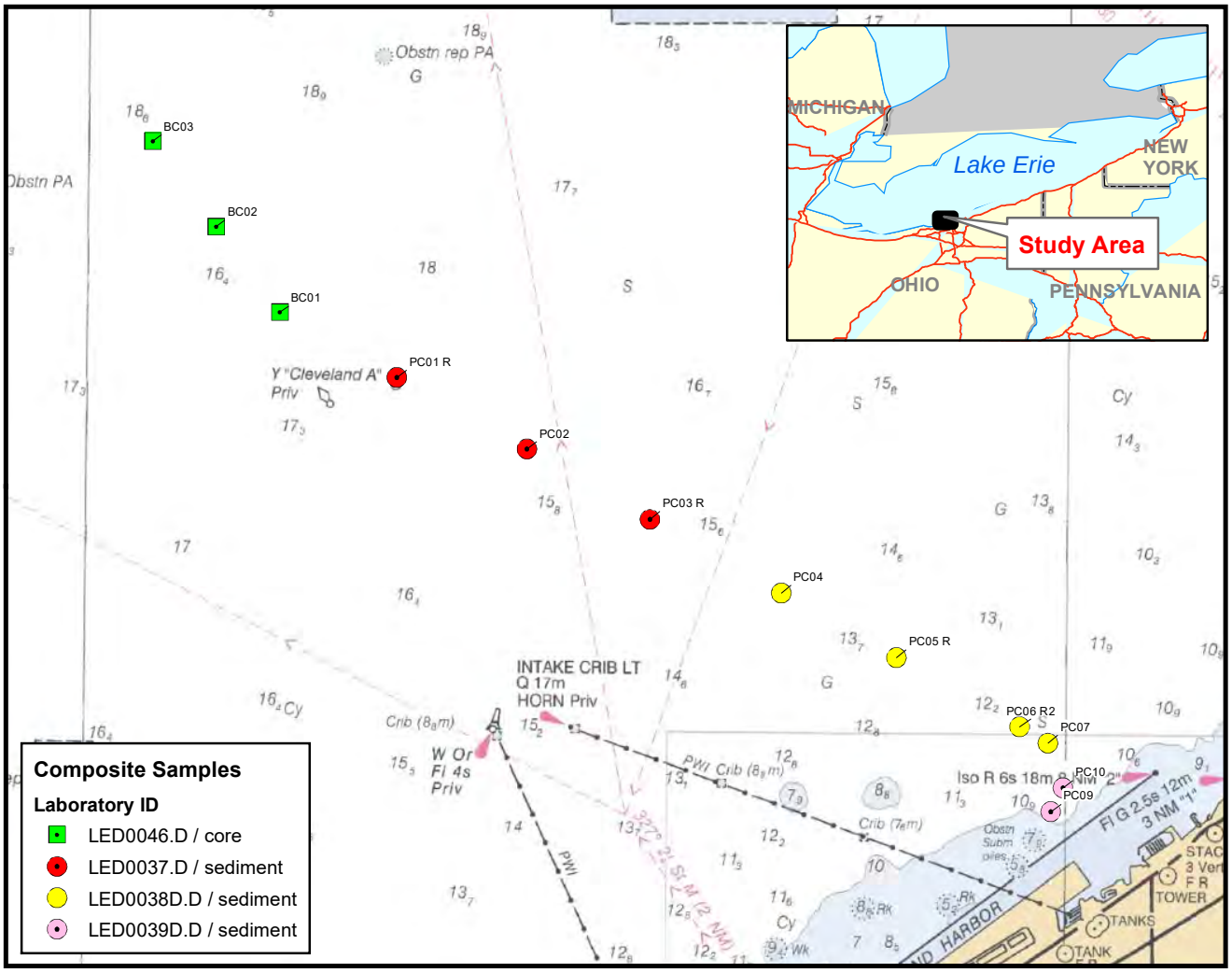


Figure 1-5. Sediment types at the sampling locations.

2 FIELD RESULTS

2.1 CORE LOCATIONS

Figure 2-1 displays the composite core collection locations. **Table 2-1** presents a listing of the collection information for each of the accepted composite core samples. The information is presented by the sample (core) ID. The table presents the client-specified information on the left (grey), and the as-built information on the right.



Icebreaker Demonstration Wind Project
Cable Route Survey - Composite Samples

0 1 2 4 6 Kilometers

Figure 2-1. Composite core collection locations.

Table 2-1. Collection Information for the Accepted Composite Core Samples.

			Acquired Sample Locations		Target Locations		
Target ID	Sample ID	Sample Type	E	N	E	N	Dist to Trgt (m)
PC1	PC1b	PC	434942.25	4604828.09	435031.01	4604784.41	98.9
PC2	PC2a	PC	436784.38	4603817.37	436777.67	4603802.64	16.2
PC3	PC3b	PC	438525.79	4602826.18	438523.81	4602824.58	2.5
PC4	PC4a	PC	440384.70	4601779.86	440387.00	4601780.31	2.3
PC5	PC5b	PC	442016.42	4600867.05	442018.41	4600866.46	2.1
PC6	PC6c	PC	443758.40	4599884.95	443756.89	4599888.81	4.1
PC7	PC7a	PC	444163.35	4599654.41	444167.04	4599653.44	3.8
PC9	PC9a	PC	444208.73	4598686.27	444210.73	4598684.88	2.4
PC10_2	PC10b	PC	444378.84	4599024.11	444382.80	4599023.05	4.1
BC1	BC1a	BC	433284.82	4605758.01	433287.22	4605755.68	3.3
BC2	BC2a	BC	432386.65	4606973.32	432386.11	4606970.91	2.5
BC3	BC3a	BC	431486.43	4608180.67	431485.31	4608186.54	6.0

All coordinates are in WGS84 UTM Zone 17 N

3 LABORATORY METHODS

3.1 SEDIMENT

3.1.1 Extraction

An automated extraction apparatus (Dionex ASE200 Accelerated Solvent Extractor) was used to extract various organics (PAH/TPH) from 1 to 15 g of a pre-dried, homogenous sample. All appropriate surrogates and spiking solutions were added. The extractions were performed using 100% dichloromethane inside stainless-steel extraction cells held at elevated temperature and solvent pressure. The extracted compounds dissolved in the hot solvent were collected in 60-mL glass vials.

The following ASE extraction conditions were used to extract the sediments:

Extraction solvent:	100% dichloromethane
Solvent pressure:	1,500 psi
Cell temperature:	100°C
Cell pre-heat time:	5 min (non-adjustable pre-set for 100°C)
Static pressure time:	2 min
Static cycles:	2 ea
Solvent flush:	60% of cell volume each cycle
Nitrogen purge time:	90 sec at end to dry cell
Method rinse:	ON (between samples)
Total extraction time:	approximately11 min/cell

The solvent in the glass vials was concentrated in a 55 - 60°C water bath until the solvent was reduced in volume to approximately 5-10 mL. The extract was transferred into a Kurderna-Danish (KD) concentrator tube. The sample volume was reduced to 0.5 mL in a 55 - 60°C water bath. The extract was then submitted for instrument analysis.

3.1.2 PAH

The quantitative method for the determination of polycyclic aromatic hydrocarbons (PAHs) and their alkylated homologues in extracts of sediment was performed by capillary gas chromatography/mass spectrometry (GC/MS) in selected ion monitoring mode (SIM). The gas chromatograph was temperature-programmed and operated in splitless mode. The capillary column was an Agilent Technologies HP-5MS (60 m long by 0.25 mm ID and 0.25 μm film thickness). Carrier flow was by electronic pressure control. The mass spectrometer scanned from 35 to 500 AMU every second or less and utilized 70 volts electron energy in electron impact ionization mode. The data acquisition system acquired and stored all data during analysis.

Calibration solutions were prepared at six concentrations ranging from 0.02 to 6 μg/mL by diluting a commercially available solution containing the analytes of interest. For each analyte of interest, a relative response factor (RRF) was determined for each calibration level. The 6 response factors were then averaged to produce a mean relative response factor for each analyte.

An analytical set contained standards, samples, and quality control samples. Each extraction batch was analyzed as an analytical set including samples and some or all of the following quality control samples: method-blank, duplicate, matrix-spike, matrix-spike duplicate, and standard reference material.

3.1.3 Aliphatic Hydrocarbon

The quantitative method for the determination of aliphatic hydrocarbons in extracts of sediment was performed by high resolution, capillary gas chromatography with flame ionization detection (GC/FID). Normal alkanes with 8 to 40 carbons (C_8 to C_{40}), and the isoprenoid series from i-C13 to i-C20 were determined with this procedure. The gas chromatograph was temperature-programmed and operated in split mode. The capillary column was a Restek Scientific RTX-1 (30 m long by 0.25 mm ID and 0.25 μm film thickness). Carrier flow was regulated by electronic pressure control. The autosampler was capable of making 1 to 5 ml injections. Dual columns and FIDs were used. The data acquisition system was by HP Chemstation software, capable of acquiring and processing GC data.

A calibration curve was established by analyzing each of 6 calibration standards (1.25, 10, 25, 40, 50 and 100 μg/ml), and fitting the data to a straight line using the least square technique. For each analyte of interest, a response factor (RF) was determined for each calibration level. All 6 response factors were then averaged to produce a mean relative response factor for each analyte. If an individual aliphatic hydrocarbon was not in the calibration solutions, a RF was estimated from the average RF of the hydrocarbon eluting immediately before the compound.

An analytical set consists of standards, samples, and quality control samples. Each extraction batch was analyzed as an analytical set including samples and some or all of the following quality control samples: method blank, duplicate, matrix spike, matrix spike duplicate and standard reference material.

3.1.4 Chlorinated Hydrocarbons

The quantitative method described in this document is for the determination of chlorinated hydrocarbons (PCBs and chlorinated pesticides) in extracts. Quantitation is performed by gas chromatography/electron capture detector (GC/ECD). The gas chromatograph is temperature-programmed and operated in splitless mode. The capillary column is a J&W DB-5® (30 m long by 0.25 mm ID and 0.25 μm film thickness). Carrier flow is by electronic pressure control. The autosampler is capable of making 1 to 5 μl injections. Dual columns and ECDs are used. The data acquisition system is by HP Chemstation software, capable of acquiring and processing GC data.

Calibration solutions are prepared at six concentrations ranging from 5 to 500 pg/μl by diluting a commercially available solution containing the analytes of interest. An Aroclor mixture consisting of Aroclor 1242, 1248, 1254 and 1260 is used as a retention time index solution for individual PCBs not found in the calibration solution. The individual PCB retention times are determined based on pattern recognition. A calibration curve is established by analyzing each of 6 calibration standards (5, 20, 40, 80, 200, and 500 pg/μl), and fitting the data to a quadratic equation.

An analytical set consists of standards, samples, and quality control samples. Each extraction batch is analyzed as an analytical set including samples and some or all of the following quality control samples: procedural blank, duplicate, matrix spike, matrix spike duplicate or blank spike, blank spike duplicate, and standard reference material.

3.1.5 Total Organic Carbon

Total organic carbon was determined in oven-dried, acid treated sediments using a LECO CR-412 Carbon Determinator. Samples were acid treated by adding 50% v/v of phosphoric acid to remove any inorganic carbon. Dried sediment was combusted at 1,350°C under an oxygen atmosphere and carbon present in the samples is oxidized to form CO_2 gas. This sample gas then flowed through two scrubber tubes. The first tube contained Anhydrone ($Mg(ClO_4)_2$), AR610 (halogen trap), and tin or copper granules to remove water and any chlorine gas, respectively. The second tube contained Anhydrone, which removes residual moisture. The sample gas then flowed through a nondispersive infrared (NDIR) detection cell.

In the NDIR detector cell, infrared energy is emitted from a nichrome wire heated to 850°C. Radiant energy enters the cell through a calcium fluoride window and projects through the cell chamber, which contains carrier or sample gas. Gases absorb infrared energy as they pass through the cell chamber. As energy exits the cell chamber through a second calcium fluoride window, a precise wavelength filter selectively blocks all wavelengths except that of CO_2 from passing into the detector. The detector responds to the energy changes between the carrier gas and sample gas and ultimately determines the concentration of the carbon contained in the sample.

Prior to analysis, the instrument establishes a baseline. As analysis proceeds, the integrated area under the signal detected is proportional to the amount of CO_2 passing through the NDIR cell. The computer reads the cell output nine times per second and provides a linearized output. The weight-corrected result is the total weight percent of carbon.

3.1.6 Grain Size

The large or coarse fraction was determined by sieving and the fine fraction was analyzed by hydrometer analysis, both according to ASTM D422. The coarse fraction is defined as sediment retained on the #200 sieve; the fine fraction is sediment passing the #200 sieve. Samples were prepared according to ASTM D421. Samples were dried in a 40°C oven in order to obtain the dry weight. Approximately 50 g of dry sample was obtained and grains were moderately disaggregated using a mortar and pestle. The sample was then soaked in 125 mL of 40 g/L sodium hexametaphosphate solution (dispersing agent) for more than 16 hours in a 1 L graduated cylinder, agitating occasionally, to complete the disaggregation process. Distilled water was then added to the solution until the total volume of the mixture (water, solution, and sample) was 1 L. The entire sample (coarse and fine fractions) was agitated in the graduated cylinder for 1 minute. Upon completion of the agitation, hydrometer readings were taken over a period of 24 hours.

Following hydrometer analysis, the samples were wet sieved. The solution was poured through a sieve set complying with ASTM D422, with the #200 sieve at the bottom of the stack. The sample was rinsed through the sieve to ensure all clay and silt particles were not retained by means of cohesion with larger grains. The sieves were placed in a 40°C oven, and the dry mass of sediment retained on each sieve in the set was obtained.

3.1.7 Trace Metal

Sediment samples were received and kept refrigerated until further processing. Sediment samples were homogenized and a representative, sub-aliquot was taken for leaching (digestion) processing. Each aliquot was freeze-dried and the percent moisture determined. Each aliquot was then manually ground to a homogeneous fine powder using a mortar and pestle. The finely ground sediment samples were then ready for further processing.

Approximately 0.2 g. of sample was placed in a clean ~ 70 mL polypropylene snap capped (perforated) container to which ~ 0.6 ml of concentrated, ultrapure HNO_3 and ~ 1.4 ml ultrapure HCl were added. Each container was closed and subjected to a heated, strong acid leach by placing in a block digester. The temperature of the hot plate was adjusted to 95 deg. C. The samples were allowed to reflux for 7-8 hours. The samples were cooled. Each digested sample was then transferred quantitatively to a 50 ml polypropylene tube using multiple deionized water rinses to achieve a final volume of ~ 20 ml (i.e. approximate dilution factor of 100. The leachate (digestate) was diluted another 10 fold (i.,e. approximate final, analytical dilution factor of 1,000) with deionized water to achieve an acid strength compatible with ICP-MS analysis. Iron was determined using an analytical dilution of ~ 400,000.

Metals concentrations were determined in the sediment leachate according to EPA** method 200.8 (ICP-MS). Reporting units are micrograms per gram (parts per million, ppm) on a dry weight basis. All metals were determined by standard mode ICP-MS except that chromium (Cr), iron (Fe), and vanadium (V) were determined by method 200.8 modified for dynamic reaction cell (DRC)-ICP-MS using ammonia as the cell gas. Arsenic (As) was determined by DRC-ICP-MS using oxygen as the cell gas. DRC-ICP-MS are interference control technologies that minimize the overestimation of trace metals levels associated with

isobaric interferences that can occur with standard mode ICP-MS. Isobaric interferences are a significant concern especially for marine sediment samples with elevated levels of calcium, sodium and chloride.

The heated, strong acid leach digestion used for this study is not a total digestion (i.e. using hydrofluoric acid) quantifying all of a given element present in the sediment matrix. The percentage of metal leached into solution for analysis varies by element. For example, for the more refractory metals (e.g. Cr, V) only a relatively small percentage is leached into solution for analysis. For many other elements (including many pollutant metals) that are largely adsorbed onto the sediment particles, a much higher percentage is leached into solution for analysis. A marine sediment reference material was used to estimate the percentage of each element leached into solution for analysis. The percentage released is compared to an historical percentage that is typically observed for such a heated strong acid leach.

The same freeze-dried, finely powdered sediment samples were used for separate mercury (Hg) analysis. Mercury was determined according to EPA method 7473. EPA method 7473 is a direct analysis method involving thermal decomposition, amalgamation (on a gold trap) followed by and atomic absorption spectrophotometry. Approximately 0.05-0.06 g of dry sediment is placed in a ceramic boat and carried through a high temperature heating process that volatilizes all Hg in the sample. Reporting units are micrograms per gram (parts per million, ppm) on a dry weight basis. A marine sediment reference material is carried through the same analytical process as a check on volatilization efficiency and data accuracy. EPA method 7473 is considered a total Hg method that produces data representing the total Hg present in each sample.

*** All references in this report to EPA and EPA methods are referring to the USA government agency.*

4 RESULTS

4.1 SEDIMENT HYDROCARBONS

Oil is a complex mixture of > 75% petroleum hydrocarbons and other organic compounds (Laflamme & Hites, 1978). Petroleum hydrocarbons can be broadly classified according to their structure as saturates, olefins, aromatics, asphaltenes, polar compounds and resins. Two classes of organic chemicals, saturated hydrocarbons (SHC) and polycyclic aromatic hydrocarbons (PAH) were analyzed in this study since they are important indicators of the age and source of hydrocarbons. Saturated hydrocarbons (SHC) consist of normal alkanes and selected isoprenoids, ranging from nC_9 to nC_{40}. Total SHC, representing the sum of the resolved and unresolved compounds, is reported for a wide range of compounds, i.e., nC_9 to nC_{44}. Polycyclic aromatic hydrocarbons included 20 parent (un-alkylated) compounds and 23 alkylated compounds, consisting of two- to six-ring PAH compounds. The full laboratory results of the sediment PAH are shown in **Appendix A**. The full laboratory results of the sediment aliphatic hydrocarbons are presented in **Appendix B.**

4.2 SEDIMENT CHLORINATED HYDROCARBONS

An extensive congener specific list of PCBs and Chlorinated Pesticides from Chlordanes, DDTs, and isomers of Hexachlorohexanes were measured in the samples. Method Detection Limits using high resolution gas chromatography / electron capture detection (GC/ECD) are very low (< 0.2 ng/dry g for sediment). The full laboratory results of the sediment chlorinated hydrocarbons are presented in **Appendix C.**

4.3 SEDIMENT TOTAL ORGANIC CARBON

Total organic carbon measurements provide an indication of the amount of organic matter present in bottom sediments. The full laboratory results of the sediment TOC are shown in **Appendix D**.

4.4 GRAIN SIZE

Sediment particle size is important because it controls sedimentary community dynamics and it correlates well with biologically meaningful variables such as porosity, compaction, water content and retention of organic matter.

Sediment particle size is equally important in controlling the chemical composition due to the increase in adsorption with high surface area, fine-grained particles. Many contaminants are strongly bound to organic particles that are in turn readily adsorbed onto fine-grained sediment.

Sediment particle size is reported in four major classes: gravel, sand, silt and clay. This classification is based on the percent composition for each class. Gravel is >2 to 64 mm diameter, sand from >0.0625 to 2 mm, silt is >0.0039 to 0.0625 m and clay is less than 0.0039 mm diameter. Percent fines are the sum of silt and clay and represent the portion of particles with diameters less than 0.063 mm. The full laboratory results of the grain size analysis are presented in **Appendix E.**

4.5 SEDIMENT TRACE METALS

The complete sample results including all QA/QC results are presented in **Appendix F**.

Note: The appendices contain the results of the analyses followed by the QA/QC sample results.

- Total PAHs of the four (4) samples are shown on Page 14.
- Total Petroleum Hydrocarbons of the four (4) samples are shown on Page 26.
- Chlorinated Pesticides (as Totals of HCc, Chlordane, DDT and PCG) are shown on Page 31
- Total Carbon (TC), Total Organic Carbon (TOC) and Total Inorganic Carbon (TIC) are shown on Page 49
- Grain Size on Pages 52 to 55
- Trace Metals for individual elements are shown on as Pages 58 and 59

5 APPENDICES

5.1 APPENDIX A – POLYCYCLIC AROMATIC HYDROCARBON - PAH

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Client Submitted Samples

Laboratory ID	LED0037.D	LED0038D.D	LED0039D.D	LED0046.D
Sample ID	PC01R, PC02, PC03	PC04, PC05R1, PC06R2, PC07	PC09, PC10	BC01, BC02, BC03
Matrix	Sediment	Sediment	Sediment	Sediment
Collection Date	NA	NA	NA	NA
Received Date	10/12/16	09/21/16	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615	ENV3615	ENV3615
Date Acquired	11/11/16 0:03	11/11/16 8:07	11/11/16 9:16	11/11/16 3:30
Method	B&B SOP1006	B&B SOP1006	B&B SOP1006	B&B SOP1006
Sample Dry Weight (g)	15.02	15.11	15.05	15.02
% Dry	80	83	77	23
% Moisture	20	17	23	77
Dilution	1X	5X	2X	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q
cis/trans Decalin	14.5		24.4		13.4		28.8	
C1-Decalins	21.0		34.3		27.7		26.5	
C2-Decalins	122		105.5		52.7		54.3	
C3-Decalins	266		341		145		82.3	
C4-Decalins	267		386		200		74.5	
Naphthalene	4.47		84.9		66.8		50.2	
C1-Naphthalenes	9.75		37.5		37.1		37.9	
C2-Naphthalenes	34.4		70.2		77.9		68.6	
C3-Naphthalenes	101		363		182		105	
C4-Naphthalenes	239		635		224		105	
Benzothiophene	1.40		4.12		3.94		2.19	
C1-Benzothiophenes	8.70		14.9		10.7		7.45	
C2-Benzothiophenes	6.08		15.9		9.1		7.43	
C3-Benzothiophenes	12.1		38.8		13.0		8.57	
C4-Benzothiophenes	7.08		31.0		11.9		8.75	
Biphenyl	6.72		10.4		11.8		10.1	
Acenaphthylene	1.22		237		55.8		32.4	
Acenaphthene	2.03		66.5		37.9		8.70	
Dibenzofuran	17.0		41.3		32.9		26.3	
Fluorene	13.0		71.3		61.5		26.5	
C1-Fluorenes	87.2		278		45.1		24.2	
C2-Fluorenes	176		573		106		48.3	
C3-Fluorenes	189		645		168		43.5	
Carbazole	3.07		23.5		12.5		13.4	
Anthracene	0.546		435		140		49.4	
Phenanthrene	82.4		500		359		122	
C1-Phenanthrenes/Anthracenes	264		1003		302		135	
C2-Phenanthrenes/Anthracenes	434		2184		494		176	
C3-Phenanthrenes/Anthracenes	424		1877		659		189	
C4-Phenanthrenes/Anthracenes	223		798		486		108	
Dibenzothiophene	18.4		72.1		30.7		17.9	
C1-Dibenzothiophenes	55.9		222		56.3		28.5	
C2-Dibenzothiophenes	88.7		489		141		50.2	
C3-Dibenzothiophenes	76.3		541		216		56.9	
C4-Dibenzothiophenes	22.9		242		112		27.5	
Fluoranthene	6.94		1838		514		279	
Pyrene	8.51		2198		411		228	
C1-Fluoranthenes/Pyrenes	31.0		2947		331		166	
C2-Fluoranthenes/Pyrenes	72.2		1929		183		89.6	
C3-Fluoranthenes/Pyrenes	79.2		1675		185		59.0	
C4-Fluoranthenes/Pyrenes	59.0		980		105		49.3	
Naphthobenzothiophene	34.8		893		105		70.0	
C1-Naphthobenzothiophenes	40.9		1615		121		78.1	
C2-Naphthobenzothiophenes	58.2		1392		166		76.0	
C3-Naphthobenzothiophenes	38.3		735		119		53.6	
C4-Naphthobenzothiophenes	12.1		254		40.6		26.7	
Benz(a)anthracene	1.65		1860		242		135	
Chrysene/Triphenylene	63.9		2243		333		208	
C1-Chrysenes	94.9		3943		237		124	
C2-Chrysenes	160		2788		271		119	
C3-Chrysenes	107		1384		172		76.2	
C4-Chrysenes	42.7		468		66.8		38.7	
Benzo(b)fluoranthene	10.3		1264		254		214	
Benzo(k,j)fluoranthene	0.90		767		150		177	
Benzo(a)fluoranthene	<0.1	U	242		40.9		30.4	
Benzo(e)pyrene	24.4		1797		165		167	
Benzo(a)pyrene	2.64		1807		187		164	
Perylene	11.1		252		59.0		153	
Indeno(1,2,3-c,d)pyrene	0.981		629		100		122	
Dibenzo(a,h)anthracene	1.16		376		35.8		37.1	
Benzo(g,h,i)perylene	10.5		932		108		128	
Total PAHs	4272		49706		9303		4919	

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Client Submitted Samples

Laboratory ID	LED0037.D	LED0038D.D	LED0039D.D	LED0046.D
Sample ID	PC01R, PC02, PC03	PC04, PC05R1, PC06R2, PC07	PC09, PC10	BC01, BC02, BC03
Matrix	Sediment	Sediment	Sediment	Sediment
Collection Date	NA	NA	NA	NA
Received Date	10/12/16	09/21/16	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615	ENV3615	ENV3615
Date Acquired	11/11/16 0:03	11/11/16 8:07	11/11/16 9:16	11/11/16 3:30
Method	B&B SOP1006	B&B SOP1006	B&B SOP1006	B&B SOP1006
Sample Dry Weight (g)	15.02	15.11	15.05	15.02
% Dry	80	83	77	23
% Moisture	20	17	23	77
Dilution	1X	5X	2X	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q
Individual Alkyl Isomers and Hopanes								
2-Methylnaphthalene	6.83		36.1		34.7		34.0	
1-Methylnaphthalene	8.19		20.9		21.6		23.8	
2,6-Dimethylnaphthalene	5.26		13.47		16.8		16.2	
1,6,7-Trimethylnaphthalene	10.7		42.8		21.1		11.6	
1-Methylfluorene	41.4		151		24.5		12.6	
4-Methyldibenzothiophene	43.2		173		36.8		17.5	
2/3-Methyldibenzothiophene	16.8		90.1		27.1		11.5	
1-Methyldibenzothiophene	14.6		32.5		11.3		9.06	
3-Methylphenanthrene	60.8		357		83.5		38.0	
2-Methylphenanthrene	68.5		252		109		44.9	
2-Methylanthracene	3.54		178		38.8		15.6	
4/9-Methylphenanthrene	137		288		95.5		47.8	
1-Methylphenanthrene	74.2		233		66.6		29.2	
3,6-Dimethylphenanthrene	19.4		273		33.4		10.8	
Retene	4.10		48.6		29.1		10.4	
2-Methylfluoranthene	2.11		343		52.4		25.1	
Benzo(b)fluorene	2.99		672		113		48.2	
C29-Hopane	12.5		27.8		225		246	
18a-Oleanane	<0.6	U	<2.9	U	35.4		42.6	
C30-Hopane	27.8		51.4		346		317	
C20-TAS	47.1		67		67.0		24.2	
C21-TAS	26.3		52.4		40.2		16.2	
C26(20S)-TAS	38.3		32.9		50.4		38.6	
C26(20R)/C27(20S)-TAS	84.2		74.4		137		108	
C28(20S)-TAS	145		119		164		135	
C27(20R)-TAS	47.2		39.9		76.4		68.7	
C28(20R)-TAS	113		92.1		126		98.9	
Surrogate Recovery								
Naphthalene-d8	70		84	D	79	D	66	
Acenaphthene-d10	88		93	D	91	D	85	
Phenanthrene-d10	90		93	D	95	D	86	
Chrysene-d12	93		104	D	104	D	92	
Perylene-d12	84		99	D	95	D	80	

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Method Blank Report

Laboratory ID	ENV3615A.D
Sample ID	Method Blank
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	11/10/16 17:09
Method	B&B SOP1006
Sample Dry Weight (g)	15.0
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	3X MDL	Actual MDL
cis/trans Decalin	<0.1	U	0.396	0.132
C1-Decalins	<0.3	U	0.789	0.263
C2-Decalins	<0.3	U	0.789	0.263
C3-Decalins	<0.3	U	0.789	0.263
C4-Decalins	<0.3	U	0.789	0.263
Naphthalene	0.122	J	1.03	0.342
C1-Naphthalenes	<1	U	3.09	1.03
C2-Naphthalenes	<0.7	U	2.05	0.684
C3-Naphthalenes	<0.7	U	2.05	0.684
C4-Naphthalenes	<0.7	U	2.05	0.684
Benzothiophene	<0.1	U	0.270	0.090
C1-Benzothiophenes	<0.2	U	0.540	0.180
C2-Benzothiophenes	<0.2	U	0.540	0.180
C3-Benzothiophenes	<0.2	U	0.540	0.180
C4-Benzothiophenes	<0.2	U	0.540	0.180
Biphenyl	0.130	J	0.882	0.294
Acenaphthylene	0.067		0.123	0.041
Acenaphthene	<0.1	U	0.309	0.103
Dibenzofuran	<0.2	U	0.612	0.204
Fluorene	<0.2	U	0.549	0.183
C1-Fluorenes	<0.4	U	1.10	0.367
C2-Fluorenes	<0.4	U	1.10	0.367
C3-Fluorenes	<0.4	U	1.10	0.367
Carbazole	<0.1	U	0.450	0.150
Anthracene	<0.1	U	0.345	0.115
Phenanthrene	0.139	J	0.624	0.208
C1-Phenanthrenes/Anthracenes	<0.1	U	0.231	0.077
C2-Phenanthrenes/Anthracenes	<0.3	U	0.855	0.285
C3-Phenanthrenes/Anthracenes	<0.3	U	0.855	0.285
C4-Phenanthrenes/Anthracenes	<0.3	U	0.855	0.285
Dibenzothiophene	<0.1	U	0.348	0.116
C1-Dibenzothiophenes	<0.1	U	0.192	0.064
C2-Dibenzothiophenes	<0.2	U	0.696	0.232
C3-Dibenzothiophenes	<0.2	U	0.696	0.232
C4-Dibenzothiophenes	<0.2	U	0.696	0.232
Fluoranthene	<0.3	U	0.999	0.333
Pyrene	<0.1	U	0.408	0.136
C1-Fluoranthenes/Pyrenes	<0.5	U	1.41	0.469
C2-Fluoranthenes/Pyrenes	<0.5	U	1.41	0.469
C3-Fluoranthenes/Pyrenes	<0.5	U	1.41	0.469
C4-Fluoranthenes/Pyrenes	<0.5	U	1.41	0.469
Naphthobenzothiophene	<0.1	U	0.384	0.128
C1-Naphthobenzothiophenes	<0.3	U	0.768	0.256
C2-Naphthobenzothiophenes	<0.3	U	0.768	0.256
C3-Naphthobenzothiophenes	<0.3	U	0.768	0.256
C4-Naphthobenzothiophenes	<0.3	U	0.768	0.256
Benz(a)anthracene	<0.2	U	0.576	0.192
Chrysene/Triphenylene	<0.1	U	0.348	0.116
C1-Chrysenes	<0.2	U	0.696	0.232
C2-Chrysenes	<0.2	U	0.696	0.232
C3-Chrysenes	<0.2	U	0.696	0.232
C4-Chrysenes	<0.2	U	0.696	0.232
Benzo(b)fluoranthene	<0.2	U	0.609	0.203
Benzo(k,j)fluoranthene	<0.1	U	0.294	0.098
Benzo(a)fluoranthene	<0.1	U	0.294	0.098
Benzo(e)pyrene	<0.2	U	0.531	0.177
Benzo(a)pyrene	<0.1	U	0.303	0.101
Perylene	<1.3	U	3.80	1.27
Indeno(1,2,3-c,d)pyrene	<0.1	U	0.150	0.050
Dibenzo(a,h)anthracene	<0.1	U	0.192	0.064
Benzo(g,h,i)perylene	<0.1	U	0.264	0.088
Total PAHs	0.458			

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Method Blank Report

Laboratory ID	ENV3615A.D
Sample ID	Method Blank
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	11/10/16 17:09
Method	B&B SOP1006
Sample Dry Weight (g)	15.0
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	3X MDL	Actual MDL
Individual Alkyl Isomers and Hopanes				
2-Methylnaphthalene	<1.3	U	3.89	1.30
1-Methylnaphthalene	<0.5	U	1.64	0.546
2,6-Dimethylnaphthalene	<0.3	U	0.783	0.261
1,6,7-Trimethylnaphthalene	<0.1	U	0.381	0.127
1-Methylfluorene	<0.2	U	0.573	0.191
4-Methyldibenzothiophene	<0.1	U	0.273	0.091
2/3-Methyldibenzothiophene	<0.1	U	0.273	0.091
1-Methyldibenzothiophene	<0.1	U	0.273	0.091
3-Methylphenanthrene	<0.1	U	0.291	0.097
2-Methylphenanthrene	<0.1	U	0.291	0.097
2-Methylanthracene	<0.1	U	0.291	0.097
4/9-Methylphenanthrene	<0.1	U	0.291	0.097
1-Methylphenanthrene	<0.1	U	0.291	0.097
3,6-Dimethylphenanthrene	<0.1	U	0.330	0.110
Retene	<0.2	U	0.693	0.231
2-Methylfluoranthene	<0.2	U	0.669	0.223
Benzo(b)fluorene	<0.1	U	0.375	0.125
C29-Hopane	<0.6	U	1.73	0.58
18a-Oleanane	<0.6	U	1.73	0.58
C30-Hopane	<0.6	U	1.73	0.58
C20-TAS	<0.6	U	1.73	0.58
C21-TAS	<0.6	U	1.73	0.58
C26(20S)-TAS	<0.6	U	1.73	0.58
C26(20R)/C27(20S)-TAS	<0.6	U	1.73	0.58
C28(20S)-TAS	<0.6	U	1.73	0.58
C27(20R)-TAS	<0.6	U	1.73	0.58
C28(20R)-TAS	<0.6	U	1.73	0.58

Surrogate Recovery	
Naphthalene-d8	76
Acenaphthene-d10	81
Phenanthrene-d10	87
Chrysene-d12	88
Perylene-d12	90

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Blank Spike Report

Laboratory ID	ENV3615B.D
Sample ID	Blank Spike
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	11/10/16 18:18
Method	B&B SOP1006
Sample Dry Weight (g)	1.00
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su. Corrected Amount (ng)	Q	Recovery (%)	Q	Spike amount (ng)
cis/trans Decalin	106		106		100
C1-Decalins	NA				
C2-Decalins	NA				
C3-Decalins	NA				
C4-Decalins	NA				
Naphthalene	95.9		96		100
C1-Naphthalenes	NA				
C2-Naphthalenes	NA				
C3-Naphthalenes	NA				
C4-Naphthalenes	NA				
Benzothiophene	93.7		93		100
C1-Benzothiophenes	NA				
C2-Benzothiophenes	NA				
C3-Benzothiophenes	NA				
C4-Benzothiophenes	NA				
Biphenyl	133		133		100
Acenaphthylene	95.6		96		100
Acenaphthene	101		100		100
Dibenzofuran	104		104		100
Fluorene	103		103		100
C1-Fluorenes	NA				
C2-Fluorenes	NA				
C3-Fluorenes	NA				
Carbazole	103		103		100
Anthracene	101		101		100
Phenanthrene	105		105		100
C1-Phenanthrenes/Anthracenes	NA				
C2-Phenanthrenes/Anthracenes	NA				
C3-Phenanthrenes/Anthracenes	NA				
C4-Phenanthrenes/Anthracenes	NA				
Dibenzothiophene	98.1		98		100
C1-Dibenzothiophenes	NA				
C2-Dibenzothiophenes	NA				
C3-Dibenzothiophenes	NA				
C4-Dibenzothiophenes	NA				
Fluoranthene	108		107		100
Pyrene	105		105		100
C1-Fluoranthenes/Pyrenes	NA				
C2-Fluoranthenes/Pyrenes	NA				
C3-Fluoranthenes/Pyrenes	NA				
C4-Fluoranthenes/Pyrenes	NA				
Naphthobenzothiophene	103		103		100
C1-Naphthobenzothiophenes	NA				
C2-Naphthobenzothiophenes	NA				
C3-Naphthobenzothiophenes	NA				
C4-Naphthobenzothiophenes	NA				
Benz(a)anthracene	105		104		100
Chrysene/Triphenylene	104		104		100
C1-Chrysenes	NA				
C2-Chrysenes	NA				
C3-Chrysenes	NA				
C4-Chrysenes	NA				
Benzo(b)fluoranthene	108		108		100
Benzo(k,j)fluoranthene	105		105		100
Benzo(a)fluoranthene	NA				
Benzo(e)pyrene	106		106		100
Benzo(a)pyrene	106		105		100
Perylene	100		100		100
Indeno(1,2,3-c,d)pyrene	100		100		100
Dibenzo(a,h)anthracene	104		104		100
Benzo(g,h,i)perylene	90.9		91		100
Average % Recovery			103		

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Blank Spike Report

Laboratory ID	ENV3615B.D
Sample ID	Blank Spike
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	11/10/16 18:18
Method	B&B SOP1006
Sample Dry Weight (g)	1.00
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su. Corrected Amount (ng)	Q	Recovery (%)	Q	Spike amount (ng)
Individual Alkyl Isomers and Hopanes					
2-Methylnaphthalene		99.0	99		100
1-Methylnaphthalene		97.0	97		100
2,6-Dimethylnaphthalene		97.4	97		100
1,6,7-Trimethylnaphthalene		101	101		100
1-Methylfluorene		102	102		100
4-Methyldibenzothiophene		103	102		101
2/3-Methyldibenzothiophene		NA			
1-Methyldibenzothiophene		NA			
3-Methylphenanthrene		NA			
2-Methylphenanthrene		NA			
2-Methylanthracene		NA			
4/9-Methylphenanthrene		NA			
1-Methylphenanthrene		106	106		100
3,6-Dimethylphenanthrene		104	104		100
Retene		101	100		100
2-Methylfluoranthene		102	102		100
Benzo(b)fluorene		108	107		100
C29-Hopane		NA			
18a-Oleanane		NA			
C30-Hopane		104	104		100
C20-TAS		NA			
C21-TAS		NA			
C26(20S)-TAS		NA			
C26(20R)/C27(20S)-TAS		NA			
C28(20S)-TAS		NA			
C27(20R)-TAS		NA			
C28(20R)-TAS		NA			

Surrogate Recovery	
Naphthalene-d8	81
Acenaphthene-d10	87
Phenanthrene-d10	91
Chrysene-d12	91
Perylene-d12	90

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Laboratory Duplicate Report

Laboratory ID	LED0039D.D	ENV3615E.D
Sample ID	PC09, PC10	Dupl. (PC09, PC10)
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615
Date Acquired	11/11/16 9:16	11/11/16 10:25
Method	B&B SOP1006	B&B SOP1006
Sample Dry Weight (g)	15.05	15.07
% Dry	77	77
% Moisture	23	23
Dilution	2X	2X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	RPD %	Q Q1	3X MDL	MDL
cis/trans Decalin	13.4		13.0		2		0.786	0.262
C1-Decalins	27.7		27.9		0		1.58	0.525
C2-Decalins	52.7		52.5		0		1.58	0.525
C3-Decalins	145		147		2		1.58	0.525
C4-Decalins	200		199		0		1.58	0.525
Naphthalene	66.8		67.1		0		2.05	0.682
C1-Naphthalenes	37.1		37.2		1		6.16	2.05
C2-Naphthalenes	77.9		78.6		1		4.09	1.36
C3-Naphthalenes	182		186		2		4.09	1.36
C4-Naphthalenes	224		230		3		4.09	1.36
Benzothiophene	3.94		3.96		0		0.540	0.180
C1-Benzothiophenes	10.7		10.2		5		1.08	0.359
C2-Benzothiophenes	9.10		9.50		4		1.08	0.359
C3-Benzothiophenes	13.0		12.8		2		1.08	0.359
C4-Benzothiophenes	11.9		12.4		4		1.08	0.359
Biphenyl	11.8		11.8		0		1.76	0.585
Acenaphthylene	55.8		56.0		0		0.243	0.081
Acenaphthene	37.9		38.3		1		0.615	0.205
Dibenzofuran	32.9		33.2		1		1.221	0.407
Fluorene	61.5		62.3		1		1.10	0.365
C1-Fluorenes	45.1		46.2		2		2.19	0.731
C2-Fluorenes	106.4		108		1		2.19	0.731
C3-Fluorenes	168		179		7		2.19	0.731
Carbazole	12.5		12.5		0		0.894	0.298
Anthracene	140		140		0		0.690	0.230
Phenanthrene	359		358		0		1.24	0.414
C1-Phenanthrenes/Anthracenes	302		304		1		0.462	0.154
C2-Phenanthrenes/Anthracenes	494		500		1		1.70	0.568
C3-Phenanthrenes/Anthracenes	659		680		3		1.70	0.568
C4-Phenanthrenes/Anthracenes	486		457		6		1.70	0.568
Dibenzothiophene	30.7		30.7		0		0.693	0.231
C1-Dibenzothiophenes	56.3		56.3		0		0.381	0.127
C2-Dibenzothiophenes	141		142		1		1.39	0.462
C3-Dibenzothiophenes	216		223		3		1.39	0.462
C4-Dibenzothiophenes	112		113		2		1.39	0.462
Fluoranthene	514		510		1		1.99	0.663
Pyrene	411		409		1		0.813	0.271
C1-Fluoranthenes/Pyrenes	331		345		4		2.80	0.934
C2-Fluoranthenes/Pyrenes	183		186		1		2.80	0.934
C3-Fluoranthenes/Pyrenes	185		192		4		2.80	0.934
C4-Fluoranthenes/Pyrenes	105		100		5		2.80	0.934
Naphthobenzothiophene	105		109		5		0.765	0.255
C1-Naphthobenzothiophenes	121		127		5		1.53	0.510
C2-Naphthobenzothiophenes	166		171		3		1.53	0.510
C3-Naphthobenzothiophenes	119		117		2		1.53	0.510
C4-Naphthobenzothiophenes	40.6		42.0		3		1.53	0.510
Benz(a)anthracene	242		251		4		1.15	0.383
Chrysene/Triphenylene	333		327		2		0.693	0.231
C1-Chrysenes	237		237		0		1.39	0.462
C2-Chrysenes	271		264		2		1.39	0.462
C3-Chrysenes	172		174		1		1.39	0.462
C4-Chrysenes	66.8		63.4		5		1.39	0.462
Benzo(b)fluoranthene	254		250		1		1.21	0.404
Benzo(k,j)fluoranthene	150		152		2		0.585	0.195
Benzo(a)fluoranthene	40.9		42.1		3		0.585	0.195
Benzo(e)pyrene	165		166		1		1.06	0.352
Benzo(a)pyrene	187		195		4		0.606	0.202
Perylene	59.0		59.6		1		7.58	2.53
Indeno(1,2,3-c,d)pyrene	100		101		0		0.300	0.100
Dibenzo(a,h)anthracene	35.8		36.4		2		0.384	0.128
Benzo(g,h,i)perylene	108		108		1		0.525	0.175
Total PAHs	9303		9375		1			

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Laboratory Duplicate Report

Laboratory ID	LED0039D.D	ENV3615E.D
Sample ID	PC09, PC10	Dupl. (PC09, PC10)
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615
Date Acquired	11/11/16 9:16	11/11/16 10:25
Method	B&B SOP1006	B&B SOP1006
Sample Dry Weight (g)	15.05	15.07
% Dry	77	77
% Moisture	23	23
Dilution	2X	2X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	RPD %	Q Q1	3X MDL	MDL
Individual Alkyl Isomers and Hopanes								
2-Methylnaphthalene	34.7		34.9		1		7.75	2.58
1-Methylnaphthalene	21.6		21.7		0		3.27	1.09
2,6-Dimethylnaphthalene	16.8		16.6		1		1.56	0.519
1,6,7-Trimethylnaphthalene	21.1		21.4		1		0.762	0.254
1-Methylfluorene	24.5		25.0		2		1.14	0.381
4-Methyldibenzothiophene	36.8		36.7		0		0.546	0.182
2/3-Methyldibenzothiophene	27.1		27.2		0		0.546	0.182
1-Methyldibenzothiophene	11.3		11.2		0		0.546	0.182
3-Methylphenanthrene	83.5		83.4		0		0.582	0.194
2-Methylphenanthrene	109		108		1		0.582	0.194
2-Methylanthracene	38.8		38.5		1		0.582	0.194
4/9-Methylphenanthrene	95.5		95.7		0		0.582	0.194
1-Methylphenanthrene	66.6		70.2		5		0.582	0.194
3,6-Dimethylphenanthrene	33.4		32.2		4		0.657	0.219
Retene	29.1		27.9		4		1.38	0.461
2-Methylfluoranthene	52.4		51.1		2		1.33	0.444
Benzo(b)fluorene	113		114		0		0.747	0.249
C29-Hopane	225		234		4		3.44	1.15
18a-Oleanane	35.4		33.7		5		3.44	1.15
C30-Hopane	346		349		1		3.44	1.15
C20-TAS	67.0		72.6		8		3.44	1.15
C21-TAS	40.2		41.5		3		3.44	1.15
C26(20S)-TAS	50.4		49.8		1		3.44	1.15
C26(20R)/C27(20S)-TAS	137		136		0		3.44	1.15
C28(20S)-TAS	164		166		1		3.44	1.15
C27(20R)-TAS	76.4		76.2		0		3.44	1.15
C28(20R)-TAS	126		127		1		3.44	1.15
Surrogate Recovery								
Naphthalene-d8	79	D	78	D				
Acenaphthene-d10	91	D	91	D				
Phenanthrene-d10	95	D	94	D				
Chrysene-d12	104	D	103	D				
Perylene-d12	95	D	96	D				

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Matrix Spike Report

Laboratory ID	LED0037.D	ENV3615D.D
Sample ID	PC01R, PC02, PC03	MS (PC01R, PC02, PC03)
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615
Date Acquired	11/11/16 0:03	11/10/16 20:36
Method	B&B SOP1006	B&B SOP1006
Sample Dry Weight (g)	15.02	15.00
% Dry	80	80
% Moisture	20	20
Dilution	1X	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	Recovery (%)	Q	Q1	Spike Amount (ng)
cis/trans Decalin	14.5		19.5		74		Y	100
C1-Decalins	21.0		NA					
C2-Decalins	122		NA					
C3-Decalins	266		NA					
C4-Decalins	267		NA					
Naphthalene	4.47		10.5		90			100
C1-Naphthalenes	9.75		NA					
C2-Naphthalenes	34.4		NA					
C3-Naphthalenes	101		NA					
C4-Naphthalenes	239		NA					
Benzothiophene	1.40		7.17		86			100
C1-Benzothiophenes	8.70		NA					
C2-Benzothiophenes	6.08		NA					
C3-Benzothiophenes	12.1		NA					
C4-Benzothiophenes	7.08		NA					
Biphenyl	6.72		11.4		70			100
Acenaphthylene	1.22		7.76		98			100
Acenaphthene	2.03		8.51		97			100
Dibenzofuran	17.0		24.1		105		Y	100
Fluorene	13.0		20.3		108			100
C1-Fluorenes	87.2		NA					
C2-Fluorenes	176		NA					
C3-Fluorenes	189		NA					
Carbazole	3.07		9.84		101			100
Anthracene	0.546		6.56		90			100
Phenanthrene	82.4		88.0		83		Y	100
C1-Phenanthrenes/Anthracenes	264		NA					
C2-Phenanthrenes/Anthracenes	434		NA					
C3-Phenanthrenes/Anthracenes	424		NA					
C4-Phenanthrenes/Anthracenes	223		NA					
Dibenzothiophene	18.4		26.4		118		Y	100
C1-Dibenzothiophenes	55.9		NA					
C2-Dibenzothiophenes	88.7		NA					
C3-Dibenzothiophenes	76.3		NA					
C4-Dibenzothiophenes	22.9		NA					
Fluoranthene	6.94		14.0		106			100
Pyrene	8.51		15.4		103			100
C1-Fluoranthenes/Pyrenes	31.0		NA					
C2-Fluoranthenes/Pyrenes	72.2		NA					
C3-Fluoranthenes/Pyrenes	79.2		NA					
C4-Fluoranthenes/Pyrenes	59.0		NA					
Naphthobenzothiophene	34.8		NA					
C1-Naphthobenzothiophenes	40.9		NA					
C2-Naphthobenzothiophenes	58.2		NA					
C3-Naphthobenzothiophenes	38.3		NA					
C4-Naphthobenzothiophenes	12.1		NA					
Benz(a)anthracene	1.65		9.16		113			100
Chrysene/Triphenylene	63.9		73.9		148		Y	100
C1-Chrysenes	94.9		NA					
C2-Chrysenes	160		NA					
C3-Chrysenes	107		NA					
C4-Chrysenes	42.7		NA					
Benzo(b)fluoranthene	10.3		14.8		67			100
Benzo(k,j)fluoranthene	0.899		8.66		116			100
Benzo(a)fluoranthene	<0.1	U	NA					
Benzo(e)pyrene	24.4		34.0		143		Y	100
Benzo(a)pyrene	2.64		10.2		114			100
Perylene	11.1		18.5		110			100
Indeno(1,2,3-c,d)pyrene	0.981		8.82		118			100
Dibenzo(a,h)anthracene	1.16		8.95		117			100
Benzo(g,h,i)perylene	10.5		17.2		101			100
Average % Recovery					102			

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Matrix Spike Report

Laboratory ID	LED0037.D	ENV3615D.D
Sample ID	PC01R, PC02, PC03	MS (PC01R, PC02, PC03)
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615
Date Acquired	11/11/16 0:03	11/10/16 20:36
Method	B&B SOP1006	B&B SOP1006
Sample Dry Weight (g)	15.02	15.00
% Dry	80	80
% Moisture	20	20
Dilution	1X	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	Su. Corrected Conc. (ng/dry g)	Q	Recovery (%)	Q	Q1	Spike Amount (ng)
Individual Alkyl Isomers and Hopanes								
2-Methylnaphthalene	6.83		14.3		111			100
1-Methylnaphthalene	8.19		14.6		96			100
2,6-Dimethylnaphthalene	5.26		11.3		90			100
1,6,7-Trimethylnaphthalene	10.7		14.9		64			100
1-Methylfluorene	41.4		48.6		105		Y	100
4-Methyldibenzothiophene	43.2		49.0		85		Y	101
2/3-Methyldibenzothiophene	16.8		NA					
1-Methyldibenzothiophene	14.6		NA					
3-Methylphenanthrene	60.8		NA					
2-Methylphenanthrene	68.5		NA					
2-Methylanthracene	3.54		NA					
4/9-Methylphenanthrene	137		NA					
1-Methylphenanthrene	74.2		80.4		90		Y	100
3,6-Dimethylphenanthrene	19.4		29.3		147		Y	100
Retene	4.10		9.1		74			100
2-Methylfluoranthene	2.11		9.6		112			100
Benzo(b)fluorene	2.99		10.1		106			100
C29-Hopane	12.5		NA					
18a-Oleanane	<0.6	U	NA					
C30-Hopane	27.8		NA					
C20-TAS	47.1		NA					
C21-TAS	26.3		NA					
C26(20S)-TAS	38.3		NA					
C26(20R)/C27(20S)-TAS	84.2		NA					
C28(20S)-TAS	145		NA					
C27(20R)-TAS	47.2		NA					
C28(20R)-TAS	113		NA					

Surrogate Recovery		
Naphthalene-d8	70	71
Acenaphthene-d10	88	89
Phenanthrene-d10	90	86
Chrysene-d12	93	89
Perylene-d12	84	87

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Standard Reference Material Report

Laboratory ID	ENV3615C.D
Sample ID	SRM1941b
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	11/10/16 19:27
Method	B&B SOP1006
Sample Dry Weight (g)	4.05
% Dry	98
% Moisture	2
Dilution	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	RPD (%)	SRM 1941b Certified Conc. (ng/dry g)	-30% Certified Conc. (ng/dry g)	+30% Certified Conc. (ng/dry g)
cis/trans Decalin	31.9					
C1-Decalins	15.5					
C2-Decalins	12.5					
C3-Decalins	24.4					
C4-Decalins	49.7					
Naphthalene	645		27	848 ± 95	527	1226
C1-Naphthalenes	203					
C2-Naphthalenes	197					
C3-Naphthalenes	164					
C4-Naphthalenes	83.3					
Benzothiophene	27.5					
C1-Benzothiophenes	31.2					
C2-Benzothiophenes	20.6					
C3-Benzothiophenes	18.0					
C4-Benzothiophenes	9.70					
Biphenyl	64.5					
Acenaphthylene	76.3					
Acenaphthene	24.0					
Dibenzofuran	81.9					
Fluorene	49.8		52	85 ± 15	49.0	130
C1-Fluorenes	50.2					
C2-Fluorenes	75.1					
C3-Fluorenes	81.1					
Carbazole	19.3					
Anthracene	183		0	184 ± 18	116	263
Phenanthrene	396		3	406 ± 44	253	585
C1-Phenanthrenes/Anthracenes	295					
C2-Phenanthrenes/Anthracenes	300					
C3-Phenanthrenes/Anthracenes	194					
C4-Phenanthrenes/Anthracenes	130					
Dibenzothiophene	50.9					
C1-Dibenzothiophenes	64.2					
C2-Dibenzothiophenes	100					
C3-Dibenzothiophenes	94.3					
C4-Dibenzothiophenes	31.5					
Fluoranthene	629		3	651 ± 50	421	911
Pyrene	474		20	581 ± 39	379	806
C1-Fluoranthenes/Pyrenes	305					
C2-Fluoranthenes/Pyrenes	242					
C3-Fluoranthenes/Pyrenes	125					
C4-Fluoranthenes/Pyrenes	68					
Naphthobenzothiophene	152					
C1-Naphthobenzothiophenes	126					
C2-Naphthobenzothiophenes	121					
C3-Naphthobenzothiophenes	88.0					
C4-Naphthobenzothiophenes	29.6					
Benz(a)anthracene	289		15	335 ± 25	217	468
Chrysene/Triphenylene	389		2	399 ± 36	254	566
C1-Chrysenes	231					
C2-Chrysenes	149					
C3-Chrysenes	80.9					
C4-Chrysenes	52.2					
Benzo(b)fluoranthene	421		7	453 ± 21	302	616
Benzo(k,j)fluoranthene	439		1	442 ± 23	293	605
Benzo(a)fluoranthene	67.5					
Benzo(e)pyrene	328		1	325 ± 25	210	455
Benzo(a)pyrene	251		35	358 ± 17	239	488
Perylene	322		21	397 ± 45	246	575
Indeno(1,2,3-c,d)pyrene	248		32	341 ± 57	199	517
Dibenzo(a,h)anthracene	79.8		40	53 ± 10	30.1	81.9
Benzo(g,h,i)perylene	240		25	307 ± 45	183	458
Total PAHs	9841					

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Polycyclic Aromatic Hydrocarbon Data
Standard Reference Material Report

Laboratory ID	ENV3615C.D
Sample ID	SRM1941b
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	11/10/16 19:27
Method	B&B SOP1006
Sample Dry Weight (g)	4.05
% Dry	98
% Moisture	2
Dilution	1X

Target Compounds	Su. Corrected Conc. (ng/dry g)	Q	RPD (%)	SRM 1941b Certified Conc. (ng/dry g)	-30% Certified Conc. (ng/dry g)	+30% Certified Conc. (ng/dry g)
Individual Alkyl Isomers and Hopanes						
2-Methylnaphthalene	206					
1-Methylnaphthalene	102					
2,6-Dimethylnaphthalene	39.1					
1,6,7-Trimethylnaphthalene	21.0					
1-Methylfluorene	26.9					
4-Methyldibenzothiophene	43.7					
2/3-Methyldibenzothiophene	29.2					
1-Methyldibenzothiophene	12.7					
3-Methylphenanthrene	88.8		17	105 ± 13	64.4	153
2-Methylphenanthrene	105					
2-Methylanthracene	62.6					
4/9-Methylphenanthrene	67.4					
1-Methylphenanthrene	60.9		18	73.2 ± 5.9	47.1	103
3,6-Dimethylphenanthrene	26.5					
Retene	29.3					
2-Methylfluoranthene	73.0					
Benzo(b)fluorene	70.8					
C29-Hopane	195					
18a-Oleanane	34.9					
C30-Hopane	283					
C20-TAS	44.7					
C21-TAS	6.25					
C26(20S)-TAS	9.00					
C26(20R)/C27(20S)-TAS	44.7					
C28(20S)-TAS	26.9					
C27(20R)-TAS	25.5					
C28(20R)-TAS	23.8					

Surrogate Recovery

Naphthalene-d8	63
Acenaphthene-d10	76
Phenanthrene-d10	80
Chrysene-d12	80
Perylene-d12	73

5.2 Appendix B - Aliphatic Hydrocarbons

B&B Laboratories
Project J16222
Report 16-3589

LEED Co. - Lake Erie
Aliphatic Hydrocarbon and Total Petroleum Hydrocarbon Data
Client Submitted Samples

Laboratory ID	LED0037.D	LED0038.D	LED0039.D	LED0046.D
Sample ID	PC01R, PC02, PC03	PC04, PC05R1, PC06R2, PC07	PC09, PC10	BC01, BC02, BC03
Matrix	Sediment	Sediment	Sediment	Sediment
Collection Date	NA	NA	NA	NA
Received Date	10/12/16	09/21/16	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615	ENV3615	ENV3615
Date Acquired	16-Nov-2016, 05:54	16-Nov-2016, 07:04	16-Nov-2016, 08:15	16-Nov-2016, 09:26
Method	B&B SOP1016	B&B SOP1016	B&B SOP1016	B&B SOP1016
Sample Dry Weight (g)	15.02	15.11	15.05	15.02
Sample Wet Weight (g)	18.69	18.18	19.61	65.26
% Dry	80	83	77	23
% Moisture	20	17	23	77
Dilution	1X	1X	1X	1X

Target Compounds	Su. Corrected Conc. (µg/dry g)	Q	Su. Corrected Conc. (µg/dry g)	Q	Su. Corrected Conc. (µg/dry g)	Q	Su. Corrected Conc. (µg/dry g)	Q
n-C9	0.120		0.113		0.089		0.095	
n-C10	0.048		0.077		0.065		0.071	
n-C11	0.099		0.172		0.109		0.114	
n-C12	0.321		0.275		0.141		0.175	
n-C13	0.961		0.682		0.349		0.325	
i-C15	0.395		0.709		0.346		0.204	
n-C14	1.305		1.259		0.624		0.393	
i-C16	0.815		1.333		0.758		0.302	
n-C15	1.297		1.813		1.105		0.542	
n-C16	1.302		1.550		1.083		0.422	
i-C18	0.624		1.226		0.751		0.222	
n-C17	1.214		1.722		1.137		1.467	
Pristane	1.127		1.701		1.384		0.339	
n-C18	1.222		1.286		1.041		0.990	
Phytane	0.634		1.465		0.993		0.299	
n-C19	1.244		1.576		1.137		0.643	
n-C20	0.979		1.443		1.025		0.348	
n-C21	0.894		1.248		0.881		1.672	
n-C22	0.820		1.465		0.773		0.392	
n-C23	0.707		1.274		0.675		0.698	
n-C24	0.567		0.636		0.518		0.350	
n-C25	0.513		0.922		0.568		0.849	
n-C26	0.432		0.658		0.385		0.352	
n-C27	0.415		0.900		0.395		1.264	
n-C28	0.376		0.317		0.612		0.641	
n-C29	0.379		0.812		0.420		1.880	
n-C30	0.229		0.313		0.192		0.398	
n-C31	0.253		0.407		0.465		2.344	
n-C32	0.143		0.155		0.247		0.395	
n-C33	0.154		0.410		0.216		1.721	
n-C34	0.094		0.117		0.186		0.282	
n-C35	0.092		0.109		0.184		1.503	
n-C36	0.040		0.105		<0.016	U	0.139	
n-C37	0.033		0.093		<0.017	U	0.214	
n-C38	0.033		0.062		<0.019	U	0.130	
n-C39	<0.019	U	0.042		<0.019	U	0.092	
n-C40	0.083		0.047		<0.019	U	0.124	
Total Alkanes	20.0		28.5		18.9		22.4	
Total Petroleum Hydrocarbons	201		822		770		606	
Total Resolved Hydrocarbons	45		141		59		160	
Unresolved Complex Mixture	156		682		711		446	
EOM (µg/dry g)	427		1159		1050		1530	

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
n-dodecane-d26	80	81	86	81
n-eicosane-d42	99	90	87	94
n-triacontane-d62	94	113	104	106

B&B Laboratories
Project J16222
Report 16-3589

LEED Co. - Lake Erie
Aliphatic Hydrocarbon and Total Petroleum Hydrocarbon Data
Method Blank Report

Laboratory ID	ENV3615A.D
Sample ID	Method Blank
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	15-Nov-2016, 22:49
Method	B&B SOP1016
Sample Dry Weight (g)	15.00
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su. Corrected Conc. (µg/dry g)	Q	Q	3X MDL Conc. (µg/dry g)	Actual MDL Conc. (µg/dry g)
n-C9	<0.012	U		0.037	0.012
n-C10	<0.021	U		0.064	0.021
n-C11	<0.016	U		0.049	0.016
n-C12	<0.019	U		0.056	0.019
n-C13	<0.045	U		0.134	0.045
i-C15	<0.016	U		0.049	0.016
n-C14	<0.013	U		0.039	0.013
i-C16	<0.004	U		0.013	0.004
n-C15	<0.016	U		0.049	0.016
n-C16	<0.004	U		0.013	0.004
i-C18	<0.004	U		0.011	0.004
n-C17	<0.003	U		0.010	0.003
Pristane	<0.003	U		0.008	0.003
n-C18	<0.004	U		0.011	0.004
Phytane	<0.006	U		0.018	0.006
n-C19	<0.005	U		0.015	0.005
n-C20	<0.012	U		0.037	0.012
n-C21	<0.004	U		0.012	0.004
n-C22	<0.003	U		0.010	0.003
n-C23	<0.008	U		0.024	0.008
n-C24	<0.005	U		0.016	0.005
n-C25	<0.007	U		0.021	0.007
n-C26	<0.008	U		0.023	0.008
n-C27	<0.011	U		0.032	0.011
n-C28	<0.011	U		0.033	0.011
n-C29	<0.021	U		0.064	0.021
n-C30	<0.013	U		0.038	0.013
n-C31	<0.015	U		0.044	0.015
n-C32	<0.012	U		0.035	0.012
n-C33	<0.021	U		0.064	0.021
n-C34	<0.016	U		0.049	0.016
n-C35	<0.015	U		0.044	0.015
n-C36	<0.016	U		0.047	0.016
n-C37	<0.017	U		0.052	0.017
n-C38	<0.019	U		0.057	0.019
n-C39	<0.019	U		0.056	0.019
n-C40	<0.019	U		0.056	0.019
Total Alkanes			U		
Total Petroleum Hydrocarbons	<1.4	U		4.20	1.40
Total Resolved Hydrocarbons	<1.4	U		4.20	1.40
Unresolved Complex Mixture	<1.4	U		4.20	1.40
EOM (µg/dry g)	<100			300	100

Surrogate (Su)	Su Recovery (%)
n-dodecane-d26	81
n-eicosane-d42	95
n-triacontane-d62	93

LEED Co. - Lake Erie
Aliphatic Hydrocarbon and Total Petroleum Hydrocarbon Data
Blank Spike Report

Laboratory ID	ENV3615B
Sample ID	Blank Spike
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/07/16
Extraction Batch	ENV3615
Date Acquired	16-Nov-2016, 00:00
Method	B&B SOP1016
Sample Dry Weight (g)	1.00
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su. Corrected Conc. (µg/dry g)	Recovery (%)	Q	Spike Amount (µg)
n-C9	9.86	98		10.0
n-C10	9.68	97		10.0
n-C11	10.0	100		10.0
n-C12	10.2	101		10.0
n-C13	9.73	96		10.1
n-C14	9.93	99		10.0
n-C15	10.0	100		10.0
n-C16	10.1	101		10.0
n-C17	10.1	101		10.0
Pristane	10.2	103		9.92
n-C18	10.2	102		10.1
Phytane	9.51	95		10.0
n-C19	10.2	103		10.0
n-C20	10.2	103		10.0
n-C21	10.2	102		10.1
n-C22	10.2	103		9.95
n-C23	10.3	104		9.89
n-C24	10.0	101		9.93
n-C25	10.2	102		10.0
n-C26	10.0	99		10.1
n-C27	10.2	102		10.0
n-C28	10.1	100		10.1
n-C29	10.0	101		9.93
n-C30	10.0	100		10.0
n-C31	10.0	99		10.1
n-C32	9.85	100		9.87
n-C33	10.1	101		10.0
n-C34	9.94	99		10.0
n-C35	9.84	99		10.0
n-C36	9.77	97		10.0
n-C37	9.94	99		10.1
n-C38	9.60	96		10.0
n-C39	9.44	94		10.0
n-C40	9.61	96		10.0
Average %Recovery		100		

Surrogate (Su)	Su Recovery (%)
n-dodecane-d26	91
n-eicosane-d42	96
n-triacontane-d62	94

B&B Laboratories
Project J16222
Report 16-3589

LEED Co. - Lake Erie
Aliphatic Hydrocarbon and Total Petroleum Hydrocarbon Data
Laboratory Duplicate Report

Laboratory ID	LED0039.D	ENV3615E.D
Sample ID	PC09, PC10	PC09, PC10
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615
Date Acquired	16-Nov-2016, 08:15	16-Nov-2016, 04:43
Method	B&B SOP1016	B&B SOP1016
Sample Dry Weight (g)	15.05	15.07
Sample Wet Weight (g)	19.61	19.63
% Dry	77	77
% Moisture	23	23
Dilution	1X	1X

Target Compounds	Su. Corrected Conc. (µg/dry g)	Q	Su. Corrected Conc. (µg/dry g)	Q	RPD (%)	Q Q	MDL (µg/dry g)	3X MDL (µg/dry g)
n-C9	0.089		0.096		8		0.012	0.037
n-C10	0.065		0.055		17		0.021	0.064
n-C11	0.109		0.114		4		0.016	0.049
n-C12	0.141		0.152		8		0.019	0.056
n-C13	0.349		0.371		6		0.045	0.134
i-C15	0.346		0.347		0		0.016	0.049
n-C14	0.624		0.626		0		0.013	0.039
i-C16	0.758		0.772		2		0.004	0.013
n-C15	1.105		1.028		7		0.016	0.049
n-C16	1.083		1.029		5		0.004	0.013
i-C18	0.751		0.759		1		0.004	0.011
n-C17	1.137		1.199		5		0.003	0.010
Pristane	1.384		1.444		4		0.003	0.008
n-C18	1.041		1.045		0		0.004	0.011
Phytane	0.993		0.949		5		0.006	0.018
n-C19	1.137		1.090		4		0.005	0.015
n-C20	1.025		1.065		4		0.012	0.037
n-C21	0.881		0.876		1		0.004	0.012
n-C22	0.773		0.799		3		0.003	0.010
n-C23	0.675		0.678		0		0.008	0.024
n-C24	0.518		0.545		5		0.005	0.016
n-C25	0.568		0.527		7		0.007	0.021
n-C26	0.385		0.421		9		0.008	0.023
n-C27	0.395		0.388		2		0.011	0.032
n-C28	0.612		0.645		5		0.011	0.033
n-C29	0.420		0.416		1		0.021	0.064
n-C30	0.192		0.207		8		0.013	0.038
n-C31	0.465		0.461		1		0.015	0.044
n-C32	0.247		0.239		3		0.012	0.035
n-C33	0.216		0.225		4		0.021	0.064
n-C34	0.186		0.184		1		0.016	0.049
n-C35	0.184		0.171		7		0.015	0.044
n-C36	<0.016	U	<0.016	U	0		0.016	0.047
n-C37	<0.017	U	<0.017	U	0		0.017	0.052
n-C38	<0.019	U	<0.019	U	0		0.019	0.057
n-C39	<0.019	U	<0.019	U	0		0.019	0.056
n-C40	<0.019	U	<0.019	U	0		0.019	0.056
Total Alkanes	18.9		18.9		0			
Total Petroleum Hydrocarbons	770		772		0		1.40	4.20
Total Resolved Hydrocarbons	59		59		0		1.40	4.20
Unresolved Complex Mixture	711		713		0		1.40	4.20
EOM (µg/dry g)	1050		1105		5			

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)
n-dodecane-d26	86	86
n-eicosane-d42	87	92
n-triacontane-d62	104	108

B&B Laboratories
Project J16222
Report 16-3589

LEED Co. - Lake Erie
Aliphatic Hydrocarbon and Total Petroleum Hydrocarbon Data
Matrix Spike Report

Laboratory ID	LED0037.D	ENV3615D.D
Sample ID	PC01R, PC02, PC03	PC01R, PC02, PC03
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/07/16	11/07/16
Extraction Batch	ENV3615	ENV3615
Date Acquired	16-Nov-2016, 05:54	16-Nov-2016, 02:21
Method	B&B SOP1016	B&B SOP1016
Sample Dry Weight (g)	15.02	15.00
Sample Wet Weight (g)	18.69	18.66
% Dry	80	80
% Moisture	20	20
Dilution	1X	1X

Target Compounds	Su. Corrected Conc. (µg/dry g)	Q	Su. Corrected Conc. (µg/dry g)	Q	Recovery (%)	Q	Q	Spike Amount (µg)
n-C9	0.120		0.695		86			10.0
n-C10	0.048		0.656		91			10.0
n-C11	0.099		0.764		100			10.0
n-C12	0.321		1.052		109			10.0
n-C13	0.961		1.672		106			10.1
i-C15	0.395		NA					
n-C14	1.305		2.082		116			10.0
i-C16	0.815		NA					
n-C15	1.297		2.002		105			10.0
n-C16	1.302		1.962		99			10.0
i-C18	0.624		NA					
n-C17	1.214		1.980		114			10.0
Pristane	1.127		1.859		110			9.92
n-C18	1.222		1.994		115			10.1
Phytane	0.634		1.365		109			10.0
n-C19	1.244		1.924		102			10.0
n-C20	0.979		1.718		111			10.0
n-C21	0.894		1.629		110			10.1
n-C22	0.820		1.543		109			9.95
n-C23	0.707		1.446		112			9.89
n-C24	0.567		1.293		110			9.93
n-C25	0.513		1.230		108			10.0
n-C26	0.432		1.140		105			10.1
n-C27	0.415		1.153		110			10.0
n-C28	0.376		1.116		110			10.1
n-C29	0.379		1.097		108			9.93
n-C30	0.229		0.937		106			10.0
n-C31	0.253		0.979		108			10.1
n-C32	0.143		0.829		104			9.87
n-C33	0.154		0.872		108			10.0
n-C34	0.094		0.807		107			10.0
n-C35	0.092		0.806		107			10.0
n-C36	0.040		0.739		104			10.0
n-C37	0.033		0.736		105			10.1
n-C38	0.033		0.711		102			10.0
n-C39	<0.019	U	0.714		107			10.0
n-C40	0.083		0.767		103			10.0
Average %Recovery					106			

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)
n-dodecane-d26	80	84
n-eicosane-d42	99	86
n-triacontane-d62	94	87

5.3 APPENDIX C - CHLORINATED HYDROCARBONS

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Organochlorine Data
Client Submitted Samples

Lab ID	LED0037	LED0038	LED0039	LED0046
Sample ID	PC01R, PC02, PC03	PC04, PC05R1, PC06R2, PC07	PC09, PC10	BC01, BC02, BC03
Matrix	Sediment	Sediment	Sediment	Sediment
Collection Date	NA	NA	NA	NA
Received Date	10/12/16	09/21/16	10/12/16	10/12/16
Extraction Date	11/09/16	11/09/16	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617	ENV3617	ENV3617
Date Acquired	15-Nov-2016, 22:55	16-Nov-2016, 04:34	16-Nov-2016, 06:27	16-Nov-2016, 08:20
Method	ECD1DUAL.M	ECD1DUAL.M	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.01	15.06	15.00	15.03
Sample Wet Weight (g)	18.67	18.12	19.54	65.30
% Dry	80	83	77	23
% Moisture	20	17	23	77
Dilution	1X	1X	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q
Aldrin	<0.06	U	<0.06	U	<0.06	U	<0.06	U
Dieldrin	<0.05	U	<0.05	U	<0.05	U	0.18	
Endrin	<0.06	U	<0.06	U	<0.06	U	<0.06	U
Heptachlor	0.02	J	<0.04	U	<0.04	U	0.27	
Heptachlor-Epoxide	<0.06	U	<0.06	U	<0.06	U	0.11	
Oxychlordane	0.06	J	<0.06	U	<0.06	U	0.06	J
Alpha-Chlordane	0.02	J	0.32		<0.05	U	0.38	
Gamma-Chlordane	<0.06	U	<0.05	U	<0.06	U	0.13	
Trans-Nonachlor	<0.05	U	0.04	J	<0.05	U	0.10	
Cis-Nonachlor	0.01	J	0.07		0.68		0.21	
Alpha-HCH	<0.08	U	<0.08	U	<0.08	U	<0.08	U
Beta-HCH	0.04	J	<0.05	U	<0.05	U	0.05	J
Delta-HCH	0.03	J	<0.05	U	0.03	J	0.14	
Gamma-HCH	0.20		<0.04	U	<0.04	U	0.85	
DDMU	<0.07	U	<0.07	U	<0.07	U	1.65	
2,4'-DDD	0.21		0.43		<0.05	U	0.61	
4,4'-DDD	0.02	J	<0.05	U	<0.05	U	<0.05	U
2,4'-DDE	0.01	J	<0.06	U	0.16		<0.06	U
4,4'-DDE	<0.05	U	0.18		1.97		3.89	
2,4'-DDT	0.01	J	<0.05	U	<0.05	U	<0.05	
4,4'-DDT	0.11		<0.05	U	<0.05	U	0.09	
1,2,3,4-Tetrachlorobenzene	<0.07	U	<0.07	U	<0.07	U	<0.07	U
1,2,4,5-Tetrachlorobenzene	<0.08	U	<0.08	U	<0.08	U	<0.08	U
Hexachlorobenzene	0.03	J	<0.05	U	0.12		1.48	
Pentachloroanisole	<0.05	U	<0.05	U	<0.05	U	<0.05	U
Pentachlorobenzene	<0.07	U	<0.07	U	<0.07	U	<0.07	U
Endosulfan II	<0.04	U	<0.04	U	2.15		<0.04	U
Endosulfan I	<0.04	U	<0.04	U	<0.04	U	<0.04	U
Endosulfan Sulfate	<0.04	U	<0.04	U	<0.04	U	<0.04	U
Mirex	<0.06	U	<0.06	U	0.14		0.03	J
Chlorpyrifos	<0.06	U	<0.06	U	<0.06	U	<0.06	U

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Organochlorine Data
Client Submitted Samples

Lab ID	LED0037	LED0038	LED0039	LED0046
Sample ID	PC01R, PC02, PC03	PC04, PC05R1, PC06R2, PC07	PC09, PC10	BC01, BC02, BC03
Matrix	Sediment	Sediment	Sediment	Sediment
Collection Date	NA	NA	NA	NA
Received Date	10/12/16	09/21/16	10/12/16	10/12/16
Extraction Date	11/09/16	11/09/16	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617	ENV3617	ENV3617
Date Acquired	15-Nov-2016, 22:55	16-Nov-2016, 04:34	16-Nov-2016, 06:27	16-Nov-2016, 08:20
Method	ECD1DUAL.M	ECD1DUAL.M	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.01	15.06	15.00	15.03
Sample Wet Weight (g)	18.67	18.12	19.54	65.30
% Dry	80	83	77	23
% Moisture	20	17	23	77
Dilution	1X	1X	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q
PCB1	<0.08	U	<0.08	U	<0.08	U	<0.08	U
PCB7/9	<0.08	U	<0.08	U	<0.08	U	<0.08	U
PCB8/5	0.04	J	<0.08	U	3.40		<0.08	U
PCB15	<0.08	U	<0.08	U	4.56		0.35	
PCB16/32	<0.04	U	<0.04	U	4.98		1.13	
PCB18	0.03	J	<0.04	U	10.92		0.33	
PCB22/51	<0.04	U	0.58		11.45		1.05	
PCB24/27	0.03	J	<0.04	U	1.39		0.06	
PCB25	<0.04	U	0.67		2.41		0.61	
PCB26	<0.04	U	<0.04	U	4.26		0.24	
PCB28	0.03	J	0.06	J	15.19		1.78	
PCB29	<0.06	U	<0.06	U	0.03	J	0.30	
PCB31	<0.04	U	<0.04	U	18.95		1.69	
PCB33/53/20	<0.04	U	1.08		13.71		0.94	
PCB40	<0.07	U	<0.07	U	4.53		0.31	
PCB41/64	<0.07	U	<0.07	U	<0.07	U	<0.07	U
PCB42/59/37	<0.07	U	<0.07	U	9.78		0.62	
PCB43	0.07	J	0.45		0.64		1.25	
PCB44	<0.07	U	<0.07	U	14.79		0.98	
PCB45	0.03	J	0.04	J	3.03		0.14	
PCB46	0.06	J	0.03	J	1.41		0.19	
PCB47/48/75	<0.07	U	0.22		3.73		1.93	
PCB49	0.02	J	0.24		11.34		1.15	
PCB52	0.12		0.17		17.77		3.00	
PCB56/60	<0.07	U	<0.07	U	20.84		1.43	
PCB66	0.02	J	0.39		17.54		1.93	
PCB70	0.09		<0.07	U	23.80		2.96	
PCB74/61	0.06	J	<0.07	U	12.50		1.90	
PCB81	<0.07	U	<0.07	U	<0.07	U	<0.07	U
PCB82	<0.04	U	<0.04	U	4.14		0.93	
PCB83	<0.04	U	0.04	J	1.21		0.24	
PCB84	0.01	J	<0.04	U	3.91		0.78	
PCB85	<0.04	U	0.05		4.31		0.98	
PCB86	0.05		0.06		<0.04	U	<0.04	U
PCB87/115	<0.05	U	<0.05	U	8.08		1.75	
PCB88	0.01	J	<0.04	U	<0.04	U	<0.04	U
PCB92	<0.04	U	<0.04	U	3.90		<0.04	U
PCB95	0.01	J	0.25		3.98		1.46	
PCB97	<0.04	U	0.05		6.22		0.74	
PCB99	0.01	J	0.04	J	7.86		1.25	
PCB101/90	0.02	J	0.19		16.79		3.14	
PCB105	<0.04	U	<0.04	U	6.40		1.43	
PCB107	<0.04	U	<0.04	U	2.78		1.16	
PCB110/77	0.07		<0.05	U	17.68		5.35	
PCB114/131/122	<0.04	U	<0.04	U	0.26		<0.04	U
PCB118	0.01	J	0.55		12.32		3.24	
PCB128	<0.07	U	0.05	J	2.20		0.94	
PCB129/126	<0.1	U	0.29		0.46		0.11	
PCB136	<0.1	U	<0.1	U	2.12		<0.1	U
PCB138/160	<0.1	U	0.38		12.53		3.14	
PCB141/179	<0.1	U	<0.1	U	3.64		0.73	
PCB146	<0.1	U	<0.1	U	1.42		0.70	

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Organochlorine Data
Client Submitted Samples

Lab ID	LED0037	LED0038	LED0039	LED0046
Sample ID	PC01R, PC02, PC03	PC04, PC05R1, PC06R2, PC07	PC09, PC10	BC01, BC02, BC03
Matrix	Sediment	Sediment	Sediment	Sediment
Collection Date	NA	NA	NA	NA
Received Date	10/12/16	09/21/16	10/12/16	10/12/16
Extraction Date	11/09/16	11/09/16	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617	ENV3617	ENV3617
Date Acquired	15-Nov-2016, 22:55	16-Nov-2016, 04:34	16-Nov-2016, 06:27	16-Nov-2016, 08:20
Method	ECD1DUAL.M	ECD1DUAL.M	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.01	15.06	15.00	15.03
Sample Wet Weight (g)	18.67	18.12	19.54	65.30
% Dry	80	83	77	23
% Moisture	20	17	23	77
Dilution	1X	1X	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q
PCB149/123	0.02	J	<0.1	U	6.71		2.17	
PCB151	<0.1	U	<0.1	U	2.43		0.60	
PCB153/132	0.01	J	0.65		15.25		5.63	
PCB156/171/202	<0.1	U	0.82		0.76		0.61	
PCB158	<0.1	U	0.28		1.33		0.17	
PCB166	<0.1	U	<0.1	U	<0.1	U	0.12	
PCB167	<0.1	U	<0.1	U	<0.1	U	0.08	J
PCB169	<0.1	U	<0.1	U	<0.1	U	<0.1	U
PCB170/190	<0.09	U	0.17		0.85		1.93	
PCB172	0.15		0.08		0.06		0.37	
PCB174	<0.05	U	<0.05	U	2.43		1.07	
PCB176/137	<0.05	U	2.06		1.06		0.12	
PCB177	<0.05	U	0.80		1.21		0.52	
PCB178	<0.05	U	0.24		0.50		0.16	
PCB180	<0.05	U	0.33		5.28		1.50	
PCB183	0.01	J	<0.05	U	0.99		0.44	
PCB185	<0.05	U	0.52		0.49		0.52	
PCB187	<0.05	U	0.76		0.87		1.81	
PCB189	<0.05	U	0.19		0.05		0.04	J
PCB191	<0.05	U	<0.05	U	0.52		0.20	
PCB194	<0.04	U	1.65		0.99		0.37	
PCB195/208	<0.04	U	0.10		0.37		0.17	
PCB196/203	<0.04	U	0.19		1.29		0.78	
PCB199	<0.08	U	<0.08	U	1.37		1.00	
PCB200	<0.04	U	<0.04	U	0.11		0.01	J
PCB201/157/173	<0.04	U	1.10		0.40		0.22	
PCB205	<0.04	U	0.10		0.21		1.06	
PCB206	<0.05	U	<0.05	U	0.37		0.22	
PCB209	<0.05	U	<0.05	U	0.17		0.49	
Total HCH	0.28		0.00	U	0.03	J	1.04	
Total Chlordane	0.11	J	0.43		0.68		1.26	
Total DDT	0.37		0.60		2.13		6.23	
Total PCB	0.98	J	15.90		401.17		77.05	

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
DBOFB	84	84	77	80
PCB 103	74	83	75	78
PCB 198	83	90	81	80

B&B Laboratories
Project J16222
Report 16-3589

LEED Co - Lake Erie
Organochlorine Data
Method Blank Report

Lab ID	ENV3617A
Sample ID	Method Blank
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 06:01
Method	ECD1DUAL.M
Sample Dry Weight (g)	15.07
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Q	3X MDL	Actual MDL
Aldrin	<0.06	U		0.17	0.06
Dieldrin	<0.05	U		0.15	0.05
Endrin	<0.06	U		0.17	0.06
Heptachlor	<0.04	U		0.12	0.04
Heptachlor-Epoxide	<0.06	U		0.18	0.06
Oxychlordane	<0.06	U		0.19	0.06
Alpha-Chlordane	<0.05	U		0.14	0.05
Gamma-Chlordane	<0.05	U		0.16	0.05
Trans-Nonachlor	<0.05	U		0.15	0.05
Cis-Nonachlor	<0.04	U		0.13	0.04
Alpha-HCH	<0.08	U		0.23	0.08
Beta-HCH	<0.05	U		0.15	0.05
Delta-HCH	<0.05	U		0.14	0.05
Gamma-HCH	<0.04	U		0.11	0.04
DDMU	<0.07	U		0.20	0.07
2,4'-DDD	<0.05	U		0.14	0.05
4,4'-DDD	<0.05	U		0.16	0.05
2,4'-DDE	<0.06	U		0.17	0.06
4,4'-DDE	<0.05	U		0.14	0.05
2,4'-DDT	<0.05	U		0.14	0.05
4,4'-DDT	<0.05	U		0.14	0.05
1,2,3,4-Tetrachlorobenzene	<0.07	U		0.20	0.07
1,2,4,5-Tetrachlorobenzene	<0.08	U		0.24	0.08
Hexachlorobenzene	<0.05	U		0.16	0.05
Pentachloroanisole	<0.05	U		0.14	0.05
Pentachlorobenzene	<0.07	U		0.20	0.07
Endosulfan II	<0.04	U		0.12	0.04
Endosulfan I	<0.04	U		0.12	0.04
Endosulfan Sulfate	<0.04	U		0.13	0.04
Mirex	<0.06	U		0.17	0.06
Chlorpyrifos	<0.06	U		0.17	0.06

B&B Laboratories
Project J16222
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LEED Co - Lake Erie
Organochlorine Data
Method Blank Report

Lab ID	ENV3617A
Sample ID	Method Blank
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 06:01
Method	ECD1DUAL.M
Sample Dry Weight (g)	15.07
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Q	3X MDL	Actual MDL
PCB1	<0.08	U		0.24	0.08
PCB7/9	<0.08	U		0.24	0.08
PCB8/5	<0.08	U		0.24	0.08
PCB15	<0.08	U		0.24	0.08
PCB16/32	<0.04	U		0.13	0.04
PCB18	<0.04	U		0.13	0.04
PCB22/51	<0.04	U		0.13	0.04
PCB24/27	<0.04	U		0.13	0.04
PCB25	<0.04	U		0.13	0.04
PCB26	<0.04	U		0.13	0.04
PCB28	<0.06	U		0.18	0.06
PCB29	<0.06	U		0.19	0.06
PCB31	<0.04	U		0.13	0.04
PCB33/53/20	<0.04	U		0.13	0.04
PCB40	<0.07	U		0.21	0.07
PCB41/64	<0.07	U		0.21	0.07
PCB42/59/37	<0.07	U		0.21	0.07
PCB43	<0.07	U		0.21	0.07
PCB44	<0.07	U		0.21	0.07
PCB45	<0.07	U		0.21	0.07
PCB46	<0.07	U		0.21	0.07
PCB47/48/75	<0.07	U		0.21	0.07
PCB49	<0.07	U		0.21	0.07
PCB52	<0.07	U		0.21	0.07
PCB56/60	<0.07	U		0.21	0.07
PCB66	<0.06	U		0.17	0.06
PCB70	<0.07	U		0.21	0.07
PCB74/61	<0.07	U		0.21	0.07
PCB81	<0.07	U		0.21	0.07
PCB82	<0.04	U		0.13	0.04
PCB83	<0.04	U		0.13	0.04
PCB84	<0.04	U		0.13	0.04
PCB85	<0.04	U		0.13	0.04
PCB86	<0.04	U		0.13	0.04
PCB87/115	<0.05	U		0.16	0.05
PCB88	<0.04	U		0.13	0.04
PCB92	<0.04	U		0.13	0.04
PCB95	<0.04	U		0.13	0.04
PCB97	<0.04	U		0.13	0.04
PCB99	<0.04	U		0.13	0.04
PCB101/90	<0.04	U		0.13	0.04
PCB105	<0.04	U		0.13	0.04
PCB107	<0.04	U		0.13	0.04
PCB110/77	<0.05	U		0.15	0.05
PCB114/131/122	<0.04	U		0.13	0.04
PCB118	<0.05	U		0.16	0.05
PCB128	<0.07	U		0.20	0.07
PCB129/126	<0.1	U		0.29	0.10
PCB136	<0.1	U		0.29	0.10
PCB138/160	<0.1	U		0.29	0.10
PCB141/179	<0.1	U		0.29	0.10
PCB146	<0.1	U		0.29	0.10

B&B Laboratories
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Report 16-3589

LEED Co - Lake Erie
Organochlorine Data
Method Blank Report

Lab ID	ENV3617A
Sample ID	Method Blank
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 06:01
Method	ECD1DUAL.M
Sample Dry Weight (g)	15.07
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Q	3X MDL	Actual MDL
PCB149/123	<0.1	U		0.29	0.10
PCB151	<0.1	U		0.29	0.10
PCB153/132	<0.04	U		0.11	0.04
PCB156/171/202	<0.1	U		0.29	0.10
PCB158	<0.1	U		0.29	0.10
PCB166	<0.1	U		0.29	0.10
PCB167	<0.1	U		0.29	0.10
PCB169	<0.1	U		0.29	0.10
PCB170/190	<0.09	U		0.28	0.09
PCB172	<0.05	U		0.14	0.05
PCB174	<0.05	U		0.14	0.05
PCB176/137	<0.05	U		0.14	0.05
PCB177	<0.05	U		0.14	0.05
PCB178	<0.05	U		0.14	0.05
PCB180	<0.05	U		0.14	0.05
PCB183	<0.05	U		0.14	0.05
PCB185	<0.05	U		0.14	0.05
PCB187	<0.05	U		0.15	0.05
PCB189	<0.05	U		0.14	0.05
PCB191	<0.05	U		0.14	0.05
PCB194	<0.04	U		0.12	0.04
PCB195/208	<0.04	U		0.12	0.04
PCB196/203	<0.04	U		0.12	0.04
PCB199	<0.08	U		0.24	0.08
PCB200	<0.04	U		0.12	0.04
PCB201/157/173	<0.04	U		0.12	0.04
PCB205	<0.04	U		0.12	0.04
PCB206	<0.05	U		0.15	0.05
PCB209	<0.05	U		0.16	0.05
Total HCH	<0.1		U	0.29	0.10
Total Chlordane	<0.18		U	0.54	0.18
Total DDT	<0.15		U	0.45	0.15
Total PCB	<1.25		U	3.76	1.25

Surrogate (Su)	Su Recovery (%)
DBOFB	90
PCB 103	95
PCB 198	100

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LEED Co - Lake Erie
Organochlorine Data
Matrix Spike Report

Lab ID	ENV3617B
Sample ID	Blank Spike
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 07:54
Method	ECD1DUAL.M
Sample Dry Weight (g)	1.00
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Recovery (%)	Q	Spike Amount (ng)
Aldrin	34.02		85		40
Dieldrin	30.86		77		40
Endrin	34.01		85		40
Heptachlor	44.33		111		40
Heptachlor-Epoxide	36.93		92		40
Oxychlordane	34.06		85		40
Alpha-Chlordane	36.65		92		40
Gamma-Chlordane	35.13		87		40
Trans-Nonachlor	36.54		91		40
Cis-Nonachlor	37.25		93		40
Alpha-HCH	34.37		86		40
Beta-HCH	35.20		88		40
Delta-HCH	30.84		77		40
Gamma-HCH	33.06		83		40
DDMU	40.76		102		40
2,4'-DDD	36.67		92		40
4,4'-DDD	35.74		89		40
2,4'-DDE	37.44		94		40
4,4'-DDE	34.57		87		40
2,4'-DDT	39.49		99		40
4,4'-DDT	39.15		98		40
1,2,3,4-Tetrachlorobenzene	38.81		97		40
1,2,4,5-Tetrachlorobenzene	39.87		100		40
Hexachlorobenzene	38.63		97		40
Pentachloroanisole	41.07		103		40
Pentachlorobenzene	35.74		89		40
Endosulfan II	19.04		48		40
Endosulfan I	NA				
Endosulfan Sulfate	36.06		90		40
Mirex	42.36		106		40
Chlorpyrifos	36.98		92		40

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LEED Co - Lake Erie
Organochlorine Data
Matrix Spike Report

Lab ID	ENV3617B
Sample ID	Blank Spike
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 07:54
Method	ECD1DUAL.M
Sample Dry Weight (g)	1.00
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Recovery Q (%)	Spike Amount (ng)
PCB1	NA			
PCB7/9	NA			
PCB8/5	33.07		83	40
PCB15	NA			
PCB16/32	NA			
PCB18	41.12		103	40
PCB22/51	NA			
PCB24/27	NA			
PCB25	NA			
PCB26	NA			
PCB28	40.98		102	40
PCB29	41.62		104	40
PCB31	NA			
PCB33/53/20	NA			
PCB40	NA			
PCB41/64	NA			
PCB42/59/37	NA			
PCB43	NA			
PCB44	41.02		103	40
PCB45	NA			
PCB46	NA			
PCB47/48/75	NA			
PCB49	NA			
PCB52	40.90		102	40
PCB56/60	NA			
PCB66	40.61		102	40
PCB70	NA			
PCB74/61	NA			
PCB81	NA			
PCB82	NA			
PCB83	NA			
PCB84	NA			
PCB85	NA			
PCB86	NA			
PCB87/115	39.95		100	40
PCB88	NA			
PCB92	NA			
PCB95	NA			
PCB97	NA			
PCB99	NA			
PCB101/90	41.45		104	40
PCB105	36.83		92	40
PCB107	NA			
PCB110/77	40.92		102	40
PCB114/131/122	NA			
PCB118	40.32		101	40
PCB128	42.00		105	40
PCB129/126	NA			
PCB136	NA			
PCB138/160	41.55		104	40
PCB141/179	NA			
PCB146	NA			

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LEED Co - Lake Erie
Organochlorine Data
Matrix Spike Report

Lab ID	ENV3617B
Sample ID	Blank Spike
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 07:54
Method	ECD1DUAL.M
Sample Dry Weight (g)	1.00
Sample Wet Weight (g)	NA
% Dry	NA
% Moisture	NA
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Recovery (%)	Q	Spike Amount (ng)
PCB149/123	NA				
PCB151	NA				
PCB153/132	42.06		105		40
PCB156/171/202	NA				
PCB158	NA				
PCB166	NA				
PCB167	NA				
PCB169	NA				
PCB170/190	42.49		106		40
PCB172	NA				
PCB174	NA				
PCB176/137	NA				
PCB177	NA				
PCB178	NA				
PCB180	41.53		104		40
PCB183	NA				
PCB185	NA				
PCB187	41.91		105		40
PCB189	NA				
PCB191	NA				
PCB194	NA				
PCB195/208	44.31		111		40
PCB196/203	NA				
PCB199	43.62		109		40
PCB200	NA				
PCB201/157/173	NA				
PCB205	NA				
PCB206	44.76		112		40
PCB209	46.20		116		40
	Average % Recovery		96		

Surrogate (Su)	Su Recovery (%)
DBOFB	90
PCB 103	94
PCB 198	104

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LEED Co - Lake Erie
Organochlorine Data
Laboratory Duplicate Report

Lab ID	LED0037	ENV3617E
Sample ID	PC01R, PC02, PC03	PC01R, PC02, PC03
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617
Date Acquired	15-Nov-2016, 22:55	15-Nov-2016, 21:03
Method	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.01	15.03
Sample Wet Weight (g)	18.67	18.70
% Dry	80	80
% Moisture	20	20
Dilution	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	RPD (%)	Q	3X MDL	MDL
Aldrin	<0.06	U	<0.06	U			0.166	0.06
Dieldrin	<0.05	U	<0.05	U			0.147	0.05
Endrin	<0.06	U	<0.06	U			0.167	0.06
Heptachlor	0.02	J	0.02	J	0		0.124	0.04
Heptachlor-Epoxide	<0.06	U	<0.06	U			0.179	0.06
Oxychlordane	0.06	J	0.06	J	0		0.188	0.06
Alpha-Chlordane	0.02	J	0.02	J	0		0.138	0.05
Gamma-Chlordane	<0.06	U	<0.06	U			0.165	0.06
Trans-Nonachlor	<0.05	U	<0.05	U			0.148	0.05
Cis-Nonachlor	0.01	J	0.02	J	67		0.132	0.04
Alpha-HCH	<0.08	U	<0.08	U			0.229	0.08
Beta-HCH	0.04	J	0.04	J	0		0.151	0.05
Delta-HCH	0.03	J	0.03	J	0		0.139	0.05
Gamma-HCH	0.20		0.21		5		0.110	0.04
DDMU	<0.07	U	<0.07	U			0.204	0.07
2,4'-DDD	0.21		0.22		5		0.137	0.05
4,4'-DDD	0.02	J	0.03	J	40		0.159	0.05
2,4'-DDE	0.01	J	0.01	J	0		0.170	0.06
4,4'-DDE	<0.05	U	<0.05	U			0.141	0.05
2,4'-DDT	0.01	J	0.01	J	0		0.138	0.05
4,4'-DDT	0.11		0.12		9		0.140	0.05
1,2,3,4-Tetrachlorobenzene	<0.07	U	<0.07	U			0.199	0.07
1,2,4,5-Tetrachlorobenzene	<0.08	U	<0.08	U			0.240	0.08
Hexachlorobenzene	0.03	J	0.03	J	0		0.163	0.05
Pentachloroanisole	<0.05	U	<0.05	U			0.137	0.05
Pentachlorobenzene	<0.07	U	<0.07	U			0.201	0.07
Endosulfan II	<0.04	U	<0.04	U			0.117	0.04
Endosulfan I	<0.04	U	<0.04	U			0.120	0.04
Endosulfan Sulfate	<0.04	U	<0.04	U			0.127	0.04
Mirex	<0.06	U	<0.06	U			0.173	0.06
Chlorpyrifos	<0.06	U	<0.06	U			0.173	0.06

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LEED Co - Lake Erie
Organochlorine Data
Laboratory Duplicate Report

Lab ID	LED0037	ENV3617E
Sample ID	PC01R, PC02, PC03	PC01R, PC02, PC03
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617
Date Acquired	15-Nov-2016, 22:55	15-Nov-2016, 21:03
Method	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.01	15.03
Sample Wet Weight (g)	18.67	18.70
% Dry	80	80
% Moisture	20	20
Dilution	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	RPD (%)	Q	3X MDL	MDL
PCB1	<0.08	U	<0.08	U			0.245	0.08
PCB7/9	<0.08	U	<0.08	U			0.245	0.08
PCB8/5	0.04	J	0.03	J	29		0.245	0.08
PCB15	<0.08	U	<0.08	U			0.245	0.08
PCB16/32	<0.04	U	<0.04	U			0.134	0.04
PCB18	0.03	J	0.03	J	0		0.134	0.04
PCB22/51	<0.04	U	<0.04	U			0.134	0.04
PCB24/27	0.03	J	0.02	J	40		0.134	0.04
PCB25	<0.04	U	<0.04	U			0.134	0.04
PCB26	<0.04	U	<0.04	U			0.134	0.04
PCB28	0.03	J	0.03	J	0		0.181	0.06
PCB29	<0.06	U	<0.06	U			0.192	0.06
PCB31	<0.04	U	<0.04	U			0.134	0.04
PCB33/53/20	<0.04	U	<0.04	U			0.134	0.04
PCB40	<0.07	U	<0.07	U			0.215	0.07
PCB41/64	<0.07	U	<0.07	U			0.215	0.07
PCB42/59/37	<0.07	U	<0.07	U			0.215	0.07
PCB43	0.07	J	0.07	J	0		0.215	0.07
PCB44	<0.07	U	<0.07	U			0.215	0.07
PCB45	0.03	J	0.02	J	40		0.215	0.07
PCB46	0.06	J	0.07	J	15		0.215	0.07
PCB47/48/75	<0.07	U	<0.07	U			0.215	0.07
PCB49	0.02	J	0.02	J	0		0.215	0.07
PCB52	0.12		0.12		0		0.215	0.07
PCB56/60	<0.07	U	<0.07	U			0.215	0.07
PCB66	0.02	J	0.02	J	0		0.167	0.06
PCB70	0.09		0.09		0		0.215	0.07
PCB74/61	0.06	J	0.06	J	0		0.215	0.07
PCB81	<0.07	U	<0.07	U			0.215	0.07
PCB82	<0.04	U	<0.04	U			0.132	0.04
PCB83	<0.04	U	<0.04	U			0.132	0.04
PCB84	0.01	J	0.01	J	0		0.132	0.04
PCB85	<0.04	U	<0.04	U			0.132	0.04
PCB86	0.05		0.05		0		0.132	0.04
PCB87/115	<0.05	U	<0.05	U			0.158	0.05
PCB88	0.01	J	0.01	J	0		0.132	0.04
PCB92	<0.04	U	<0.04	U			0.132	0.04
PCB95	0.01	J	0.01	J	0		0.132	0.04
PCB97	<0.04	U	<0.04	U			0.132	0.04
PCB99	0.01	J	0.02	J	67		0.132	0.04
PCB101/90	0.02	J	0.03	J	40		0.132	0.04
PCB105	<0.04	U	<0.04	U			0.128	0.04
PCB107	<0.04	U	<0.04	U			0.132	0.04
PCB110/77	0.07		0.08		13		0.150	0.05
PCB114/131/122	<0.04	U	<0.04	U			0.132	0.04
PCB118	0.01	J	0.01	J	0		0.159	0.05
PCB128	<0.07	U	<0.07	U			0.196	0.07
PCB129/126	<0.1	U	<0.1	U			0.287	0.10
PCB136	<0.1	U	<0.1	U			0.287	0.10
PCB138/160	<0.1	U	<0.1	U			0.287	0.10
PCB141/179	<0.1	U	<0.1	U			0.287	0.10
PCB146	<0.1	U	<0.1	U			0.287	0.10

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LEED Co - Lake Erie
Organochlorine Data
Laboratory Duplicate Report

Lab ID	LED0037	ENV3617E
Sample ID	PC01R, PC02, PC03	PC01R, PC02, PC03
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Extraction Date	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617
Date Acquired	15-Nov-2016, 22:55	15-Nov-2016, 21:03
Method	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.01	15.03
Sample Wet Weight (g)	18.67	18.70
% Dry	80	80
% Moisture	20	20
Dilution	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	RPD (%)	Q	3X MDL	MDL
PCB149/123	0.02	J	0.02	J	0		0.287	0.10
PCB151	<0.1	U	<0.1	U			0.287	0.10
PCB153/132	0.01	J	0.01	J	0		0.111	0.04
PCB156/171/202	<0.1	U	<0.1	U			0.287	0.10
PCB158	<0.1	U	<0.1	U			0.287	0.10
PCB166	<0.1	U	<0.1	U			0.287	0.10
PCB167	<0.1	U	<0.1	U			0.287	0.10
PCB169	<0.1	U	<0.1	U			0.287	0.10
PCB170/190	<0.09	U	<0.09	U			0.278	0.09
PCB172	0.15		0.16		6		0.143	0.05
PCB174	<0.05	U	<0.05	U			0.143	0.05
PCB176/137	<0.05	U	<0.05	U			0.143	0.05
PCB177	<0.05	U	<0.05	U			0.143	0.05
PCB178	<0.05	U	<0.05	U			0.143	0.05
PCB180	<0.05	U	<0.05	U			0.143	0.05
PCB183	0.01	J	0.01	J	0		0.143	0.05
PCB185	<0.05	U	<0.05	U			0.143	0.05
PCB187	<0.05	U	<0.05	U			0.150	0.05
PCB189	<0.05	U	<0.05	U			0.143	0.05
PCB191	<0.05	U	<0.05	U			0.143	0.05
PCB194	<0.04	U	<0.04	U			0.119	0.04
PCB195/208	<0.04	U	<0.04	U			0.119	0.04
PCB196/203	<0.04	U	<0.04	U			0.119	0.04
PCB199	<0.08	U	<0.08	U			0.243	0.08
PCB200	<0.04	U	<0.04	U			0.119	0.04
PCB201/157/173	<0.04	U	<0.04	U			0.119	0.04
PCB205	<0.04	U	<0.04	U			0.119	0.04
PCB206	<0.05	U	<0.05	U			0.155	0.05
PCB209	<0.05	U	<0.05	U			0.160	0.05
Total HCH	0.28		0.28		0		0.295	0.10
Total Chlordane	0.11	J	0.13	J	17		0.546	0.18
Total DDT	0.37		0.40		8		0.454	0.15
Total PCB	0.98	J	1.01	J	3		3.769	1.26

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)
DBOFB	84	82
PCB 103	74	71
PCB 198	83	85

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LEED Co - Lake Erie
Organochlorine Data
Matrix Spike Report

Lab ID	LED0038	ENV3617D
Sample ID	PC04, PC05R1, PC06R2, PC07	PC04, PC05R1, PC06R2, PC07
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	09/21/16	09/21/16
Extraction Date	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617
Date Acquired	16-Nov-2016, 04:34	15-Nov-2016, 15:25
Method	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.06	15.06
Sample Wet Weight (g)	18.12	18.12
% Dry	83	83
% Moisture	17	17
Dilution	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Recovery (%)	Q	Spike Amount (ng)
Aldrin		<0.06 U	2.62		99		40
Dieldrin		<0.05 U	2.33		88		40
Endrin		<0.06 U	2.33		87		40
Heptachlor		<0.04 U	2.32		87		40
Heptachlor-Epoxide		<0.06 U	2.33		88		40
Oxychlordane		<0.06 U	2.74		103		40
Alpha-Chlordane		0.32	2.34		76		40
Gamma-Chlordane		<0.05 U	2.39		90		40
Trans-Nonachlor		0.04 J	2.46		91		40
Cis-Nonachlor		0.07	2.43		89		40
Alpha-HCH		<0.08 U	2.32		87		40
Beta-HCH		<0.05 U	2.43		91		40
Delta-HCH		<0.05 U	1.86		70		40
Gamma-HCH		<0.04 U	2.38		90		40
DDMU		<0.07 U	2.60		98		40
2,4'-DDD		0.43	3.47		114		40
4,4'-DDD		<0.05 U	2.74		103		40
2,4'-DDE		<0.06 U	2.32		87		40
4,4'-DDE		0.18	2.03		70		40
2,4'-DDT		<0.05 U	2.37		89		40
4,4'-DDT		<0.05 U	1.97		74		40
1,2,3,4-Tetrachlorobenzene		<0.07 U	2.65		100		40
1,2,4,5-Tetrachlorobenzene		<0.08 U	2.22		84		40
Hexachlorobenzene		<0.05 U	2.76		104		40
Pentachloroanisole		<0.05 U	3.10		117		40
Pentachlorobenzene		<0.07 U	2.55		96		40
Endosulfan II		<0.04 U	1.96		74		40
Endosulfan I		<0.04 U	NA				
Endosulfan Sulfate		<0.04 U	2.78		104		40
Mirex		<0.06 U	2.46		93		40
Chlorpyrifos		<0.06 U	<0.06 U		0	I	40

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LEED Co - Lake Erie
Organochlorine Data
Matrix Spike Report

Lab ID	LED0038	ENV3617D
Sample ID	PC04, PC05R1, PC06R2, PC07	PC04, PC05R1, PC06R2, PC07
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	09/21/16	09/21/16
Extraction Date	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617
Date Acquired	16-Nov-2016, 04:34	15-Nov-2016, 15:25
Method	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.06	15.06
Sample Wet Weight (g)	18.12	18.12
% Dry	83	83
% Moisture	17	17
Dilution	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Recovery (%)	Q	Spike Amount (ng)
PCB1		<0.08 U		NA			
PCB7/9		<0.08 U		NA			
PCB8/5		<0.08 U		2.75	103		40
PCB15		<0.08 U		NA			
PCB16/32		<0.04 U		NA			
PCB18		<0.04 U		2.12	80		40
PCB22/51		0.58		NA			
PCB24/27		<0.04 U		NA			
PCB25		0.67		NA			
PCB26		<0.04 U		NA			
PCB28		0.06 J		1.86	68		40
PCB29		<0.06 U		2.27	85		40
PCB31		<0.04 U		NA			
PCB33/53/20		1.08		NA			
PCB40		<0.07 U		NA			
PCB41/64		<0.07 U		NA			
PCB42/59/37		<0.07 U		NA			
PCB43		0.45		NA			
PCB44		<0.07 U		2.13	80		40
PCB45		0.04 J		NA			
PCB46		0.03 J		NA			
PCB47/48/75		0.22		NA			
PCB49		0.24		NA			
PCB52		0.17		2.14	74		40
PCB56/60		<0.07 U		NA			
PCB66		0.39		2.84	92		40
PCB70		<0.07 U		NA			
PCB74/61		<0.07 U		NA			
PCB81		<0.07 U		NA			
PCB82		<0.04 U		NA			
PCB83		0.04 J		NA			
PCB84		<0.04 U		NA			
PCB85		0.05		NA			
PCB86		0.06		NA			
PCB87/115		<0.05 U		2.55	96		40
PCB88		<0.04 U		NA			
PCB92		<0.04 U		NA			
PCB95		0.25		NA			
PCB97		0.05		NA			
PCB99		0.04 J		NA			
PCB101/90		0.19		2.69	94		40
PCB105		<0.04 U		2.73	103		40
PCB107		<0.04 U		NA			
PCB110/77		<0.05 U		2.84	107		40
PCB114/131/122		<0.04 U		NA			
PCB118		0.55		3.09	96		40
PCB128		0.05 J		2.92	108		40
PCB129/126		0.29		NA			
PCB136		<0.1 U		NA			
PCB138/160		0.38		2.88	94		40
PCB141/179		<0.1 U		NA			
PCB146		<0.1 U		NA			

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LEED Co - Lake Erie
Organochlorine Data
Matrix Spike Report

Lab ID	LED0038	ENV3617D
Sample ID	PC04, PC05R1, PC06R2, PC07	PC04, PC05R1, PC06R2, PC07
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	09/21/16	09/21/16
Extraction Date	11/09/16	11/09/16
Extraction Batch	ENV3617	ENV3617
Date Acquired	16-Nov-2016, 04:34	15-Nov-2016, 15:25
Method	ECD1DUAL.M	ECD1DUAL.M
Sample Dry Weight (g)	15.06	15.06
Sample Wet Weight (g)	18.12	18.12
% Dry	83	83
% Moisture	17	17
Dilution	1X	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Su Corrected Conc. (ng/dry g)	Q	Recovery (%)	Q	Spike Amount (ng)
PCB149/123		<0.1 U		NA			
PCB151		<0.1 U		NA			
PCB153/132		0.65		2.95	87		40
PCB156/171/202		0.82		NA			
PCB158		0.28		NA			
PCB166		<0.1 U		NA			
PCB167		<0.1 U		NA			
PCB169		<0.1 U		NA			
PCB170/190		0.17		2.79	99		40
PCB172		0.08		NA			
PCB174		<0.05 U		NA			
PCB176/137		2.06		NA			
PCB177		0.80		NA			
PCB178		0.24		NA			
PCB180		0.33		2.57	84		40
PCB183		<0.05 U		NA			
PCB185		0.52		NA			
PCB187		0.76		2.62	70		40
PCB189		0.19		NA			
PCB191		<0.05 U		NA			
PCB194		1.65		NA			
PCB195/208		0.10		2.38	86		40
PCB196/203		0.19		NA			
PCB199		<0.08 U		1.82	69		40
PCB200		<0.04 U		NA			
PCB201/157/173		1.10		NA			
PCB205		0.10		NA			
PCB206		<0.05 U		3.14	118		40
PCB209		<0.05 U		2.08	78		40
Average % Recovery					89		

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)
DBOFB	84	87
PCB 103	83	81
PCB 198	90	98

B&B Laboratories
Project J16222
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LEED Co - Lake Erie
Organochlorine Data
Standard Reference Material Report

Lab ID	ENV3617C
Sample ID	SRM 1941b
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 13:32
Method	ECD1DUAL.M
Sample Dry Weight (g)	4.00
Sample Wet Weight (g)	4.10
% Dry	98
% Moisture	2
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Q	SRM 1941b Certified Conc. Conc. (ng/dry g)	-30% Conc. Conc. (ng/dry g)	+30% Conc. Conc. (ng/dry g)
Aldrin	1.10					
Dieldrin	0.19					
Endrin	<0.21					
Heptachlor	<0.16					
Heptachlor-Epoxide	0.10	J				
Oxychlordane	<0.24					
Alpha-Chlordane	0.57			0.85	0.52	1.25
Gamma-Chlordane	0.33			0.57	0.33	0.86
Trans-Nonachlor	0.37			0.44	0.26	0.66
Cis-Nonachlor	0.25			0.38	0.23	0.56
Alpha-HCH	<0.29					
Beta-HCH	0.06	J				
Delta-HCH	0.12	J				
Gamma-HCH	<0.14					
DDMU	<0.26					
2,4'-DDD	1.14					
4,4'-DDD	3.37			4.66	2.94	6.66
2,4'-DDE	<0.21					
4,4'-DDE	3.12			3.22	2.06	4.55
2,4'-DDT	<0.17					
4,4'-DDT	0.81					
1,2,3,4-Tetrachlorobenzene	<0.25					
1,2,4,5-Tetrachlorobenzene	<0.3					
Hexachlorobenzene	7.77			5.83	3.82	8.07
Pentachloroanisole	<0.17					
Pentachlorobenzene	<0.25					
Endosulfan II	<0.15					
Endosulfan I	<0.15					
Endosulfan Sulfate	0.35					
Mirex	<0.22					
Chlorpyrifos	<0.22					

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LEED Co - Lake Erie
Organochlorine Data
Standard Reference Material Report

Lab ID	ENV3617C
Sample ID	SRM 1941b
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 13:32
Method	ECD1DUAL.M
Sample Dry Weight (g)	4.00
Sample Wet Weight (g)	4.10
% Dry	98
% Moisture	2
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Q	SRM 1941b Certified Conc. Conc. (ng/dry g)	-30% Conc. Conc. (ng/dry g)	+30% Conc. Conc. (ng/dry g)
PCB1	<0.31					
PCB7/9	<0.31					
PCB8/5	1.64			1.65	1.02	2.39
PCB15	1.47					
PCB16/32	1.58					
PCB18	2.04			2.39	1.47	3.48
PCB22/51	2.03					
PCB24/27	0.87					
PCB25	1.01					
PCB26	0.99					
PCB28	3.99			4.52	2.77	6.62
PCB29	0.07	J				
PCB31	3.00			3.18	1.94	4.67
PCB33/53/20	1.88					
PCB40	0.55					
PCB41/64	<0.27					
PCB42/59/37	1.40					
PCB43	<0.27					
PCB44	3.57			3.85	2.56	5.27
PCB45	0.43					
PCB46	0.81					
PCB47/48/75	2.84					
PCB49	3.45			4.34	2.84	6.01
PCB52	3.79			5.24	3.47	7.18
PCB56/60	3.15					
PCB66	5.86			4.96	3.10	7.14
PCB70	3.86					
PCB74/61	1.60					
PCB81	<0.27					
PCB82	<0.17					
PCB83	0.57					
PCB84	1.30					
PCB85	0.41					
PCB86	0.47					
PCB87/115	0.73			1.14	0.69	1.69
PCB88	<0.17					
PCB92	0.72					
PCB95	2.75			3.93	2.32	5.92
PCB97	1.03					
PCB99	2.01			2.90	1.78	4.24
PCB101/90	5.04			5.11	3.34	7.09
PCB105	1.00			1.43	0.93	1.99
PCB107	3.90					
PCB110/77	5.08			4.62	2.98	6.47
PCB114/131/122	2.65					
PCB118	2.94			4.23	2.83	5.75
PCB128	0.86			0.70	0.46	0.96
PCB129/126	0.29	J				
PCB136	0.68					
PCB138/160	3.70			3.60	2.32	5.04
PCB141/179	0.51					
PCB146	0.66					

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LEED Co - Lake Erie
Organochlorine Data
Standard Reference Material Report

Lab ID	ENV3617C
Sample ID	SRM 1941b
Matrix	Sediment
Collection Date	NA
Received Date	NA
Extraction Date	11/09/16
Extraction Batch	ENV3617
Date Acquired	15-Nov-2016, 13:32
Method	ECD1DUAL.M
Sample Dry Weight (g)	4.00
Sample Wet Weight (g)	4.10
% Dry	98
% Moisture	2
Dilution	1X

Target Compounds	Su Corrected Conc. (ng/dry g)	Q	Q	SRM 1941b Certified Conc. Conc. (ng/dry g)	-30% Conc. Conc. (ng/dry g)	+30% Conc. Conc. (ng/dry g)
PCB149/123	3.40			4.35	2.86	5.99
PCB151	0.85					
PCB153/132	4.19			5.47	3.61	7.53
PCB156/171/202	0.41			0.51	0.29	0.78
PCB158	0.00	U				
PCB166	0.35	J				
PCB167	0.18	J				
PCB169	0.06	J				
PCB170/190	9.74		*	1.35	0.88	1.87
PCB172	0.51					
PCB174	0.72					
PCB176/137	0.12	J				
PCB177	0.24					
PCB178	0.27					
PCB180	2.51			3.24	1.91	4.88
PCB183	0.74			0.98	0.62	1.39
PCB185	2.92					
PCB187	2.12			2.17	1.37	3.11
PCB189	<0.18					
PCB191	<0.18					
PCB194	0.69			1.04	0.69	1.43
PCB195/208	0.53			0.65	0.41	0.92
PCB196/203	0.33					
PCB199	1.57					
PCB200	0.01	J				
PCB201/157/173	0.59			0.78	0.52	1.05
PCB205	0.39					
PCB206	1.77			2.42	1.56	3.39
PCB209	4.39			4.86	3.09	6.90
Total HCH	0.2	J				
Total Chlordane	2					
Total DDT	8					
Total PCB	130					

Surrogate (Su)	Su Recovery (%)
DBOFB	90
PCB 103	94
PCB 198	93

5.4 APPENDIX D - TOTAL ORGANIC CARBON

B&B Laboratories
Project J16222
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LEED Co. - Lake Erie
% Carbon Determination
Client Submitted Samples

Laboratory ID	LED0037	LED0038	LED0039	LED0046
Sample ID	PC01R, PC02, PC03	PC04, PC05R1, PC06R2, PC07	PC09, PC10	BC01, BC02, BC03
Matrix	Sediment	Sediment	Sediment	Sediment
Collection Date	NA	NA	NA	NA
Received Date	10/12/16	09/21/16	10/12/16	10/12/16
Analysis Batch TC	LECO1824	LECO1824	LECO1824	LECO1824
Preparation Date TC	11/14/16	11/14/16	11/14/16	11/14/16
Analysis Date TC	11/14/16	11/14/16	11/14/16	11/14/16
Sample Dry Weight (mg)	252.5	252.7	252.4	250.9
Method TC	B&B SOP 1005	B&B SOP 1005	B&B SOP 1005	B&B SOP 1005
Analysis Batch TOC	LECO1825	LECO1825	LECO1825	LECO1825
Preparation Date TOC	11/14/16	11/14/16	11/14/16	11/14/16
Analysis Date TOC	11/14/16	11/14/16	11/14/16	11/14/16
Sample Dry Weight (mg)	252.9	254.7	250.9	253.7
Method TOC	B&B SOP 1005	B&B SOP 1005	B&B SOP 1005	B&B SOP 1005

Target Analyte	mg Carbon	Q	mg Carbon	Q	mg Carbon	Q	mg Carbon	Q
Total Carbon (TC)	4.13		4.79		5.05		8.88	
Total Organic Carbon (TOC)	1.51		2.14		1.95		7.38	
Total Inorganic Carbon (TIC)	2.62		2.65		3.10		1.50	
	% Carbon	Q	% Carbon	Q	% Carbon	Q	% Carbon	Q
Total Carbon (TC)	1.64		1.90		2.00		3.54	
Total Organic Carbon (TOC)	0.60		0.84		0.78		2.91	
Total Inorganic Carbon (TIC)	1.04		1.06		1.23		0.63	

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LEED Co. - Lake Erie
% Carbon Determination
Laboratory Duplicate Report

Laboratory ID	LED0037	LED0037DUP
Sample ID	PC01R, PC02, PC03	PC01R, PC02, PC03
Matrix	Sediment	Sediment
Collection Date	NA	NA
Received Date	10/12/16	10/12/16
Analysis Batch TC	LECO1824	LECO1824
Preparation Date TC	11/14/16	11/14/16
Analysis Date TC	11/14/16	11/14/16
Sample Dry Weight (mg)	252.5	250.8
Method TC	B&B SOP 1005	B&B SOP 1005
Analysis Batch TOC	LECO1825	LECO1825
Preparation Date TOC	11/14/16	11/14/16
Analysis Date TOC	11/14/16	11/14/16
Sample Dry Weight (mg)	252.9	251.4
Method TOC	B&B SOP 1005	B&B SOP 1005

Target Analyte	mg Carbon	Q	mg Carbon	Q				
Total Carbon (TC)	4.13		4.07					
Total Organic Carbon (TOC)	1.51		1.40					
Total Inorganic Carbon (TIC)	2.62		2.67					
	% Carbon	Q	% Carbon	Q	RPD	Q	% Carbon MDL	% Carbon 2x MDL
Total Carbon (TC)	1.64		1.62		1		0.03	0.06
Total Organic Carbon (TOC)	0.60		0.55		7		0.03	0.06
Total Inorganic Carbon (TIC)	1.04		1.07		3		0.03	0.06

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LEED Co. - Lake Erie
Total Carbon
Method Blank Report

Laboratory ID	LC1824B
Sample ID	NA
Matrix	Sediment
Collection Date	NA
Received Date	NA
Analysis Batch TC	LECO1824
Preparation Date TC	11/14/16
Analysis Date TC	11/14/16
Sample Dry Weight (mg)	0.25
Method TC	B&B SOP 1005

Target Analyte	mg Carbon	Q		
Total Carbon (TC)	0.00	U		
	% Carbon	Q	% Carbon	
			MDL	3x MDL
Total Carbon (TC)	0.00	U	0.03	0.09

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Project J16222
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LEED Co. - Lake Erie
Total Organic Carbon
Method Blank Report

Laboratory ID	AC1825B
Sample ID	NA
Matrix	Sediment
Collection Date	NA
Received Date	NA
Analysis Batch TOC	LECO1825
Preparation Date TOC	11/14/16
Analysis Date TOC	11/14/16
Sample Dry Weight (mg)	0.25
Method TOC	B&B SOP 1005

Target Analyte	mg Carbon	Q		
Total Organic Carbon (TOC)	0.00	U		
	% Carbon	Q	% Carbon	
			MDL	3x MDL
Total Organic Carbon (TOC)	0.00	U	0.03	0.09

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LEED Co. - Lake Erie
Total Carbon
Standard Reference Material Report

Laboratory ID	LC1824SRM
Sample ID	NA
Matrix	Sediment
Collection Date	NA
Received Date	NA
Analysis Batch TC	LECO1824
Preparation Date TC	11/14/16
Analysis Date TC	11/14/16
Sample Dry Weight (mg)	250.4
Method TC	B&B SOP 1005

Target Analyte	mg Carbon	Q
Total Carbon (TC)	8.05	

	% Carbon	Q	% Dev.	Q	Reference Value SRM8704 % Carbon	-5%	+5%
Total Carbon (TC)	3.22		4		3.351 ± 0.017	3.167	3.536

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LEED Co. - Lake Erie
Total Organic Carbon
Standard Reference Material Report

Laboratory ID	AC1825SRM
Sample ID	NA
Matrix	Sediment
Collection Date	NA
Received Date	NA
Analysis Batch TOC	LECO1825
Preparation Date TOC	11/14/16
Analysis Date TOC	11/14/16
Sample Dry Weight (mg)	200.3
Method TOC	B&B SOP 1005

Target Analyte	mg Carbon	Q
Total Organic Carbon (TOC)	6.00	

	% Carbon	Q	% Dev.	Q	Reference Value SRM1941b % Carbon	-5%	+5%
Total Organic Carbon (TOC)	2.99		0		2.99 ± 0.24	2.613	3.392

SRMs are acidified

5.5 APPENDIX E – GRAIN SIZE

GRAIN SIZE DATA RESULTS

Job Number	J16222
Client	LEED Co.
Job Description	Environmental Composite Cor
Core ID	LED0040; PC01R, PC02, PC03
Top Depth	0
Bottom Depth	0

Grain Size Data

D (mm)	Sieve #	% Finer
63	2.5"	100.00
19	3/4"	100.00
9.5	3/8"	100.00
4.75	4	99.12
2.36	8	95.31
2	10	94.06
1.18	16	90.19
0.85	20	88.49
0.425	40	76.36
0.3	50	68.38
0.25	60	65.01
0.18	80	61.60
0.15	100	60.12
0.075	200	56.51
0.0443		55.52
0.0315		53.54
0.0201		51.55
0.0118		47.59
0.0084		43.62
0.0061		37.67
0.0031		29.74
0.0013		21.81

% Passing #10	94.06
% Passing #200	56.51
% Pass 2µ	24.91

Maximum Particle Size
9.5 mm

Dispersing Agent
(NaPO3)6 @ 40 g/L

Soak Time in Dispersing Agent
16 hrs

Dispersing Device
Apparatus A, ASTM D-422

Dispersing Period
1 min

% Gravel	> 2 mm	5.94
% Sand	0.075 - 2 mm	37.54
% Silt	0.002 - 0.075 mm	31.60
% Clay	< 0.002 mm	24.91

GRAIN SIZE DATA RESULTS

Job Number	J16222
Client	LEED Co.
Job Description	Environmental Composite Core
Core ID	LED0041; PC04, PC05R1, PC06R2, PC07
Top Depth	0
Bottom Depth	0

Grain Size Data

D (mm)	Sieve #	% Finer
63	2.5"	100.00
19	3/4"	100.00
9.5	3/8"	100.00
4.75	4	98.80
2.36	8	90.64
2	10	88.99
1.18	16	86.07
0.85	20	84.92
0.425	40	81.56
0.3	50	79.09
0.25	60	77.63
0.18	80	75.04
0.15	100	73.76
0.075	200	71.45
0.0416		72.39
0.0296		70.41
0.0190		66.44
0.0114		56.52
0.0083		47.60
0.0060		40.66
0.0030		31.73
0.0013		21.82

% Passing #10	88.99
% Passing #200	71.45
% Pass 2µ	25.73

Maximum Particle Size
9.5 mm

Dispersing Agent
(NaPO3)6 @ 40 g/L

Soak Time in Dispersing Agent
16 hrs

Dispersing Device
Apparatus A, ASTM D-422

Dispersing Period
1 min

% Gravel	> 2 mm	11.01
% Sand	0.075 - 2 mm	17.54
% Silt	0.002 - 0.075 mm	45.72
% Clay	< 0.002 mm	25.73

GRAIN SIZE DATA RESULTS

Job Number	J16222
Client	LEED Co.
Job Description	Environmental Composite Cor
Core ID	LED0042; PC09, PC10
Top Depth	0
Bottom Depth	0

Grain Size Data

D (mm)	Sieve #	% Finer
63	2.5"	100.00
19	3/4"	100.00
9.5	3/8"	100.00
4.75	4	100.00
2.36	8	100.00
2	10	100.00
1.18	16	100.00
0.85	20	100.00
0.425	40	97.83
0.3	50	97.21
0.25	60	96.85
0.18	80	96.15
0.15	100	95.73
0.075	200	94.08
0.0383		89.19
0.0276		85.23
0.0186		71.35
0.0118		47.57
0.0087		33.69
0.0063		25.77
0.0032		16.85
0.0014		12.88

% Passing #10	100.00
% Passing #200	94.08
% Pass 2µ	14.24

Maximum Particle Size
0.85 mm

Dispersing Agent
(NaPO3)6 @ 40 g/L

Soak Time in Dispersing Agent
16 hrs

Dispersing Device
Apparatus A, ASTM D-422

Dispersing Period
1 min

% Gravel	> 2 mm	0.00
% Sand	0.075 - 2 mm	5.92
% Silt	0.002 - 0.075 mm	79.84
% Clay	< 0.002 mm	14.24

GRAIN SIZE DATA RESULTS

Job Number	J16222
Client	LEED Co.
Job Description	Environmental Composite Cor
Core ID	LED0046; BC01, BC02, BC03
Top Depth	0
Bottom Depth	0

Grain Size Data

D (mm)	Sieve #	% Finer
63	2.5"	100.00
19	3/4"	100.00
9.5	3/8"	100.00
4.75	4	100.00
2.36	8	100.00
2	10	100.00
1.18	16	100.00
0.85	20	100.00
0.425	40	99.62
0.3	50	98.98
0.25	60	98.64
0.18	80	98.35
0.15	100	98.23
0.075	200	98.01
0.0375		93.10
0.0268		91.12
0.0175		85.18
0.0105		75.27
0.0077		67.35
0.0057		57.45
0.0029		45.56
0.0013		30.70

% Passing #10	100.00
% Passing #200	98.01
% Pass 2µ	37.25

Maximum Particle Size
0.85 mm

Dispersing Agent
(NaPO3)6 @ 40 g/L

Soak Time in Dispersing Agent
16 hrs

Dispersing Device
Apparatus A, ASTM D-422

Dispersing Period
1 min

% Gravel	> 2 mm	0.00
% Sand	0.075 - 2 mm	1.99
% Silt	0.002 - 0.075 mm	60.76
% Clay	< 0.002 mm	37.25

5.6 APPENDIX F – TRACE METALS

TDI-BI/ B **Laboratories LEED County Lake Erie Study (Job No. J16222 SDG NA)**

Final Sediment Total Recoverable Trace Metals & Total Mercury Data for Samples Received 21 Sept. & 12 October 2016

(Report X1218-9457-001)

						Processing		
Sponsor ID	AE Sample ID	Collection Date	Location	Sample Type	Matrix	(Note 3)	Method	Anal. Date
	Field Samples (Notes 1,2)							
	Uncensored (raw) sediment trace metals data							
LED0043	XX-3122	Not Applicable	PC01R, PC02, PC03	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
LED0044	XX-3123	Not Applicable	PC04, PC05R1, PC06R2, PC07	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
LED0045	XX-3124	Not Applicable	PC09, PC10	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
LED0046	XX-3125	Not Applicable	BC01, BC02, BC03	Composite Sed. Core	FW Sediment	Total Rec.	Note 4	Note 5
	Sediment trace metals data censored to the reporting limit							
LED0043	XX-3122	Not Applicable	PC01R, PC02, PC03	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
LED0044	XX-3123	Not Applicable	PC04, PC05R1, PC06R2, PC07	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
LED0045	XX-3124	Not Applicable	PC09, PC10	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
LED0046	XX-3125	Not Applicable	BC01, BC02, BC03	Composite Sed. Core	FW Sediment	Total Rec.	Note 4	Note 5

APPROVED:

TDI-BI/ B **Laboratories LEED County Lake Erie Study (Job No. J16222 SDG NA)**

Final Sediment Total Recoverable Trace Metals & Total Mercury Data for Samples Received 21 Sept. & 12 October 2016

(Report X1218-9457-001)

		Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.
Sponsor ID	AE Sample ID	Ag (ppm)	Al (ppm)	As (ppm)	B (ppm)	Ba (ppm)	Be (ppm)	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Mo (ppm)
	Field Samples (Notes 1,2)													
	Uncensored (raw) sediment trace metals data													
LED0043	XX-3122	0.08	11650	13.1	10.8	116	0.72	0.17	11.9	18.6	22.6	26100	567	4.12
LED0044	XX-3123	0.10	11800	13.9	11.1	125	0.73	0.24	12.6	19.0	26.8	29000	423	4.12
LED0045	XX-3124	0.15	11500	14.6	10.8	75.4	0.60	0.51	12.6	26.1	42.4	33000	456	4.12
LED0046	XX-3125	0.38	20400	8.21	12.5	129	1.18	1.94	13.9	53.1	47.7	34000	567	1.78
	Sediment trace metals data censored to the reporting limit													
LED0043	XX-3122	< 0.1	11650	13.1	10.8	116	0.72	0.17	11.9	18.6	22.6	26100	567	4.12
LED0044	XX-3123	< 0.1	11800	13.9	11.1	125	0.73	0.24	12.6	19.0	26.8	29000	423	4.12
LED0045	XX-3124	0.15	11500	14.6	10.8	75.4	0.60	0.51	12.6	26.1	42.4	33000	456	4.12
LED0046	XX-3125	0.38	20400	8.21	12.5	129	1.18	1.94	13.9	53.1	47.7	34000	567	1.78

APPROVED:

TDI-BI/ B **Laboratories LEED County Lake Erie Study (Job No. J16222 SDG NA)**

Final Sediment Total Recoverable Trace Metals & Total Mercury Data for Samples Received 21 Sept. & 12 October 2016

(Report X1218-9457-001)

		Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Percent
Sponsor ID	AE Sample ID	Ni (ppm)	Pb (ppm)	Sb (ppm)	Se (ppm)	Sn (ppm)	V (ppm)	Zn (ppm)	Hg (ppm)	Ca (ppm)	K (ppm)	Mg (ppm)	Na (ppm)	Moisture
	Field Samples (Notes 1,2)													
	Uncensored (raw) sediment trace metals data													
LED0043	XX-3122	30.3	11.8	0.33	0.51	0.56	24.0	72.7	0.0138	28500	2580	10600	133	19.7
LED0044	XX-3123	30.2	16.0	0.38	0.51	1.22	23.6	111	0.0173	40800	2520	12900	144	17.9
LED0045	XX-3124	34.1	24.0	0.71	0.52	2.43	22.3	116	0.0354	32400	2270	12800	142	22.6
LED0046	XX-3125	51.4	44.9	0.61	1.55	2.85	50.7	204	0.335	14300	4250	13500	174	78.2
	Sediment trace metals data censored to the reporting limit													
LED0043	XX-3122	30.3	11.8	< 0.5	< 2	0.56	24.0	72.7	0.0138	28500	2580	10600	< 2000	
LED0044	XX-3123	30.2	16.0	< 0.5	< 2	1.22	23.6	111	0.0173	40800	2520	12900	< 2000	
LED0045	XX-3124	34.1	24.0	0.71	< 2	2.43	22.3	116	0.0354	32400	2270	12800	< 2000	
LED0046	XX-3125	51.4	44.9	0.61	< 2	2.85	50.7	204	0.335	14300	4250	13500	< 2000	

APPROVED:

TDI-BI/ B **Laboratories LEED County Lake Erie Study (Job No. J16222 SDG NA)**

Final Sediment Total Recoverable Trace Metals & Total Mercury Data for Samples Received 21 Sept. & 12 October 2016

(Report X1218-9457-001)

						Processing		
Sponsor ID	AE Sample ID	Collection Date	Location	Sample Type	Matrix	(Note 3)	Method	Anal. Date
		Laboratory Quality Assurance Samples						
	Reporting Limit Sediment (ppm dry wt.)						Note 4	Note 5
	Reference Material (Note 3)							
	MESS3-1		Albion Env.	Reference Material	Marine Sed.	Total Rec.	Note 4	Note 5
	Certified Value							
	Percent Recovery (% R)							
	Historical % R							
	Digestion Duplicates (Note 6)							
LED0043	XX-3122	Not Applicable	PC01R, PC02, PC03	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
	XX-3122-DUP	Not Applicable	PC01R, PC02, PC03	Digestion Duplicate	FW Sediment	Total Rec.	Note 4	Note 5
	Relative Percent Difference (RPD)							
	Matrix Spike (Note 7)							
LED0045	XX-3124	Not Applicable	PC09, PC10	Composite Sed. Grabs	FW Sediment	Total Rec.	Note 4	Note 5
	XX-3124-SPK	Not Applicable	PC09, PC10	Matrix Spike	FW Sediment	Total Rec.	Note 4	Note 5
	Expected Increase							
	% R							
	Blank Spikes (Note 7)							
	LCS-1						Note 4	Note 5
	Expected Increase							
	% R							
	Method Blank							
	MBLK-1 (Raw)						Note 4	Note 5
	MBLK-1 (Censored)						Note 4	Note 5

APPROVED:

TDI-BI/ B **Laboratories LEED County Lake Erie Study (Job No. J16222 SDG NA)**
Final Sediment Total Recoverable Trace Metals & Total Mercury Data for Samples Received 21 Sept. & 12 October 2016
(Report X1218-9457-001)

		Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.
Sponsor ID	AE Sample ID	Ag (ppm)	Al (ppm)	As (ppm)	B (ppm)	Ba (ppm)	Be (ppm)	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Mo (ppm)
	Reporting Limit Sediment (ppm dry wt.)	0.1	500	2	5	0.5	0.5	0.1	2	1	0.3	1000	0.5	1
	Reference Material (Note 3)													
	MESS3-1	0.18	13600	18.6	26.8	330	0.92	0.24	11.9	29.0	31.7	31300	329	2.37
	Certified Value	0.18	85900	21.2	NCV	340	2.30	0.24	14.4	105	33.9	43,400	324	2.78
	Percent Recovery (% R)	102	16	88		97	40	100	83	28	94	72	102	85
	Historical % R	111	23	88		98	48	104	90	32	102	83	96	97
	Digestion Duplicates (Note 6)													
LED0043	XX-3122	0.08	11650	13.1	10.8	116	0.72	0.173	11.9	18.6	22.6	26100	567	4.12
	XX-3122-DUP	0.09	12580	12.9	11.3	115	0.65	0.173	11.6	18.8	23.8	27600	620	4.26
	Relative Percent Difference (RPD)	3.7	7.7	1.5	4.5	0.9	9.2	0.0	2.6	1.1	5.2	5.6	8.9	3.3
	Matrix Spike (Note 7)													
LED0045	XX-3124	0.15	11500	14.6	10.8	75.4	0.60	0.510	12.6	26.1	42.4	33000	456	4.12
	XX-3124-SPK	2.55	11100	20.4	9.53	293	1.62	5.69	32.5	78.6	85.3	32400	971	4.18
	Expected Increase	2.50	Not Spiked	5.00	Not Spiked	200	1.00	5.00	20.0	50.0	50.0	Not Spiked	500	Not Spiked
	% R	96		116		109	102	104	100	105	86		103	
	Blank Spikes (Note 7)													
	LCS-1	0.49	0.23	1.03	0.01	41.1	0.21	1.04	3.98	10.2	10.2	0.46	95.4	0.01
	Expected Increase	0.50	Not Spiked	1.00	Not Spiked	40.0	0.20	1.00	4.00	10.0	10.0	Not Spiked	100	Not Spiked
	% R	98		103		103	103	104	100	102	102		95	
	Method Blank													
	MBLK-1 (Raw)	0.00	0.29	0.00	0.02	0.00	0.00	0.001	0.00	0.00	0.01	0.04	0.031	0.02
	MBLK-1 (Censored)	< 0.1	< 500	< 2	< 5	< 0.5	< 0.5	< 0.1	< 2	< 1	< 0.3	< 1000	< 0.5	< 1

APPROVED:

TDI-BI/ B **Laboratories LEED County Lake Erie Study (Job No. J16222 SDG NA)**
Final Sediment Total Recoverable Trace Metals & Total Mercury Data for Samples Received 21 Sept. & 12 October 2016
(Report X1218-9457-001)

		Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Dry Wt.	Percent
Sponsor ID	AE Sample ID	Ni (ppm)	Pb (ppm)	Sb (ppm)	Se (ppm)	Sn (ppm)	V (ppm)	Zn (ppm)	Hg (ppm)	Ca (ppm)	K (ppm)	Mg (ppm)	Na (ppm)	Moisture
	Reporting Limit Sediment (ppm dry wt.)	1	0.1	0.5	2	0.2	2	1	0.002	4000	2000	4000	2000	
	Reference Material (Note 3)													
	MESS3-1	36.0	16.6	0.70	0.90	0.62	66.8	142	0.097	14400	4250	13700	12000	
	Certified Value	46.9	21.1	1.02	0.72	NCV	243	159	0.091	14700	26000	16000	16000	
	Percent Recovery (% R)	77	79	68	125		27	89	107	98	16	86	75	
	Historical % R	84	80	71	93		33	90	102	96	21	89	79	
	Digestion Duplicates (Note 6)													
LED0043	XX-3122	30.3	11.8	0.33	0.51	0.56	24.0	72.7	0.0138	28500	2580	10600	133	
	XX-3122-DUP	30.0	11.7	0.36	0.44	0.54	25.9	78.1	0.0143	31700	2750	11400	134	
	Relative Percent Difference (RPD)	1.0	0.9	7.3	13.3	2.0	7.6	7.2	3.6	10.6	6.4	7.3	0.7	
	Matrix Spike (Note 7)													
LED0045	XX-3124	34.1	24.0	0.71	0.52	2.43	22.3	116	0.0354	32400	2270	12800	142	
	XX-3124-SPK	135	69.1	5.12	5.59	2.10	72.1	309	1.83	32500	2130	12600	128	
	Expected Increase	100	50.0	5.00	5.00	Not Spiked	50.0	200	1.89	Not Spiked	Not Spiked	Not Spiked	Not Spiked	
	% R	101	90	88	101		100	97	95					
	Blank Spikes (Note 7)													
	LCS-1	20.5	9.72	0.99	1.13	0.00	8.95	41.3	NA	0.98	0.22	0.66	0.52	
	Expected Increase	20.0	10.0	1.00	1.00	Not Spiked	10.0	40.0		Not Spiked	Not Spiked	Not Spiked	Not Spiked	
	% R	103	97	99	113		90	103						
	Method Blank													
	MBLK-1 (Raw)	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.000	0.69	0.26	0.60	0.52	
	MBLK-1 (Censored)	< 1	< 0.1	< 0.5	< 2	< 0.2	< 2	< 1	< 0.002	< 4000	< 2000	< 4000	< 2000	

APPROVED:

Notes:

1. Metals concentration units are total recoverable metals in micrograms per gram (parts per million) on a dry weight basis. This data report applies only to the samples listed and the report shall not be reproduced except in full. Mercury (Hg) are total sediment Hg in ppm. To provide the maximum amount of information to the sponsor for data interpretation, sediment metal levels are reported both raw (uncensored) and censored to the reporting limit. Data censored to the reporting limit are most commonly reported to regulatory agencies.
2. Sediment samples were received in good condition from the sponsor (TDI-BI/B&B Laboratories, 14391B South Dowling, College Station, TX 77845) and kept refrigerated until further processing. Sediment samples were then homogenized and freeze-dried to a constant weight in the original bottles. The percent moisture was determined to allow conversion between wet (as received) and the dry weight concentrations reported here. The dried sediment samples were then ground to a fine powder. For EPA method 200.8 approximately 0.2 g of the dried and powdered sediment samples were subjected to a strong acid leaching digestion at 95 deg. C. for six hours. The acid leachate was then brought to approximately 20 ml final volume with deionized water. The leachate (digestate) was then diluted further as needed to keep the solution concentration within the calibration range of the ICP-MS instrument and to adjust as needed the acid strength for analysis.
3. The heated, strong acid leach digestion used for this study is NOT a total digestion quantifying all of a given element present in the sediment matrix. The percentage of metal leached into solution for analysis varies by element. For example, for the more refractory metals (e.g. Al, Cr, V) only a relatively small percentage is leached into solution for analysis. For many other elements (including many pollutant metals) that are largely adsorbed onto the sediment particles, a much higher percentage is leached into solution for analysis. A marine sediment reference material (MESS-3) was used to estimate the percentage of each element leached into solution for analysis. The percentage released is compared to a historical percentage that is typically observed for such a heated strong acid leach. The leaching efficiency observed between the observed and historical percentage leached was generally in agreement for this sample set. The leaching efficiency can be used to estimate the total metal present in the sediment samples.
4. Metals concentrations (except Hg) were determined in the sediment leachate according to EPA method 200.8 (ICP-MS). All metals were determined by standard mode ICP-MS except that calcium (Ca), chromium (Cr), iron (Fe), magnesium (Mg), manganese (Mn), nickel (Ni), potassium (K), selenium (Se), and vanadium (V) were determined by method 200.8 modified for dynamic reaction cell (DRC)-ICP-MS using ammonia as the cell gas. Arsenic (As) was determined by DRC-ICP-MS using oxygen as the cell gas DRC-ICP-MS are interference control technologies that minimize the overestimation of aqueous trace metals levels associated with isobaric interferences that can occur with standard mode ICP-MS. Isobaric interferences are a significant concern especially for many sediment matrices because of elevated concentrations of Ca, Mg, Na, Cl, etc. Total sediment Hg was determined using EPA method 7473. In this method, the dried and powdered sediment samples are analyzed directly by thermal decomposition, amalgamation and atomic absorption spectrophotometry.
5. Sediment leachates were analyzed by EPA 200.8 (see note 4) on 12-15-2016. Dry, homogenized sediment samples were analyzed for Hg (see note 4) on 12-13-2016.
6. For digestion (leach) duplicates, different aliquots of freeze-dried sediments are digested and analyzed individually as separate samples. An RPD of < 20% is expected for digestion duplicates.
7. The trace metals spike is added to the spiked samples prior to the leaching procedure and carried through the entire process in the same manner as the other unknown sediment samples. Major elements in high concentrations (Al,Ca,K,Mg,Fe) and a few rarely requested elements (B,Mo,Sn) were not spiked. All matrix spike percent recoveries (% R) were acceptable.