FINAL
Assessment of Contaminated Sediments Celeron Island Area Site Characterization Report

Detroit River Area of Concern, Grosse Ile, Michigan

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
µg/kg	Micrograms per kilogram
µmole	Micromole
AOC	Area of concern
AVS	Acid volatile sulfide
CAB	Cellulose acetate butyrate
COC	Constituent of concern
cy	Cubic yard(s)
DQO	Data quality objective
EA	EA Engineering, Science, and Technology (MI), PLC
EPA	U.S. Environmental Protection Agency
ESB	Equilibrium Partitioning Sediment Benchmarks
ESBTU	Equilibrium Partitioning Sediment Benchmarks Toxicity Unit
EVS	Environmental Visualization System
FD	Field Duplicates
FSP	Field Sampling Plan
ft	Foot (feet)
g_{oc}	Gram organic carbon
GLLA	Great Lakes Legacy Act
GLNPO	Great Lakes National Program Office
GPS	Global positioning system
in.	Inch(es)
mg/kg	Milligram(s) per kilogram
MS/MSD	Matrix spike/matrix spike duplicate
ND	Not detected
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEC	Probable effects concentration
PEC-Q	Probable effects concentration quotient
ppb	Parts per billion
ppm	Parts per million
QAPP	Quality Assurance Project Plan

RL	Reporting limit
RV	Research vessel
SAV	Submerged aquatic vegetation
SEM	Simultaneously extracted metals
SIM	Selected ion monitoring
SOP	Standard operating procedure
SQG	Sediment Quality Guidelines
TEC	Threshold effects concentration
TOC	Total organic carbon
WGS84	World Geodetic System 1984

EXECUTIVE SUMMARY

This report presents the characterization of contaminated sediments for the Celeron Island Area (site), located within the Detroit River Area of Concern (AOC), Grosse Ile, Michigan (Figure ES-1). This work was conducted by EA Science and Technology and its affiliate EA Engineering, Science and Technology, (MI) PLC[1] (EA) and the U.S. Environmental Protection Agency's (EPA) Great Lakes National Program Office (GLNPO) in accordance with the Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) for the Celeron Island Area Site Characterization, Detroit River AOC, Grosse Ile, Michigan (EA 2013a, EA 2013b), finalized November 2013. To address the delisting criteria and allow for the eventual removal of the Degradation of Benthos beneficial use impairment, EPA's GLNPO, Michigan Department of Environmental Quality, Detroit River Public Advisory Committee, and Friends of Detroit River initiated an effort in 2012 to define the "known contaminated sediment sites" in the Detroit River. The group conducted a content analysis of a number of contaminant studies and established six sediment target sites. The Celeron Island Area is one of the six target areas (Figure ES-1).

The purpose of this field investigation was to determine the nature and extent of chemical contamination in the areas of soft sediment deposition. This site characterization report summarizes the findings from the field investigation, including data tables and maps, data interpretations, and findings of the investigation. The overall objectives of this report are to identify priority areas within the Celeron Island area at which remediation efforts should be initiated or where further investigation should be conducted. This Executive Summary presents a summary of the findings of the site characterization report; detail on the site background and methodology and further detail on the findings and conclusions are presented in the report.

E.1 SEDIMENT CHEMISTRY RESULTS

For reporting and visual presentation of the results of the sediment investigation, the Celeron Island Area was divided into three separate areas. Area A extends from the westernmost portion of the main river channel west to the western bank of the Detroit River. Area B is comprised of the center of the main river channel and includes the sampling locations on the western side of Celeron Island. Area C is comprised of the eastern portion of the main channel that flows along the eastern side of Celeron Island (Figure ES-2).

Bulk Chemistry

In general, the highest concentrations of constituents were located in the channels in the inshore and nearshore portion of Area A (Figure ES-3) and on the eastern side of Celeron Island in Area B (Figure ES-4). Total polychlorinated biphenyl (PCB) exceedances in Area A were primarily detected in grab and core samples from inshore locations. Concentrations elevated above the probable effects concentration (PEC) were detected in the upper sediment profile, with the

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[1] EA Engineering, Science, and Technology, Inc. does business as EA Science and Technology in the State of Michigan and EA is affiliated with EA Engineering, Science and Technology, (MI) PLC.

exception of locations CI13-39 and -49, where concentrations above the PEC were present in the 3- to 5-feet (ft) interval. Area B had elevated concentrations at the surface only; surface grabs at locations CI13-25 and -30 had total PCB concentrations three times the PEC. In Area C, elevated concentrations were mainly in the top 3 ft of sediment in the northern portion of the area.

For total 17 polycyclic aromatic hydrocarbons (PAHs), the majority of samples from offshore locations in Area A had concentrations below the threshold effects concentration (TEC). Concentrations elevated above the PEC were common in deeper intervals at inshore (CI13-42, -43, -44, -46, and -49) and nearshore (CI13-27A and -42) sample locations. Total 17PAH concentrations in Area B also generally exceeded the TEC, with two locations exceeding the PEC (CI13-26 and -29A) at the surface. No concentrations in core samples exceeded the PEC. Area C showed a similar pattern of surface grab total 17PAH concentrations exceeding the TEC. The surface and near surface depth intervals from locations on the western side of Area C near Celeron Island had concentrations that exceeded the PEC.

Arsenic concentrations in Areas A, B, and C were below the PEC in all samples, and exceeded the TEC at inshore (CI13-27A, -42, -48, -49) and one nearshore location (CI13-32). Cadmium concentrations in grab and core samples in Area A were elevated above the PEC at inshore locations and very nearshore locations in both surface and subsurface intervals. Inshore locations CI13-42 and -48 had cadmium concentrations three times the PEC at the surface. Samples in Area B had few exceedances of the cadmium TEC. In Area C, cadmium concentrations were elevated at the surface and near surface. Chromium concentrations showed a pattern similar to cadmium in Areas A, B, and C. Inshore location CI13-42, had chromium concentrations three times the PEC at the surface, and location -48 had chromium concentrations two times the PEC at the surface. In Area C, chromium concentrations exceeded the TEC in the surface interval at location CI13-04, and exceeded two times the PEC in the 1- to 3-ft interval. Copper concentrations exceeded the PEC at inshore (CI13-42, -48, and -49) and nearshore locations (CI13-27A) in surface and near surface intervals in Area A. Areas B and C had widespread copper concentrations in surface samples that exceeded the TEC, but no samples from Areas B or C had PEC exceedances. In Area A, core samples had iron concentrations that exceeded the PEC (40,000 parts per million [ppm]) at inshore (CI13-42, -48, and -49) and nearshore locations (CI13-27A) in surface and near surface intervals. Nearshore sample locations in Areas B and C had concentrations that fell below the TEC.

The majority of lead exceedances were between the TEC and PEC, with concentrations exceeding the PEC (128 ppm) at Area A inshore location CI13-45. In core samples, there were widespread elevated concentrations (above the PEC) of lead in both surface and deeper intervals at inshore (CI13-39, -42, -48, and -49) and nearshore (CI13-27A) locations. Lead concentrations exceeded two times the PEC at the surface at location CI13-48. There were no lead concentration exceedances of the TEC in Areas B and C, with the exception of location CI13-04.

Mercury concentrations exceeding the PEC in Area A at the surface and subsurface were detected at inshore (CI13-39, -42, -48, and -49) and nearshore (CI13-27A) locations. Areas B and C had widespread mercury concentration TEC exceedances, except for locations on the eastern side of Area C, where concentrations of mercury were below the TEC. Nickel concentrations exceeding the PEC in Area A at the surface and subsurface were found at inshore locations (CI13-42, -48, and -49). Areas B and C had widespread TEC exceedances, except for locations on the eastern side of Area C, where concentrations of nickel were below the TEC. Zinc concentrations exceeded the PEC at inshore and nearshore locations; concentrations exceeded two times the PEC in the surface interval at locations CI13-42 and -48 in Area A. In Areas B and C, zinc concentrations exceeding the TEC at the surface were common, except for locations within the eastern extent of Area C that had zinc concentrations below the TEC.

E.2 EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARK TOXIC UNITS (ESBTUS) AND PROBABLE EFFECT CONCENTRATION QUOTIENTS (PEC-Q)

Equilibrium Partitioning Sediment Benchmark Toxicity Units (ESBTUs) were calculated to estimate whether there is potential ecological risk associated with exposure to porewater that is in equilibrium with a measured concentration of the contaminant in the sediment. Typically, a PAH ESBTU less than or equal to 1.0 indicates that benthic organisms are not expected to be harmed by contamination present in the sediments (EPA 2003). Of the 197 sediment samples, 167 had an ESBTU less than 1, and 30 samples had a PAH ESBTU greater than or equal to 1. For the ponar grab samples, one sample from Area A (CI13-44-SURF) and several samples throughout both Area B and Area C had a PAH ESBTU between 1 and 10. A PAH ESBTU of greater than 10 was calculated for sample location CI13-16 along the eastern side of Celeron Island in Area C. In the sediment core samples, PAH ESBTUs between 1 and 10 were calculated for samples from various depth intervals throughout Areas A and B. ESBTUs greater than 10 were calculated at locations CI13-43, CI13-44, and CI13-42 in Area A.

Probable effect concentration quotients (PEC-Qs) are used to evaluate the combined effects of chemical mixtures on the toxicity of sediments to benthic organisms (Ingersoll et al. 2001). They use consensus-based freshwater sediment quality guidelines to calculate concentration quotients (or hazard quotients), defined as measured sediment concentrations divided by the specific sediment quality guideline for that particular chemical or metal. The principle of PEC-Qs is to calculate the geometric mean of all quotients for that particular sediment sample, including those for metals, PAHs, and PCBs. For the Celeron Island Area Site Characterization, the mean PEC-Qs ranged from 0.01 at location CI13-28, to 17.6 at location CI13-43. The mean PEC-Q for each sediment sample was compared to a benchmark of 1. Twenty five sediment samples collected from 14 different locations had mean PEC-Q values greater than 1. The samples with the highest PEC-Qs were collected from locations in the small channels within Area A (CI13-43, -44, -45, -48, and -49), from the northern- and southernmost portions of Area B (CI13-25, -26 and CI13-30, respectively), and from the northern portion of Area C (CI13-04) and along the eastern side of Celeron Island (CI13-14 and -16).

E.3 SPATIAL ANALYSIS

To determine the location of hot spots within the Celeron Island Area, all individual constituents with concentrations exceeding their respective PEC in sediment samples, the calculated PAH ESBTUs, and the calculated PEC-Qs were spatially interpolated separately using the kriging method. Although ESBTUs were also calculated for metals, this data was not included in the spatial analysis because all metal ESBTUs fell below the EPA guidance concentration for risk of adverse biological effects. Determination of hot spots allows priority areas to be targeted for further delineation or remediation. Seven hot spots in the study area where one or more analytes were present in concentrations exceeding the PEC were identified. Figure ES-3 presents the results for all constituents exceeding their respective PECs in Areas A, and ES-4 presents the results for all constituents exceeding their respective PECs in Areas B, and C.

Based on the interpolation results, four high impact hot spot areas are identified within the Celeron Island Area: (1) hot spot 2; (2) hot spot 5; (3) hot spot 6; and (4) hot spot 7. High impact hot spot areas are defined as areas having concentrations of at least one constituent exceeding three times the PEC. These areas have the largest estimated volumes of sediment with constituents of concern (COCs) exceeding the PEC The predominant constituents contributing to elevated concentrations above the PEC in the high impact hot spots are total PCBs and total PAHs. Low impact hot spot areas are defined as areas having concentrations of at least one constituent exceeding the PEC. These areas have less elevated constituent concentrations and smaller estimated sediment volumes exceeding the PEC. There are three smaller areas with measured concentrations of one or more constituents above PECs that are thus considered to be low impact hot spot areas (Figures ES-3 and ES-4): (1) hot spot 1; (2) hot spot 3; and (3) hot spot 4.

High impact hot spot 2 includes sample locations CI13-38, -39, -42, -43, -44, -48, and -49 (Figure ES-5). The COCs for this hot spot area are total PCBs, total PAHs, mercury, and seven metals (cadmium, chromium, copper, lead, mercury, nickel, and zinc). Hot spot 5 includes sample locations CI13-04, -25, -26, and -27A (Figure ES-6). The COCs for this hot spot area are total PCBs, total PAHs, and seven metals (cadmium, chromium, copper, lead, mercury, nickel, and zinc). Hot spot 6 includes sample locations CI13-14, -15, and -16 (Figure ES-7). The COCs for this hot spot area are total PCBs and total PAHs. Hot spot 7 includes sample location CI13-30 (Figure ES-8). The COC for this hot spot area is total PCBs.

PAH ESBTUs and PEC-Qs were modeled at each location that had any sample with an ESBTU or PEC-Q of greater than 1. The kriging analysis identified areas with ESBTUs and PEC-Qs greater than 1 within some of the high and low impact hot spot areas that were identified when all constituents were kriged (Figures ES-9 through ES-12). The highest PAH ESBTU (70.64) was present in the 3-5 ft depth interval at location CI13-43 in hot spot 2; the highest PEC-Q (17.57) was detected in the same sample.

E.4 CONCLUSIONS

Based on the data collected during the sediment assessment in the Celeron Island Area, the high impact hot spot areas for sediment with elevated concentrations of constituents are hot spot 2 (located in the channels in Area A), hot spot 5 (located in the northern portions of Areas A, B, and C), hot spot 6 (located on the eastern side of Celeron Island), and hot spot 7 (located on the western side of Celeron Island). The model estimated that these four high impact hot spots have an estimated total of 147,000 cubic yards of sediment with constituent concentrations exceeding the PEC.

The four high impact hot spot areas should be considered for focusing further investigation and potential remediation efforts in the Celeron Island Area. When evaluating the sediment data, it is evident that each of these areas has sediment with elevated concentrations of constituents exceeding two or three times the PEC. Modeling of the PAH ESBTUs and the PEC-Qs also showed elevated values within the high impact hot spot areas that were identified when modeling all constituents with concentrations above the PEC. Further delineation of the extent of sediment with elevated concentrations of constituents is recommended. In hot spot 2, the potential exists for elevated concentrations further north in the channels. There is also uncertainty regarding the extent of hot spot 1, since it was estimated based on a single sample in that channel. The modeling results for all constituents elevated above two or three times the PEC, the PAH ESBTUs, and the PEC-Qs suggest that these areas should be considered priority areas for further investigation and potential remediation within the Celeron Island Area.

1. INTRODUCTION

This report presents the contaminated sediments assessment site characterization for the Celeron Island Area (the site), located within the Detroit River Area of Concern (AOC), Grosse Ile, Michigan (Figure 1-1). This work was conducted by EA Science and Technology and its affiliate EA Engineering, Science, and Technology, (MI) PLC (EA) and the U.S. Environmental Protection Agency's (EPA) Great Lakes National Program Office (GLNPO) in accordance with the Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) for the Celeron Island Area Site Characterization, Detroit River AOC, Grosse Ile, Michigan (EA 2013a, EA 2013b), finalized November 2013.

1.1 WORK SCOPE AND OBJECTIVES

1.1.1 Project Objectives

The purpose of the field investigation was to determine the nature and extent of chemical contamination in the areas of soft sediment deposition. Primary objectives were to determine depth of contamination, provide information about depositional areas, and identify high priority areas for remediation or for further investigation in the Celeron Island Area.

1.1.2 Objectives of the Site Characterization Report

This site characterization report summarizes the findings from the field investigation, including data tables and maps, data interpretation, and findings of the investigation. The results of this site characterization were evaluated to assess the sediment quality for the Celeron Island area. The overall objectives of this report are to define the spatial extent of constituents and soft sediment, develop a preliminary estimate of volume of sediment with elevated concentrations of constituents, and identify priority areas within the Celeron Island area at which remediation efforts should be initiated.

1.2 SITE LOCATION AND HISTORY

The Detroit River has a drainage area of 700 square miles of land in Michigan and Ontario, and receives wastewater from the 107 square mile City of Detroit sewershed. It is part of the international connecting waterway that also includes the St. Clair River and Lake St. Clair, the 32-mile strait of the Detroit River links Lake Erie to the Upper Great Lakes (Figure 1-1). The mean discharge of the Detroit River into Lake Erie is 185,000 cubic feet (ft) per second. It has five tributaries, although greater than 95 percent of its total flow comes from Lake Huron via the St. Clair River and Lake St. Clair (Besser et al. 1996). The Celeron Island Area encompasses a pentagonal area of islands and open water starting from the southern tip of Celeron Island, west to the head of Sturgeon Bar, north to Edmond Island, northeast to Gibraltar Main Island, southeast to the tip of Hickory Island, and southwest back to the tip of Celeron Island (Figure 1-2). Celeron Island is an 81-acre island located at the mouth of the Trenton Channel in the Detroit River where the river flows into Lake Erie (Besser et al. 1996).

The Detroit River's past and present use is as an industrial and drinking water source. It is believed that contaminated sediments in the study area contribute to beneficial use impairments in the AOC. Impairment of beneficial use means a change in the chemical, physical, or biological integrity of the Great Lakes ecosystem. A Detroit River Stage 1 Remedial Action Plan was completed in 1991 (Michigan Department of Natural Resources 1991) and identifies the following beneficial use impairments for the Detroit River AOC:

1. Restrictions on fish and wildlife consumption
2. Tainting of fish and wildlife flavor
3. Restrictions on drinking water consumption, or taste and odor
4. Degradation of fish and wildlife populations
5. Beach closings
6. Fish tumors or other deformities
7. Degradation of aesthetics
8. Bird or animal deformities or reproduction problems
9. Degradation of benthos
10. Restriction on dredging activities
11. Loss of fish and wildlife habitat

At the time the Stage 1 Remedial Action Plan was drafted, six municipal drinking water intakes serving approximately 4.1 million people in nearly 100 communities, and approximately 25 industries, withdrew water from the Detroit River. As a receiving water, approximately 30 industries and power plants discharged cooling water and/or process water, and 10 municipal wastewater treatment plants discharged industrial and domestic wastewater. Several active outfalls are present near the Celeron Island Area; two outfalls are located within 2.5 miles directly north of the Celeron Island Area boundary, and two are located within approximately 1.5 miles northwest of the Celeron Island Area boundary (Figure 1-2). There are also thirteen historical outfall locations. Twelve of these outfalls were clustered just south of Grosse Ile Parkway along the Detroit River shoreline, and one former outfall was located northwest of the Celeron Island Area boundary, further inland (Figure 1-2). The principal industrial discharges were on the Michigan shoreline along the lower 15 miles of the river from Zug Island downstream through the Trenton Channel to the mouth of Lake Erie. Major industries included steel mills, petroleum refineries, electrical power generating plants, chemical manufacturing plants, and automotive part manufacturers. The largest discharger to the river was the Detroit Water and Sewerage Department, which discharged an average of 715 million gallons per day including waste from more than 700 industrial users. An additional 46 facilities discharged to Detroit River tributaries. The river also received urban and industrial runoff directly and through its tributaries and storm sewer systems (Michigan Department of Natural Resources 1991).

Use of the river today is similar to 1991 except that there are fewer industries and wastewater treatment plants. Along the Michigan shoreline, there are four municipal drinking water intakes serving about 4.2 million people in nearly 127 communities. Approximately 20 industries and power plants discharge cooling water and/or process water to the river, and about 29 additional facilities discharge to the tributaries. There are five municipal wastewater treatment plants. Detroit Water and Sewerage Department is still the largest discharger, discharging an average of

710 million gallons per day, including waste from about 400 significant industrial users (Detroit Water and Sewerage Department 2013).

The Stage 1 Remedial Action Plan and subsequent studies found that sediment contaminant concentrations in the Detroit River are generally much greater along the Michigan shoreline compared to the mid-river and Ontario shoreline. The Michigan shoreline from the Rouge River downstream through the mouth of the Trenton Channel appears to be the most affected. Contaminant distributions in sediment are reflective of a combination of historical point sources and hydrological effects (Michigan Department of Natural Resources 1991).

Because there is little lateral mixing in the Detroit River, constituents in sediment are believed to deposit according to long-shore water flow following a longitudinal vector. This has resulted in high contaminant levels in near-shore zones, particularly downstream of point sources and tributaries, while large areas of the Detroit River exhibit moderate to low levels of contamination further away from the Michigan shore (Michigan Department of Natural Resources 1991).

To address the delisting criteria and allow for the eventual removal of the Degradation of Benthos beneficial use impairment, EPA GLNPO, Michigan Department of Environmental Quality, Detroit River Public Advisory Committee, and Friends of Detroit River initiated an effort in 2012 to define the “known contaminated sediment sites” in the Detroit River. The group conducted a content analysis of a number of contaminant studies and established six sediment target sites. The Celeron Island Area is one of the six target areas.

2. CELERON ISLAND AREA SITE INVESTIGATION

The purpose of this field investigation was to determine the nature and extent of chemical contamination in the areas of soft sediment deposition. Primary objectives were to determine depth of contamination, provide information about depositional areas, and identify high priority areas for remediation or for further investigation in the Celeron Island Area.

The Celeron Island Area site characterization was conducted in coordination with EPA. The investigations, including all sampling activities and analytical testing methods, were carried out in accordance with procedures outlined in the FSP and QAPP (EA 2013b, EA 2013a).

2.1 SAMPLING PROGRAM DESIGN AND RATIONALE

The site-specific QAPP details the project data quality objectives (DQOs) and outlines how the sample collection program fulfills the project objectives (EA 2013a). Sampling was conducted to delineate the nature and extent of sediment contamination in the Celeron Island Area of the Detroit River AOC.

2.1.1 Sample Locations

The sample locations for the Celeron Island Area site characterization were chosen based on historical sampling data, location of historic and current outfalls (Figure 1-2), water depths, and proximity to the navigation channel. Input from Michigan Department of Environmental Quality and the Detroit Riverkeeper was also received prior to finalization of sample locations. Additional information regarding the analytical program is included in the QAPP (EA 2013a).

A total of 50 sample locations were attempted using a vibracoring system and ponar grab sampler (Figure 2-1) onboard the GLNPO *Research Vessel (R/V) Mudpuppy II*. Several sample locations had to be abandoned; therefore, one core and one grab sample were collected from 43 locations for physical and chemical analysis. The onboard Global Positioning System (GPS) of the *R/V Mudpuppy II* was used to navigate to each location. Target coordinates for each subsurface sediment sample location were provided to EA by the EPA. Variance from these coordinates was calculated and documented; actual coordinates are provided in Table 2-1. Sample locations that had to be moved or abandoned in the field are described in Section 2.8.

2.1.2 Number of Samples

Sediment core samples were collected from 43 sample locations. Deviation from the 50 target sample locations is described in Section 2.8. Core samples were taken from up to five intervals at each location. A total of 174 sediment samples (not including quality control samples) were submitted for analysis (Table 2-2). The sampling interval depths were as follows: 0-1 ft, 1-3 ft, and 2 ft thereafter until refusal. Sediment from each interval was homogenized prior to separation into individual containers for submittal to the laboratory. Sediment cores varied in length from 0.7-14.5 ft.

A surface sample of the top 6 inches (0-0.5 ft) of sediment was also collected with a ponar grab/dredge sampler at 49 of the proposed coring locations to provide sufficient sample volume to support analysis of the uppermost interval; 42 ounces total. A total of 49 surface grab samples (not including quality control samples) were submitted for analysis.

2.2 NAVIGATION AND SURVEY

The *R/V Mudpuppy II* navigated to each proposed sampling location using GPS with sub-meter accuracy. The onboard GPS of the *R/V Mudpuppy II* utilized the World Geodetic System 1984 (WGS84) to navigate and record each individual sampling location. The unit was checked daily for accuracy prior to use in accordance with the EPA's *Interim Guidance for Developing Global Positioning System Data Collection Standard Operating Procedures and Quality Assurance Project Plans* (EPA 2008) and the procedures outlined in the QAPP (EA 2013a). The sample locations are presented in Table 2-1. Once the vessel navigated to the sample location, the sampling team visually confirmed that the proximal location or surroundings matched the proposed location as shown on the proposed sample location map (Figure 2-1) prior to sampling.

2.3 SEDIMENT SAMPLING

Mobilization for the Celeron Island Area sediment sampling commenced on 22 September 2013. Sample collection was initiated on 23 September and continued through 30 September 2013 (there was a final sampling/processing/demobilization day on 28 October 2013 due to the federal government shutdown). Staging for the field effort took place at the EPA Large Lakes Research Station in Grosse Ile, Michigan. Modified Level D personal protective equipment (i.e., Saranex-coated Tyvek, safety glasses, work boots, and Nitrile gloves) were worn during core collection (EA 2013b). In addition, all personnel aboard the *R/V Mudpuppy II* had a respirator fit test within the last year, and respirators were onboard for each individual. EA standard operating procedures (SOPs) 016 and 059 for maintaining field logbooks (Appendix B of the QAPP) were followed throughout sample collection and processing.

2.3.1 Vibracore Sampling

A total of 43 subsurface sediment cores were collected using a vibracoring system onboard the GLNPO sampling vessel *R/V Mudpuppy II*. The onboard GPS of the *R/V Mudpuppy II* was used to navigate to each location. The vibracoring system consisted of a core liner with an inside diameter of 4 inches (in.). A core liner with a length of 5, 7.5, 10, or 15 ft was fitted into the vibracoring unit with a one-way valve at the top to retain sediment during retrieval, and a plastic or stainless steel catcher inserted into the bottom of the core. Coring operations were conducted using an onboard crane, winch, and generator. Staging for the field effort took place at the EPA Large Lakes Research Station at Grosse Ile, Michigan.

To obtain sediment samples, a dedicated, decontaminated cellulose acetate butyrate core liner was inserted directly into the vibracore unit and secured. The core was penetrated to the depth of refusal and then retrieved using the winch system. The core liner was removed from the vibracore unit and excess liner was cut to the sediment interface with an electric saw. The core was capped at both ends, sealed, and measured. Each core was labeled with the location number, date and time of collection, and direction of top and bottom of core.

Following collection, sediment cores were transferred to a refrigeration truck (cooled to 4 degrees Celsius [°C]) at the on-shore staging area. The cores were stored in the secured refrigeration truck until they could be processed. Appropriate holding times were maintained for all samples. Field books and sample collection data sheets were prepared in accordance with the procedures outlined in the FSP (EA 2013b). A log of coring activities, sampling locations, water depths, and core recoveries was recorded in permanently bound logbooks in indelible ink. Personnel names, local weather conditions, and other information that impacted the field sampling program were also recorded. Each page of the logbook was numbered and dated by the personnel entering information. Copies of the field logbooks are provided in Appendix A.

2.3.2 Ponar Grab Sampling

A total of 49 surface sediment samples (not including field duplicates [FDs]) were successfully collected using a ponar onboard the *R/V Mudpuppy II.* The ponar sampler was mechanically deployed and retrieved as described in Standard Operating Procedure MP102 (EA 2013b). The procedure included deploying the sampler off of the edge of the boat, retrieving the sampler to the boat deck, decanting water at the top of the sampler, and emptying the sediment into an appropriate pan. Decontaminated stainless-steel pans and bowls were used to capture the sediment as it was emptied from the ponar. During the course of the field event, the laboratory requested additional surface sediment sample volume for analysis. Subsequently, twenty-two ponar samples were collected on a different day from the corresponding core locations to fulfill this request. This is further described in Section 2.8.1.

Multiple deployments were sometimes necessary to collect sufficient volume. Samples to be analyzed for simultaneously extracted metals (SEM)/ acid volatile sulfide (AVS) were placed directly into sample containers on the boat. Sediment was transferred to the sample processing area located onshore.

2.3.3 Sediment Core Processing

Sediment sample processing was performed onshore at a temporary location at EPA's Grosse Isle facility. At the processing facility, cores were split lengthwise for examination and sampling. The cores were logged and photographed from the top of the core (sediment surface) to the bottom (recovery depth), representing a vertical profile of the soft sediment. Sediments were classified in general accordance with the Unified Soil Classification System under ASTM International D2487-11. These sediment logging activities were performed in accordance with SOP 016 (Appendix B of the QAPP).

After the log was completed, the sediment from each subsample interval was removed from the core or grab sampler with a clean stainless-steel spatula or spoon and placed in a clean disposable pan or stainless steel tray. Cores collected via vibracoring were subsampled at several depth intervals. Core samples were homogenized by removing all material collected from the designated depth interval in a single core and mixing until consistency was uniform. Sediment samples were packaged and shipped in accordance with EA SOPs (EA 2013a). Equipment that was re-used (e.g., cutting tools, broad knife, spatula, bowls, etc.) was decontaminated in accordance with the decontamination procedures described in Section 2.6. Lithologic and photographic logs of sediment cores are included in Appendices B and C, respectively.

2.4 ANALYTICAL PROGRAM

The analytical program is summarized in Table 2-2. Each sediment core sample and surface grab sample underwent the following analyses:

- Total polychlorinated biphenyls (PCBs) (Aroclors)
- 34 polycyclic aromatic hydrocarbons (PAHs)
- Michigan 10 metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc) plus iron and nickel
- Total organic carbon (TOC)
- Percent solids

In addition to the above analytical parameters, ponar grab sediment samples from the 0 to 0.5 ft interval were analyzed for:

- SEM/ AVS
- Grain size.

These analyses were only performed on surface sediment because the data they yield are useful for assessing toxicity to organisms that typically contact only the surface sediments. Field duplicates were not collected for grain size analysis.

2.5 SAMPLE HANDLING, CHAIN-OF-CUSTODY, AND QUALITY ASSURANCE/QUALITY CONTROL

2.5.1 Sample Handling, Chain-of-Custody, and Documentation

Sediment samples analyzed for PCBs (Aroclors), 34 PAHs, Michigan 10 metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc) plus iron and nickel, TOC, percent solids, SEM/AVS, and grain size were shipped from the site to TestAmerica's Burlington laboratory. Samples were placed in the appropriate sample containers (obtained from TestAmerica), preserved, and labeled in accordance with the QAPP/FSP (EA 2013a, EA 2013b). With the exception of SEM/AVS, surface sample volume was transported to shore in plastic and stainless steel containers, noted in the field logbook in Appendix A. The SEM/AVS samples were placed into jars directly after the ponar sample was taken. In preparation for shipment to the laboratories, all samples were packaged in accordance with the procedures outlined in the FSP (EA 2013b).

Sample labeling was performed in accordance with SOP 001 (Attachment A of the FSP). Individual sample containers were labeled with a unique designation that corresponded to the specific geographic location, year of collection, and subsample depth interval. The FSP (EA 2013b) outlines the specific sample identification procedures that were implemented. Sample identifications included Celeron Island, the year of sampling, the location number, and the targeted end point of the interval in feet. "CI" was used for Celeron Island, and "13" was used to identify the sampling year 2013. An example of a sample identifier is "CI13-01-0001;" which describes a sample taken at Celeron Island in 2013 at the depth interval of 0-1 ft below the sediment surface. Sample depths were at intervals of 0-0.5 ft, 0-1 ft, and 2 ft thereafter; therefore, the depth intervals were as follows: SURFACE (ponar grab), 0001, 0103, 0305, 0507, and 0709. Field duplicates were designated by adding "FD" to the end of the sample identifier. Matrix spike (MS)/ matrix spike duplicates (MSDs) were designated by adding "MS" or "MSD" to the end of the sample identifier. For example: CI13-01-0001FD or CI13-01-0001MS.

Chain-of-custody forms were completed and used to track samples from the time of sampling to the arrival of samples at the laboratory. Completed chain-of-custody forms are provided in Appendix A of the Data Usability Assessment Report (EA 2013c).

2.5.2 Quality Control

Throughout the project, various measures were implemented to ensure the overall quality and usability of the collected data. The field investigation activities included collection of additional quality control samples (e.g., duplicates, MS/MSD, etc.) sufficient to meet the requirements of the DQOs as defined in Section A.7 of the QAPP (EA 2013a). Duplicate samples were submitted as described in the FSP (EA 2013b), and field and laboratory quality control requirements were completed in accordance with Section B.5 of the QAPP. Deviations from the QAPP/FSP (EA 2013a, EA 2013b) can be found in Section 2.8.

2.6 DECONTAMINATION

Decontamination procedures were implemented during the field investigation to prevent cross-contamination between sampling locations. During sampling activities, disposable or dedicated sampling tools and materials were utilized whenever possible to minimize the decontamination efforts. Decontamination procedures were carried out in accordance with the SOPs presented in Appendix B of the QAPP (EA 2013a).

2.7 INVESTIGATION-DERIVED WASTE

Following collection of the sediment samples, investigation-derived waste was managed in accordance with the procedures described in the SOPs presented in Appendix B of the QAPP (EA 2013a). In general, residual sediments and decontamination water were returned to their respective sample location onsite. Disposable materials and personal protective equipment that came into contact with site sediments were bagged and disposed of as general municipal waste.

2.8 DEVIATIONS FROM THE QAPP AND FSP

2.8.1 Sampling Locations

Actual coordinates of the sampling locations are presented in Table 2-1. A total of 24 of the target sample locations were moved during the field activities (Table 2-1). A total of three locations (CI13-32, CI13-41, and CI13-42) were moved from the proposed locations due to shallow water. Locations CI13-08, CI13-20, and CI13-28 were moved slightly due to the close proximity to large rocks along shore at the proposed locations. A total of six locations (CI13-33, CI13-37, CI13-40, CI13-44, CI13-45, and CI13-47) were moved due to extremely dense macrophytes at the proposed locations. Location CI13-07 was moved slightly upstream of the Ford Yacht Club entrance to avoid possible influence from the marina. A total of six locations (CI13-30, CI13-31, CI13-35, CI13-36, CI13-48, and CI13-50) were moved slightly by EPA to areas of greater deposition. Locations CI13-21 and CI13-25 were moved slightly because of difficulty anchoring in a strong current at the proposed locations. Locations CI13-18, CI13-27, and CI13-29 were moved and renamed CI13-18A, CI13-27A, and CI13-29A, respectively, due to failed attempts at recovering vibracore and ponar samples at the proposed locations. One location, CI13-19, was abandoned after consultation with the EPA due to lack of soft sediments at the proposed location. Location moves, renaming, and abandonments were approved by EPA at the time of the sample.

Cores could not be recovered from a total of seven locations (CI13-02, CI13-08, CI13-12, CI13-19, CI13-21, CI13-22, and CI13-25) including CI13-19 which was abandoned. After consultation with the EPA, in accordance with the QAPP (EA 2013a), vibracoring was abandoned at these locations after three attempts.

A total of 22 ponar samples were collected on a different day from the corresponding core, as noted in Table 2-1. Insufficient volume was submitted for analytical analysis from the initial surface sample, requiring a second sample. The first ponar sample was not analyzed; it was replaced by the second. The ponar re-sampling utilized the coordinates from the core collection to keep samples in close proximity. This was approved by EPA at the time of sampling.

2.8.2 Proposed Analytical Program

Table 2-2 compares the proposed and actual analytical program for Celeron Island. The QAPP and FSP assumed that an average of five analytical samples would be collected from each location with MS/MSDs and FDs submitted for 5 and 10 percent of total samples submitted, respectively. Therefore, it was proposed that a total of 250 samples would be submitted for PCB-Aroclors, selected ion monitoring (SIM) 34-PAHs, Michigan 10 metals plus iron and nickel, TOC, and percent solids. Fifty of the 250 samples (surface samples only) would also be submitted for the ratio of SEM to AVS and grain size. Actual core lengths varied (Section 3.2.1); however, the average length was less than 10 ft. A total of 174 samples were submitted for PCB-Aroclors, SIM 34-PAHs, Michigan 10 metals (plus iron and nickel), TOC, and percent solids; 49 samples (surface samples only) were submitted for grain size and SEM/AVS. FDs and MS/MSDs were submitted for 10 and 5 percent of the samples submitted, respectively, with two exceptions: grain size samples were not submitted for FD or MS/MSD analyses and percent solids were not submitted for MS/MSD analysis as specified in the QAPP/FSP (EA 2013a, b).

2.8.3 Sample Processing

The QAPP and FSP (EA 2013a, b) stated that surface samples would be collected and processed onboard the *R/V Mudpuppy II.* Once in the field, EPA deemed it more efficient to transfer the ponar sample to a container and process it at the onshore staging area with the cores. Surface sample volume was transported to shore in plastic and stainless steel containers, and noted in the core processing logbook in Appendix A; with the exception of SEM/AVS samples which were placed into jars directly after the ponar sample was taken.

3. RESULTS

3.1 DATA EVALUATION

The overall data quality objective for the project was to provide data of known and documented quality to characterize current site conditions at the Celeron Island area. Data collected from the Celeron Island area were validated by evaluating the completeness, correctness, and conformance of the data set against the method, SOP, or contract requirements documented in the QAPP/FSP (EA 2013a, EA 2013b). The data review and validation achieved the project goals. The overall data review and validation program attained the project objectives with no adverse effects on data quality or usability (EA 2013c).

To address the goals of this assessment, the validated data collected under this investigation were compared to the consensus-based threshold effects concentrations (TECs) and the probable effects concentrations (PECs) of the Sediment Quality Guidelines (SQGs) for Freshwater Systems (MacDonald et al. 2000). Contaminant concentrations exceeding the applicable sediment quality criteria were identified. Figures were prepared to visually present contaminant concentrations and identify potential hot spots or focus areas within the study area.

Detected values greater than or equal to the Method Detection Limit, but less than the laboratory Reporting Limit (RL), were J-qualified and are estimated. Analytes that were not detected were U-qualified. For samples submitted with FDs, the maximum concentration between the sample and its FD was used in reporting the bulk chemistry and modeling results.

3.1.1 Comparison to Sediment Quality Guidelines

The SQGs were developed as informal (non-regulatory) guidelines for use in interpreting chemical data from analyses of sediments. Several biological-effects approaches have been used to assess freshwater sediment quality relative to the potential for adverse effects on benthic organisms, including the TEC/PEC (MacDonald et al. 2000) approach. The TEC and PEC levels were derived using concentrations with both effects and no observed effects (MacDonald et al. 2000). TECs typically represent concentrations below which adverse biological effects have been rarely observed, while PECs typically represent concentrations in the middle of the effects range and above which effects have been more frequently observed (MacDonald et al. 2000). Concentrations that are between the TEC and PEC represent the concentrations at which adverse biological effects occasionally occur. TEC and PEC levels for iron were not available from the MacDonald et al. document; iron concentrations in sediment from the Celeron Island Area were compared to the iron TEC and PEC documented in the Ontario effect-based freshwater sediment quality guidelines (Persaud et al. 1993). This iron benchmark was also recommended for use by the Wisconsin Department of Natural Resources (WDNR 2003).

3.1.2 Calculation of Total Polycyclic Aromatic Hydrocarbons and Total Polychlorinated Biphenyls

When calculating total PAHs, results that were J-qualified were calculated using the result value, and results that were U-qualified were calculated using one-half the RL. Substituting one-half the RL (not detected [ND] = ½ RL) for each non-detect provides a conservative estimate of the concentration. This method, however, tends to produce results that are biased high, especially in data sets where many samples are non-detects. This overestimation is important to consider when comparing calculated total values to criteria. Total PCB aroclor concentrations were calculated by summing the concentrations of each PCB aroclor with non-detects set equal to zero (ND=0).

3.1.3 Simultaneously Extracted Metals/Acid Volatile Sulfide Ratio

The bioavailability of divalent metals to aquatic organisms is influenced by presence of AVS. In low oxygenated environments (anaerobic), metals may precipitate with sulfides, making them unavailable for uptake by aquatic organisms. Using this method, six metals (cadmium, copper, lead, nickel, mercury, and zinc) were extracted, measured, and added together (including any values that were "J" qualified). If a metal was not detected, it was considered a zero in the calculation. The mercury concentrations were very low and were not included in the calculation. The sum of the concentrations of the five other metals was then compared to the amount of AVS detected in the same sediment sample. If AVS was not detected in the sample, the SEM/AVS ratio was not calculated.

An SEM/AVS ratio less than 1 indicates a high degree of probability that the metals are bound to organic material and not bioavailable to aquatic organisms. If the SEM/AVS is greater than 1, then the metals in sediment exceed the sulfide binding ability and have a higher probability of being bioavailable to aquatic organisms.

3.1.4 Equilibrium Partitioning Sediment Benchmark Toxic Units and Probable Effect Concentration Quotients

Equilibrium Partitioning Sediment Benchmark Toxicity Units (ESBTUs) were utilized to estimate whether there is potential ecological risk associated with exposure to porewater that is in equilibrium with a measured concentration of a contaminant in the sediment. Typically, a PAH ESBTU less than or equal to 1.0 indicates that benthic organisms are not expected to be harmed by contamination present in the sediments (EPA 2003). Details of the ESBTU calculations and results are presented in Section 4.

Probable effect concentration quotients (PEC-Qs) were used to evaluate the combined effects of chemical mixtures on the toxicity of sediments to benthic organisms (Ingersoll et al. 2001). The PEC-Qs combine data from multiple constituents in sediments into one unitless index, and thus are useful in comparing the quality of sediments from different locations and at different times (EPA 2000). Details of the PEC-Q calculations and results are presented in Section 5.

3.2 RESULTS FROM THE CELERON ISLAND AREA SEDIMENT INVESTIGATION

For reporting and visual presentation of the results of the sediment investigation, the Celeron Island area was divided into three separate areas. Area A extends from the main river channel west to the western bank of the Detroit River. Area B is comprised of the center of the main river channel and includes the sampling locations on the western side of Celeron Island. Area C is comprised of the eastern portion of the main channel that flows along the eastern side of Celeron Island (Figure 2-1).

3.2.1 Core Recovery

Cores were collected from 43 of the 50 locations. Vibracore samples could not be collected at seven locations (CI13-02, CI13-08, CI13-12, CI13-19, CI13-21, CI13-22, and CI13-25) because the vibracore could not penetrate the substrate at these proposed locations. The cores were collected to refusal depth, with the exception of CI13-36. Sediment recovery ranged from 0.7 ft (CI13-18A) to 14.5 ft (CI13-36) (Table 3-1). Detailed lithographic descriptions of the 43 collected cores are presented in Appendix B.

3.2.2 Lithology

The sediment cores collected within the Celeron Island Area site demonstrate a mixture of core profiles containing sediment types consistent with a fluvial system. Most cores were characterized by thick alternating layers of clay and silty clay underlain by sandy or gravelly material. Native and non-native material such as shells, roots and organic material, hydrocarbon odor, and woody debris were frequently observed within various sediment types and depths.

Complete core logs and photographs are included in Appendices B and C. A general description of cores collected during the investigation is included in the text that follows.

Area A

Cores collected in Area A showed varying lithology. A majority of the cores were comprised mostly of alternating layers of clay and silty clay that generally varied from 0.5 ft to 5 ft with clayey sand or gravelly clay underneath. Cores collected in the northern portion of Area A (CI13-01, -27, -28) contained gravel or pebble pieces and shell hash. Moving south in Area A, cores displayed fine packed clay layers intermixed with sandy layers. The thickest clay layers that represented complete intervals (not interrupted by core refusal or due to core tube length) were present at locations CI13-27 and CI13-28, 5.5 ft and 9 ft, respectively. Roots and submerged aquatic vegetation (SAV) were present in cores collected from just south of the islands in Area A (CI13-33, -34, -35, -39).

Several cores collected just south of Horse Island in Area A also contained a strong hydrocarbon odor within the top 2 to 3 feet of the core (CI13-37 and -38). Shells and SAV were also present in several cores collected from near the smaller channels of the Detroit River (CI13-40 and -41).

Moving further west, hydrocarbon odor was present in several cores and woody debris increased. The core collected from location CI13-44 had the strongest hydrocarbon odor and a brown sheen, possibly indicating NAPL presence.

Area B

The majority of cores collected in Area B were comprised of sandy clay and clay layers of varying thickness (between 1 ft and 6 ft). Individual layers were typically around 1 ft in thickness, with the exception of cores CI13-26 and CI13-50 which had 7 ft and 6 ft sandy clay layers, respectively. Coarse pebble material was present in cores CI13-23, -24, and -29. Thick roots and organic material were present at cores collected from locations CI13-29, -30, and -50 in the southern portion of Area B. Cores from locations CI13-20 and -26 had a higher moisture content than other cores collected in Area B.

Area C

Similar to Areas A and B, several cores collected in Area C were comprised mostly of alternating layers of silty clay and clay. The thickness of these layers was typically between 0.5 ft and 1.5 ft. A stiff clay layer, often with intermixed gravel, was present at the bottom of most of the cores from Area C. These cores also contained more sand, with layers of sandy clay and sandy silt present both overlaying and underlying silty clay and clay layers. Large amounts of gravelly material were also present in several cores (CI13-03, -09, -10, -13, and -18). Tuberous roots and other vegetation were present in the surface layer of cores from CI13-05, -06, -10, -14, and -15. A faint hydrocarbon odor was detected in the top 2 ft of cores from CI13-06, -14, and -15.

3.2.3 Bulk Sediment Results

A total of 201 sediment samples, including quality control samples, were submitted for PCB-Aroclors, SIM 34-PAHs, metals, and TOC; 57 were submitted for SEM/AVS; and 49 were submitted for grain size (Table 2-2).

Analytical data were submitted to a subcontracted data validator, Environmental Data Services, Inc., for 100 percent Tier I and 20 percent Tier II data validation as specified in the Great Lakes Legacy Act (GLLA) Data Reporting Standard (Version 1.0, March 2010). To assess compliance with the Laboratory Statement of Work, data validation included completeness and compliance checks, data assessment, and validation at Stage 2 following *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (Office of Solid Waste and Emergency Response No. 9200.1-85, EPA 540-R-08-005, 13 January 2009).

3.2.3.1 Grain Size, Particle Size, and Density

Analytical results are presented in Table 3-2. A total of 29 samples (55 percent) were composed primarily (greater than 50 percent) of sand; the remaining 20 samples (45 percent) were composed primarily of silt and clay. The samples composed primarily of silt and clay were collected from Area C along the eastern side of Celeron Island and from the majority of sample locations within Area A (Figure 2-1). Particle size distribution graphs for each sample are presented in Appendix D.

3.2.3.2 PCB Aroclors

PCB aroclor data and total PCBs (ND=0) are presented in Table 3-3. Figures 3-1A, 3-1B, and 3-1C show the distribution of total PCBs SQG exceedances in Areas A, B, and C respectively. Results from the surface grab samples (0- to 0.5-ft interval) are shown on the aerial photo and results from the core depth intervals are shown on the associated graphs. PCB aroclors were detected in the surface grab samples at all locations.

In Area A, all surface grab samples had concentrations greater than the TEC with concentrations at two inshore locations (CI13-45 and CI13-48) exceeding the PEC. In the core samples, total PCBs exceeded the PEC at inshore (CI13-49, -48, -45, and -43) and very nearshore locations (CI13-42, -39 and -27). All PEC exceedances were in the upper 3 ft except for locations CI13-39 and CI13-49 where concentrations in the 3- to 5-ft stratum also exceeded the PEC. In offshore locations (CI13-28,-36, -35,-34,-33, -31,-32, -37, and -38), total PCBs in subsurface samples were below the TEC.

Total PCB concentrations in surface samples in the main channel (Area B) also generally exceeded the TEC, with three locations exceeding the PEC (CI13-26, -25 and -30). Total PCB concentrations in the surface grab samples from CI13-25 and CI13-30 were three times the PEC; however, none of the core samples had total PCB concentrations that exceeded the PEC.

Area C showed a similar pattern of surface samples with total PCB aroclor concentrations exceeding the TEC. At location CI13-17, the 0- to 1-ft stratum had total PCB concentrations that exceeded the PEC; at locations CI13-13 and CI13-14 the surface strata concentrations were twice the PEC; and at the north end of Area C (at location CI13-04), concentrations two and three times the PEC were found in the top 3 ft of sediment.

3.2.3.3 Polycyclic Aromatic Hydrocarbons

PAH data and total 17PAHs (ND=½ RL) are presented in Table 3-4. Total PAHs were calculated using both 17 individual PAHs and 34 individual PAHs; however, the 17PAH totals were used as comparison criteria to be consistent with the derivation of the TEC/PEC values. Figures 3-2A, 3-2B, and 3-2C show the distribution of total 17PAH SQG exceedances in Areas A, B, and C respectively. Results from the surface grab samples (0- to 0.5-ft interval) are shown on the aerial photo, and results from the vibracore depth intervals are shown on the associated graphs. PAHs were detected in the surface grab samples and all core samples at each location.

In Area A, the majority of surface grab samples were greater than the TEC with two nearshore locations (CI13-33 and CI13-37) exceeding the PEC. In the core samples, total 17PAHs were found to exceed the PEC at inshore (CI13-42, -43, -44, -46, and -49) and very nearshore locations (CI13-27A and -42). PEC exceedances were found throughout the sediment profile, with elevated concentrations often occurring in deeper intervals. In offshore locations (CI13-28,-36, -35,-34,-33, -31,-32, -37, and -38), most of the total 17PAHs in subsurface samples were less than the TEC.

Total 17PAH concentrations in surface samples in the main channel (Area B) also generally exceeded the TEC, with two locations exceeding the PEC (CI13-26 and -29A). In the core samples, most total 17PAH concentrations fell below the TEC with three locations greater than or equal to the TEC in surface intervals (CI13-20, -23, and -30). No concentrations in core samples exceeded the PEC.

Area C showed a similar pattern of surface grab samples with total 17PAH concentrations exceeding the TEC. At locations CI13-03, -14, and -15, total 17PAH concentrations exceeded the PEC; and at location CI13-16, total 17PAH concentrations exceeded three times the PEC in the grab sample. Core samples from most of the locations on the eastern side of Area C had total 17PAH concentrations below the TEC or between the TEC and the PEC. The surface and near surface depth intervals from locations on the western side of Area C near Celeron Island had concentrations that exceeded the PEC.

3.2.3.4 Total Organic Carbon

TOC results are provided in Table 3-5.

In the surface grab samples, TOC ranged from 0.32 percent at location CI13-22 on the western side of Celeron Island in Area B, to 13.3 percent at location CI13-49 in one of the channels within Area A. In the core samples, TOC ranged from 0.48 percent at location CI132-41-0305 collected from Area A, to 17.1 percent in sample CI13-34-0103 collected from Area A.

3.2.3.5 Metals

Metals results were compared to respective TEC and PEC values and are presented in Table 3-5. Of the 12 analyzed metals, three (barium, selenium, and silver) do not have TEC or PEC values; therefore, these metals are not discussed in this section and were not included in the spatial analysis for the site (Section 6).

The detected concentrations for each metal with TEC/PEC values at each location are displayed in the following figures: Figures 3-3A through C (arsenic), Figures 3-4A through C (cadmium), Figures 3-5A through C (chromium), Figures 3-6A through C (copper), Figures 3-7A through C (iron), Figures 3-8A through C (lead), Figures 3-9A through C (mercury), Figures 3-10A through C (nickel), and Figures 3-11A through C (zinc). Results from the surface grab samples (0- to 0.5-ft interval) are shown on the aerial photo, and results from the vibracore depth intervals are shown on the associated graphs.

Arsenic

Figures 3-3A, 3-3B, and 3-3C show the distribution of arsenic SQG exceedances in Areas A, B, and C respectively. In Area A, all surface grab samples had concentrations below the TEC (9.79

mg/kg [ppm]). In the core samples, several inshore (CI13-27A, -42, -48, -49) and one nearshore location (CI13-32) exceeded the TEC, but were below the PEC (33 ppm). Arsenic concentrations in surface samples and core samples in the main channel (Area B) were below the TEC. In Area C, concentrations of arsenic in surface grab samples did not exceed the TEC. In the core samples, two locations (CI13-03 and -10) had concentrations that exceeded the TEC, but were below the PEC.

Cadmium

Figures 3-4A, 3-4B, and 3-4C show the distribution of cadmium SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of surface grab samples were greater than the TEC (0.99 ppm) with two inshore locations (CI13-42 and CI13-45) exceeding the PEC (4.98 ppm). In the core samples, cadmium concentrations exceeded the PEC at inshore and nearshore locations in surface and deeper depth intervals. Inshore locations CI13-42 and -48 had cadmium concentrations three times the PEC at the surface.

Cadmium concentrations in surface samples in the main channel (Area B) only exceeded the TEC at one location (CI13-50). In the core samples, cadmium concentrations exceeded the TEC at locations CI13-20 and CI13-30 at the surface. In Area C, cadmium concentrations in surface grab samples exceeded the TEC at four locations (CI13-03, -14, -15, and -16). In the core samples, only location CI13-04 had cadmium concentration exceedances of the TEC at the surface and near surface.

Chromium

Figures 3-5A, 3-5B, and 3-5C show the distribution of chromium SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of chromium concentrations in surface grab samples were greater than the TEC (43.4 ppm), with one inshore location (CI13-45) having a concentration that exceeded the PEC (111 ppm). In the core samples, chromium concentrations exceeded the PEC at inshore and nearshore locations in surface and deeper depth intervals. Inshore locations CI13-42 and -48 had chromium concentrations three and two times the PEC at the surface, respectively.

Chromium concentrations in surface grab samples and in core samples in the main channel (Area B) did not exceed the TEC. In Area C, chromium concentrations exceeded the TEC in the surface interval at location CI13-04, and exceeded two times the PEC in the 1- to 3-ft interval.

Copper

Figures 3-6A, 3-6B, and 3-6C show the distribution of copper SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of copper concentrations in surface grab samples were greater than the TEC (31.6 ppm) at inshore and nearshore locations; with offshore locations being below the TEC. In the core samples, copper concentrations exceeded the PEC (149 ppm) at inshore (CI13-42, -48, and -49) and nearshore locations (CI13-27A) in surface and near surface intervals. Sample location CI13-49 had a copper concentration exceeding the PEC in the 3- to 5-ft interval.

Copper concentrations in surface grab samples in the main channel (Area B) were mostly below the TEC, with two locations (CI13-26 and -50) exceeding the TEC. In the core samples, all concentrations were below the TEC except the 1- to 3-ft interval of location CI13-23.

In Area C, copper concentrations exceeded the TEC in surface grab samples from locations CI13-13, -14, and -15. Only a single core sample from location CI13-04 had copper concentrations that exceeded the TEC. No samples had concentrations exceeding the PEC.

Iron

Figures 3-7A, 3-7B, and 3-7C show the distribution of iron SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of iron concentrations in surface grab samples were greater than the TEC (20,000 ppm) at inshore and nearshore locations, with several offshore locations being below the TEC. In the core samples, iron concentrations exceeded the PEC (40,000 ppm) at inshore (CI13-42, -48, and -49) and nearshore locations (CI13-27A) in surface and near surface intervals.

Iron concentrations in surface grab samples in the main channel (Area B) were above the TEC in the center of Area B, and below the TEC at the nearshore locations. All iron concentrations in core samples from Area B were below the TEC.

In Area C, iron concentrations exceeded the TEC in surface grab samples from the center of the channel, with nearshore location concentrations falling below the TEC. Surface and near surface core samples from locations CI13-04, -07, -10, -11, and -16 were above the TEC.

Lead

Figures 3-8A, 3-8B, and 3-8C show the distribution of lead SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of lead concentrations in surface grab samples were greater than the TEC (35.8 ppm) at inshore and nearshore locations, with lead concentrations exceeding the PEC (128 ppm) at inshore location CI13-45. In core samples, there was widespread elevated concentrations (above the PEC) of lead in both surface and deeper intervals at inshore (CI13-39, -42, -48, and -49) and nearshore (CI13-27A) locations. Lead concentrations exceeded two times the PEC at the surface at location CI13-48.

Lead concentrations in surface grab samples and in core samples in the main channel (Area B) were all below the TEC. In Area C, lead concentrations were below the TEC in surface grab samples, and core samples from CI13-04 had TEC exceedances at the surface and near surface.

Mercury

Figures 3-9A, 3-9B, and 3-9C show the distribution of mercury SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of mercury concentrations in surface grab samples were greater than the TEC (0.18 ppm) at inshore and nearshore locations, with mercury concentrations exceeding the PEC (1.06 ppm) at locations CI13-45, -36, and -49. In core samples, there were widespread concentrations elevated two times and three times the PEC in both surface and deeper intervals at inshore (CI13-39, -42, -48, and -49) and nearshore (CI13-27A) locations.

Mercury concentrations in surface grab samples and in core samples in the main channel (Area B) were generally above the TEC, except for nearshore locations CI13-21, -22, and -23. In the core samples, mercury concentrations exceeded the TEC in surface and subsurface intervals at all locations except CI13-18 and -23.

In Area C, lead concentrations were above the TEC in surface grab samples, and core samples had TEC exceedances at the surface and near surface at all locations except for nearshore locations on the eastern side of Area C.

Nickel

Figures 3-10A, 3-10B, and 3-10C show the distribution of nickel SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of nickel concentrations in surface grab samples were greater than the TEC (22.7 ppm) at inshore and nearshore locations. In core samples, there were concentrations above the PEC (48.6) at locations CI13-27A, -39, and -49 at the surface and subsurface, and concentrations elevated two times and three times the PEC in both surface and deeper intervals at inshore (CI13-39, -42, -48, and -49) and nearshore (CI13-27A) locations.

Nickel concentrations in surface grab samples and in core samples in the main channel (Area B) were generally above the TEC, except for locations on the western side of Celeron Island. In the core samples, nickel concentrations were below the TEC at all locations except CI13-20 and -30.

In Area C, nickel concentrations were above the TEC in surface grab samples from the western side of the area, and at one location in the northern portion of Area C (CI13-03). The core samples had TEC exceedances at the surface and near surface at locations CI13-03, -07, -09, -10, and -16, with nickel concentrations exceeding the PEC in subsurface samples at location CI13-04. Locations within the eastern extent of Area C had nickel concentrations below the TEC.

Zinc

Figures 3-11A, 3-11B, and 3-11C show the distribution of zinc SQG exceedances in Areas A, B, and C respectively. In Area A, the majority of zinc concentrations in surface grab samples were greater than the TEC (121 ppm), with concentrations exceeding the PEC at inshore locations CI13-42 and -45, and at nearshore locations CI13-36 and -37. In core samples, there were widespread concentrations above the TEC throughout the sediment profile at most of the locations. Concentrations above the PEC (459 ppm) were detected in surface and subsurface samples at several inshore and nearshore locations. Zinc concentrations exceeded two times the PEC in the surface interval at locations CI13-42 and -48.

Zinc concentrations in surface grab samples and in core samples in the main channel (Area B) were generally above the TEC. In the core samples, zinc concentrations were below the TEC at all locations except CI13-20 and -30.

In Area C, zinc concentrations were above the TEC in surface grab samples from the western side of the area. The core samples had zinc concentration TEC exceedances at the surface and near surface at location CI13-04. Locations within the eastern extent of Area C had zinc concentrations below the TEC.

3.2.3.6 Simultaneously Extracted Metals to Acid Volatile Sulfide Ratio

A total of 49 surface (0-0.5 ft) sediment grab samples and five FDs were submitted for the ratio of SEM to AVS analysis. Two samples from the northern portion of Area A (CI13-01-SURF, CI13-28-SURF) and one sample from the northern portion of Area B (CI13-02-SURF) had a ratio greater than 1, with zinc as the dominant metal. This indicates that these metals are bioavailable and there is potential for toxicity to benthic organisms. All SEM/AVS results are presented in Table 3-6. These data will be used for derivation of ESBs presented in Section 5.

4. EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARKS

PAH ESB Toxic Units (ESBTUs) were calculated as an additional tool for evaluating potential risk associated with sediment contamination. ESBTUs are used to estimate whether there is potential ecological risk associated with exposure to porewater that is in equilibrium with a measured concentration of the contaminant in the sediment. Thus, ESBTUs are calculated using an assumed relationship for partitioning between sediment and water.

4.1.1 PAHs

ESBTUs for total 34PAHs were calculated following the methods outlined in *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures* (EPA 2003). Based on this guidance, individual PAH concentrations in sediment were first divided by the fraction of organic carbon measured in the sediment sample, resulting in an organic carbon-based PAH concentration, or normalized concentration. This value was then compared to the maximum solubility of that PAH in sediment on an organic carbon basis. If the organic carbon normalized PAH concentration was greater than the maximum solubility concentration, then the maximum solubility concentration was used to calculate the PAH ESBTU instead of the normalized concentration. If the organic carbon normalized PAH concentration was less than the maximum solubility, the normalized concentration was used. This value was then divided by the individual PAH's effective concentration in sediment, defined as the product of its final chronic value and organic carbon-water partition coefficient (K_{oc}), resulting in an ESB for each individual PAH. The PAH ESBTU for a sediment sample is the sum of the 34 individual PAH's ESBTUs (Table 4-1).

Typically, a PAH ESBTU less than or equal to 1 indicates that benthic organisms are not expected to be harmed by contamination present in the sediments (EPA 2003). Of the 197 sediment samples, 167 had a PAH ESBTU less than 1, and 30 samples had a PAH ESBTU greater than or equal to 1.0 (Table 4-1). For the ponar grab samples, one sample from Area A (CI13-44-SURF) and several samples throughout both Areas B and C had a PAH ESBTU between 1 and 10 (Figures 4-1A, 4-1B, and 4-1C). A PAH ESBTU of greater than 10 was calculated for sample location CI13-16 along the eastern side of Celeron Island in Area C (Figure 4-1C). In the sediment core samples, PAH ESBTUs between 1 and 10 were calculated for samples from various depth intervals throughout Areas A and B. The ESBTUs greater than 10 were calculated at locations CI13-43, CI13-44, and CI13-42 in Area A (Figure 4-1A). The samples with PAH ESBTUs greater than 1 may be toxic to aquatic life.

4.1.2 Metals

Metal toxicity is evaluated through an indirect estimate of bioavailability based on the concentrations of AVS and SEM, and TOC in the sediments. Metal ESBTUs were calculated following the methods outlined in *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc)* (EPA 2005). The molar concentration of

AVS was subtracted from the molar concentration of the sum of the SEM measured in each sediment sample, and the result was divided by the fraction of organic carbon, accounting for preferential sorption of metals to organic carbon. It should be noted that if the particular sample has excess AVS such that all SEM is accounted for, this value can be negative.

As presented in the EPA 2005 guidance, when metals ESBTUs are calculated using this method, a value less than 130 micromole (µmol) of residual SEM per gram organic carbon (g_{oc}) indicates that the sediment poses a low risk of adverse biological effects associated with metals. Values between 130 and 3,000 µmol/g_{oc} may have adverse effects, and values over 3,000 µmol/g_{oc} are expected to be associated with adverse effects. All ESBTU results for metals were well below 130 µmols of residual SEM per gram organic carbon (Table 4-2).

5. PROBABLE EFFECT CONCENTRATION QUOTIENTS (PEC-Q)

As described in the *Prediction of Sediment Toxicity Using Census-based Freshwater Sediment Quality Guidelines* (USEPA 2000) guidance, PEC quotients (PEC-Qs) combine data from multiple constituents in sediments into one unitless index, and thus can be used in comparing the quality of sediments from different locations and at different times. As discussed in Ingersoll et.al. (2001) PEC-Qs are used to evaluate the combined effects of chemical mixtures on the toxicity of sediments to benthic organisms. They use consensus-based freshwater sediment quality guidelines to calculate concentration quotients (or hazard quotients) defined as measured sediment concentrations divided by the specific sediment quality guideline for that particular chemical or metal. The principle of PEC-Qs is to calculate the geometric mean of all quotients for that particular sediment sample including those for metals, PAHs, and PCBs.

When the geometric mean PEC-Q is regressed with the percent of toxicity found in that sample (typically growth or mortality), as shown in Ingersoll et.al. (2001), and the geometric mean of the PEC-Qs is approximately 1, between 30 percent and 50 percent of the organisms showed a toxic effect. This could be termed the Effect Concentration for 30 percent (EC_{30}) or 50 percent (EC_{50}) respectively. This means that between 80 percent and 50 percent% of the organisms should **not** show an effect when the PEC-Q is 1. Examination of the proportion of toxicity when the PEC-Q is 0.5 shows that between 6 percent and 35 percent of the organisms showed a toxic effect, again meaning that between 94 percent and 65 percent of the organisms did **not** show a toxic effect when the PEC-Q was 0.5. The important aspects related to the use of PEC-Qs are:

1. The toxic endpoint is not necessarily lethality, but often the endpoint is a chronic endpoint such as growth.

2. The use of a PEC-Q of 1 does not imply that 100 percent of organisms exposed to those concentrations will show an effect (chronic or acute), rather that 30 – 50 percent of those organisms will show the effects, and the rest will not be impacted.

3. The proportion of organisms which show an effect drops to 6 – 35 percent when the PEC-Q of 0.5 is used.

Consensus-based PECs were used to predict the potential for toxicity in sediments collected from Celeron Island. Mean PEC-Qs were calculated using the procedure that was established by USEPA (2000) to determine the concentration of constituents above which adverse effects are likely to be observed to sediment-dwelling organisms. A PEC-Q was first determined for each metal (arsenic, cadmium, chromium, copper, lead, nickel, and zinc) for which a reliable PEC was available.

$$PEC - Qmetals = \frac{metal\ concentration\ (in\ dry\ weight)}{corresonding\ PEC\ value}$$

Then, an average PEC-Q for metals was calculated by summing the PEC-Qs of each metal and dividing by the number of metals that were included in the calculation (USEPA 2000).

$$mean\ PEC - Qmetals = \frac{\sum individual\ metal\ PEC - Qs}{n}$$

where n = number of metals with reliable PECs for which sediment chemistry data are available.

PEC-Qs were also calculated for total 17PAHs using a value equal to half the RL for non-detects (ND=1/2RL), and total PCBs using a value of zero for the non-detects (ND=0).

$$PEC - Qtotal\ PAHs = \frac{total\ PAH\ concentraton\ (ND = \frac{1}{2RL})(in\ dry\ weight)}{corresponding\ PEC\ value}$$

$$PEC - Qtotal\ PCBs = \frac{total\ PCB\ concentraton\ (ND = 0)(in\ dry\ weight)}{corresponding\ PEC\ value}$$

A mean PEC-Q was calculated by summing the average PEC-Q for metals, the PEC-Q for PAHs, and the PEC-Q for PCBs.

$$mean\ PEC - Q = \frac{mean\ PEC - Qmetals + PEC - Qtotal\ PAHs + PEC - Qtotal\ PCBs}{n}$$

where n = number of sediment classes of chemicals for which sediment chemistry data are available.

A single PEC-Q was determined for each sediment sample (named the mean PEC-Q) to provide an overall measure of chemical contamination and to support an evaluation of the combined potential effects of multiple constituents in the sediment collected from the site (USEPA 2000).

The mean PEC-Q values for each sample collected are summarized in Table 5-1. The mean PEC-Qs ranged from 0.01 at location CI13-28, to 17.6 at location CI13-43 (Figures 5-1A, 5-1B, and 5-1C). The mean PEC-Q for each sediment sample was compared to benchmarks of 0.5 and 1. Twenty five sediment samples collected from 14 different locations had mean PEC-Q values greater than 1 (Table 5-1). The samples with PEC-Qs greater than 1 were collected from locations in the small channels within Area A (CI13—27, -39, -42, -43, -44, -45, -47, -48, and -49) (Figure 5-1A), from the northern- and southernmost portions of Area B (CI13-25, -26 and CI13-30, respectively) (Figure 5-1B), and from the northern portion of Area C (CI13-04) and along the eastern side of Celeron Island (CI13-14 and -16) (Figure 5-1C).

6. SPATIAL ANALYSIS TO DETERMINE HOT SPOTS WITHIN THE CELERON ISLAND AREA

To determine the location of hot spots within the Detroit River AOC, three datasets were spatially interpolated to develop an estimate of the level and distribution of elevated concentrations of constituents across the study area: 1) all individual constituents (Section 3.2.3) with concentrations exceeding their respective PEC in sediment samples; 2) the calculated PAH ESBTUs (Section 4.1.1) Although ESBTUs were also calculated for metals, this data was not included in the spatial analysis because all metal ESBTUs fell below the EPA guidance concentration for risk of adverse biological effects; and 3) the calculated PEC-Qs (Section 5). Hot spot determination allows for prioritizing areas to be targeted for remediation.

Interpolation was performed by using a spatially explicit statistical method called kriging. Sections 6.2 and 6.3 describe the kriging analysis results for all constituents, Section 6.4 describes the kriging analysis results for PAH ESBTUs, and Section 6.5 describes the kriging analysis results for PEC-Qs.

6.1 METHODOLOGY

A three-dimensional model of each analyte measured in the sediment samples was constructed using the statistical interpolation method of kriging with C-Tech's Environmental Visualization System (EVS) Pro Version.

Input included each analyte's concentration at every location, and the results were combined to identify all areas with one or more analyte concentration above the respective PEC levels, two times above the PEC, and three times above the PEC levels. To further define the hot spot areas identified from modeling all constituents, additional inputs included the calculated PAH ESBTUs and PEC-Qs; these were modeled separately to identify areas with PAH ESBTUs of between 1 and 10 and greater than 10, and to identify areas with a PEC-Q above 1. Although ESBTUs were also calculated for metals, this data was not included in the spatial analysis because all metal ESBTUs fell below the EPA guidance concentration for risk of adverse biological effects.

6.2 MODEL RESULTS FOR ALL CONSTITUENTS IN THE CELERON ISLAND AREA

Concentrations of all individual constituents were input to the model, and the kriging analysis identified areas with PEC exceedances of total PCBs, total PAHs, and/or each of the nine metals that have PECs. Seven hot spots were identified within the study area where one or more analytes were present in concentrations exceeding the PEC.

Figure 6-1 presents the results for all constituents exceeding their respective PECs in Area A, and Figure 6-2 presents the results for all constituents exceeding their respective PECs in Areas B and C. These figures present the estimated volume of sediment with elevated concentrations of constituents for each hot spot along with the predominant constituent contributing to elevated concentrations. The volume estimates do not include contingency or overburden. However, they are subject to the uncertainties of the study design and modeling limitations. Sections 6.2.1 and 6.2.2 identify the high impact hot spot areas and low impact hot spot areas within each area. High impact hot spot areas are defined as areas having concentrations of at least one constituent exceeding three times the PEC. These areas have the largest estimated volumes of sediment with constituents of concern (COCs) exceeding the PEC. Low impact hot spot areas are defined as areas having concentrations of at least one constituent exceeding the PEC. These areas have less elevated constituent concentrations and, in some cases, smaller estimated sediment volumes exceeding the PEC.

6.2.1 High Impact Hot Spot Areas

Based on the interpolation results, four high impact hot spot areas are identified within the Celeron Island Area: (1) hot spot 2; (2) hot spot 5 (Figure 6-1); (3) hot spot 6; and (4) hot spot 7 (Figure 6-2).

- **Hot spot 2**: Hot spot 2 covers approximately 6,000 linear ft of the channels within the western portion of Area A (Figure 6-1). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 39,000 cy (Figure 6-1). The predominant constituent contributing to elevated concentrations above the PEC is total PAHs.

- **Hot spot 5**: Hot spot 5 spans across the northern portion of Areas A, B and C (Figures 6-1 and 6-2). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 67,000 cy (Figure 6-1 and 6-2). The predominant constituent contributing to elevated concentrations above the PEC is total PCBs.

- **Hot spot 6**: Hot spot 6 is located on the eastern side of Celeron Island in Area C (Figure 6-2). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 15,000 cy (Figure 6-2). The predominant constituent contributing to elevated concentrations above the PEC is total PAHs.

- **Hot spot 7**: Hot spot 7 is located on the western side of Celeron Island in Area C (Figure 6-2). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 26,000 cy (Figure 6-2). The predominant constituent contributing to elevated concentrations above the PEC is total PCBs.

Each of these high impact hot spot areas is described in detail in Section 6.3.

6.2.2 Low Impact Hot Spot Areas

There are three smaller areas with measured concentrations of one or more constituents above PECs, and are thus considered to be low impact hot spot areas (Figure 6-1): (1) hot spot 1; (2) hot spot 3; and (3) hot spot 4.

- **Hot Spot 1**: Hot spot 1 is located in the westernmost small channel within Area A and includes sample location CI13-46 (Figure 6-1). The estimated volume of sediment with constituent concentrations exceeding the PEC is 5,000 cy. This area has constituent concentrations exceeding the PEC; the predominant constituent with concentrations elevated above the PEC is total PAHs (Figure 6-1).

- **Hot Spot 3**: Hot spot 3 is located in the southern portion of Area A and includes sample locations CI13-33 and -34 (Figure 6-1). The estimated volume of sediment with constituent concentrations exceeding the PEC is 7,000 cy. The predominant constituent with concentrations elevated above the PEC is total PAHs.

- **Hot Spot 4**: Hot spot 4 is located approximately 1,000 ft east of hot spot 2 in Area A (Figure 6-1). The estimated volume of sediment with constituent concentrations exceeding the PEC is 4,000 cy. The predominant constituent with concentrations elevated above the PEC is zinc.

6.3 DETERMINATION OF PREDOMINANT HOT SPOTS BASED ON ALL CONSTITUENTS IN THE CELERON ISLAND AREA

The high impact hot spot areas identified in Section 6.2.1 can be considered as potential first priority targets for further delineation and potential remediation efforts within the Celeron Island Area. Each of these five high impact hot spot areas is described in detail below; the sample locations and the maximum concentration of each constituent greater than the respective PEC are presented (Figures 6-3 through 6-6).

6.3.1 Hot Spot 2

Hot spot 2 includes sample locations CI13-38, -39, -42, -43, -44, -45, -48, and -49 (Figure 6-3). The COCs for this hot spot area are total PCBs, total PAHs, and seven metals (cadmium, chromium, copper, lead, mercury, nickel, and zinc). The model estimates that approximately half of this hot spot area has constituent concentrations exceeding three times the PEC, while the other half of the area has constituent concentrations exceeding the PEC, or two times the PEC.

Concentrations of total PCBs exceeded three times the PEC at sample locations CI13-39, -42, -48, and -49 within hot spot 2 (Figure 6-3). Total PAH concentrations exceeded the PEC at CI13-39 and 49. Total PAH concentrations exceeded three times the PEC at sample locations CI13-42, -43 and -44 within this hot spot. Hot spot 2 contained the highest total PAH concentration (1,188,600 ppb) of all the high impact hot spots in the Celeron Island Area.

Concentrations of lead and nickel exceeded the PEC at CI13-39 and -49, while concentrations of other metals exceeded two times the PEC at these sample locations (Figure 6-3). At locations CI13-42 and -48, concentrations of copper exceeded the PEC and concentrations of nickel exceeded three times the PEC. Additionally, lead exceeded the PEC at location CI13-42 and two times the PEC at CI13-48, while mercury concentrations exceeded two times the PEC at location CI13-42 and three times the PEC at CI13-48. Zinc concentrations exceeded two times the PEC at both CI13-42 and -48.

6.3.2 Hot Spot 5

Hot spot 5 includes sample locations CI13-04, -25, -26, and -27A (Figure 6-4). The COCs for this hot spot area are total PCBs, total PAHs, and seven metals (cadmium, chromium, copper, lead, mercury, nickel, and zinc). The model estimates that most of this hot spot area has constituent concentrations exceeding the PEC or two times the PEC, while a smaller portion of the area has constituent concentrations exceeding three times the PEC.

Concentrations of total PCBs exceeded three times the PEC at all sample locations except CI13-26 (Figure 6-4). Total PAH concentrations exceeded three times the PEC at location CI13-27A only; the remaining locations in this hot spot area had no total PAH exceedances (CI13-25), had concentrations exceeding the PEC (CI13-04), or had concentrations exceeding two times the PEC (CI13-26) (Figure 6-4). Locations CI13-25 and -26 had no metal concentrations above the respective PECs. Concentrations of two metals (chromium and nickel) were detected above the PEC at CI13-04, while location CI13-27A had concentrations of one metal (mercury) detected at three times the PEC and concentrations of six metals (cadmium, chromium, copper, lead, nickel, and zinc) detected above the PEC (Figure 6-4).

6.3.3 Hot Spot 6

Hot spot 6 includes sample locations CI13-13,-14, -15, and -16 (Figure 6-5). The COCs for this hot spot area are total PCBs and total PAHs. The model estimates that approximately three-quarters of this hot spot area has constituent concentrations exceeding the PEC or two times the PEC, while one-quarter of the area has constituent concentrations exceeding three times the PEC.

Concentrations of total PAHs exceeded the PEC at locations CI13-14 and -15, and exceeded three times the PEC at CI13-16. Concentrations of total PCBs exceeded two times the PEC at CI13-13 and -14.

6.3.4 Hot Spot 7

Hot spot 7 includes sample location CI13-30 (Figure 6-6). The COC for this hot spot area is total PCBs. The model estimates that most of this hot spot area has total PCB concentrations exceeding the PEC or two times the PEC, while a small portion of the area has constituent concentrations exceeding three times the PEC.

6.4 MODEL RESULTS FOR EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARK TOXIC UNITS (ESBTUS) FOR THE CELERON ISLAND STUDY AREA

PAH ESBTUs were also modeled at each location that had any sample with an ESBTU of greater than 1. The kriging analysis identified areas with ESBTUs greater than 1 within some of the low and high impact hot spot areas that were identified when all constituents were kriged (Section 6.2). Figure 6-7 presents the results for PAH ESBTUs exceeding 1 in Areas A, and Figure 6-8 presents the results for PAH ESBTUs exceeding 1 in Areas B and C.

6.4.1 Spatial Analysis for ESBTUs in Area A

The spatial analysis for PAH ESBTUs in Area A identified four areas where sediment samples had PAH ESBTUs greater than 1. Figure 6-7 presents the areas identified along with the maximum PAH ESBTU in each area.

Two of the areas with elevated PAH ESBTUs in Area A are in the same location as high impact hot spot areas 2 and 5, as identified in Section 6.3 (Figure 6-1). PAH ESBTUs between 1 and 10 and greater than 10 were located around sample location CI13-42, -43, and -44 within hot spot 2 (Figures 6-3 and 6-7); PAH ESBTUs between 1 and 10 were located at sample location CI13-27 within hot spot 5 (Figures, 6-4 and 6-7). The highest PAH ESBTU in Area A (70.64) was present in the 3- to 5-ft depth interval at location CI13-43 within hot spot 2. One area with PAH ESBTUs between 1 and 10 is within low impact hot spot 1 (Figure 6-1) and includes sample location CI13-46.

Low impact hot spot area 3 does not appear when considering only PAH ESBTUs; the total PAH concentrations at this area were only elevated just above the PEC.

6.4.2 Spatial Analysis for ESBTUs in Areas B and C

The spatial analysis for PAH ESBTUs in Areas B and C identified four areas where sediment samples had PAH ESBTUs greater than 1. Figure 6-8 presents the areas identified along with the maximum PAH ESBTU in each area.

Three of the areas with elevated PAH ESBTUs in Areas B and C are in the same location as high impact hot spot areas 5 (which also extends into Area A) and 6, as identified in Sections 6.2 and 6.3 (Figure 6-2). PAH ESBTUs between 1 and 10 were located around sample location CI13-04 and -26, within hot spot 5, and at locations CI13-14 and -15 within hot spot 6 (Figures 6-4, 6-5, and 6-8). PAH ESBTUs greater than 10 were located around sample location CI13-16 within high impact hot spot 6 (Figures 6-2, 6-5, and 6-8). The highest PAH ESBTU in Areas B and C (13.93) was present in the 0- to 0.5-ft depth interval at location CI13-16 within hot spot 6. Although not part of a hot spot, the areas around sample locations CI13-06 and -07 also had PAH ESBTUs between 1 and 10.

6.5 MODEL RESULTS FOR PROBABLE EFFECT CONCENTRATION QUOTIENTS FOR THE CELERON ISLAND STUDY AREA

In addition to all constituents and PAH ESBTUs, PEC-Qs were modeled at each location that had any sample with a PEC-Q of greater than 1. The kriging analysis identified areas with PEC-

Qs greater than 1 within some of the low and high impact hot spot areas that were identified when all constituents were kriged (Section 6.2). Figure 6-9 presents the results for PEC-Qs exceeding 1 in Area A, and Figure 6-10 presents the results for PEC-Qs exceeding 1 in Areas B and C.

6.5.1 Spatial Analysis for PEC-Qs in Area A

The spatial analysis for PEC-Qs in Area A identified three areas where sediment samples had PEC-Qs greater than 1. Figure 6-9 presents the areas identified, along with the estimated volume of sediment with a PEC-Q of greater than 1 and the maximum PEC-Q value within that area.

All of the areas with elevated PEC-Qs in Area A were in the same location as high impact hot spot areas 2 and 5 (Figures 6-3 and 6-4), as identified in Section 6.3 (Figure 6-1). PEC-Qs greater than 1 were located around several sample locations (CI13-39, -42, -43,-44, 48, and -49) within hot spot 2 (Figure 6-1). PEC-Qs greater than 1 were also present around sample location CI13-27 within hot spot 5 (Figure 6-4). The highest PEC-Q (17.57) was present in the 3- to 5-ft depth interval at location CI13-43 within the area of hot spot 2. Low impact hot spot area 3 (Figure 6-1) does not appear when considering the PEC-Q of all constituents; the constituent with elevated concentrations at this area was total PAHs, and concentrations were only elevated just above the PEC.

6.5.2 Spatial Analysis for PEC-Qs in Areas B and C

The spatial analysis for PEC-Qs in Areas B and C identified five areas where sediment samples had PEC-Qs greater than 1. Figure 6-10 presents the areas identified along with the maximum PEC-Q value within that area.

All of the areas with elevated PEC-Qs in Areas B and C were in the same location as high impact hot spot areas 5 and 7, as identified in Section 6.3 (Figure 6-2). PEC-Qs greater than 1 were located around sample locations CI13-04, -25, and -26 within hot spot 5 (which also extends into Area A), at locations CI13-14 and -16 within hot spot 6, and at location CI13-30 within hot spot 7. The highest PEC-Q (4.48) was present in the 0- to 0.5-ft depth interval at location CI13-16 within the area of hot spot 6.

7. CONCLUSIONS

Based on the data collected during the sediment assessment in the Celeron Island Area, the high impact hot spot areas for sediment with elevated concentrations of constituents are hot spot 2 (located in a channel in Area A, hot spot 5 (located in the northern portions of Areas A, B, and C), hot spot 6 (located on the eastern side of Celeron Island), and hot spot 7 (located on the western side of Celeron Island) (Figures 6-3 through 6-6). These four high impact hot spots have an estimated total of 147,000 cy of sediment with constituent concentrations exceeding the PEC.

The four high impact hot spot areas should be considered for further investigation and potential remediation efforts in the Celeron Island Area. Model results indicated that each of these areas has a large volume of sediment with elevated concentrations of constituents exceeding two or three times the PEC. Modeling of the PAH ESBTUs and the PEC-Qs also showed elevated values within the high impact hot spot areas that were identified when modeling all constituents with concentrations above the PEC. Further delineation of the extent of sediment with elevated concentrations of constituents is recommended. In hot spot 2, the potential might exist for elevated concentrations further north in the channels (Figure 6-3). The modeling results for all constituents elevated above two or three times the PEC, the PAH ESBTUs, and the PEC-Qs suggest that these areas should be considered for further investigation and potential remediation within the Celeron Island Area (Figures 6-7 through 6-10). However, the limited number of samples results in significant uncertainty of the volume of sediment with elevated concentrations of constituents in the hot spot areas.

As discussed in Section 6.2.2, there are several low impact hot spot areas that demonstrated concentrations of one or more constituents above PECs. These locations contained a constituent concentration elevated slightly above the PEC, or had less than half the volume of sediment with elevated concentrations as compared to the four high impact hot spot areas (Figures 6-1 and 6-2). As a result, these areas are not considered indicative of hot spots warranting further delineation or remediation. Hot spot 1 is close to hot spot 2 and could be considered for further delineation or potential remediation because it has a small area around CI13-46 with concentrations of constituents exceeding two times the PEC, along with a larger estimated volume of sediment exceeding the PEC. There is uncertainty with regard to the extent of hot spot 1 since it is defined by the only sampling location in that channel.

8. REFERENCES

Besser, J.M., Giesy, J.M., Kubita, J.A. 1996. *Assessment of sediment quality in dredged and undredged areas of the Trenton Channel of the Detroit River, Michigan USA, using the Sediment Quality Triad*. J. Great Lakes Res. 22 (3), 683−696.

Detroit Water and Sewerage Department. 2013. *Detroit Water and Sewerage Department Factsheet.* http://www.dwsd.org/downloads_n/about_dwsd/fact_sheet/dwsd_fact_sheet.pdf.

EA Engineering, Science, and Technology (MI), PLC (EA). 2013a. *Quality Assurance Project Plan, Assessment of Contaminated Sediments, Celeron Island Area, Detroit River Area of Concern, Grosse Ile, Michigan*. May.

———. 2013b. Field Sampling Plan, Appendix A: *Quality Assurance Project Plan, Assessment of Contaminated Sediments, Celeron Island Area, Detroit River Area of Concern, Grosse Ile Michigan*. May.

———. 2013c. *Data Usability Report, Assessment of Contaminated Sediments, Celeron Island Area, Detroit River Area of Concern, Grosse Ile Michigan*. May.

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

MacDonald D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Archives of Environmental Contamination and Toxicology* 39:20-31.

Michigan Department of Natural Resources. 1991. *Detroit River Remedial Action Plan Stage* 1. Surface Water Quality Division, Lansing, Michigan. June.

Persaud, D.R., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the protection and management of aquatic sediments in Ontario. Standards Development Branch. Ontario Ministry of Environment and Energy. Toronto, Canada.

U.S. Environmental Protection Agency (EPA). 2008. *Interim Guidance for Developing Global Positioning System Data Collection Standard Operating Procedures and Quality Assurance Project Plans*. EPA/600/R-08/020.

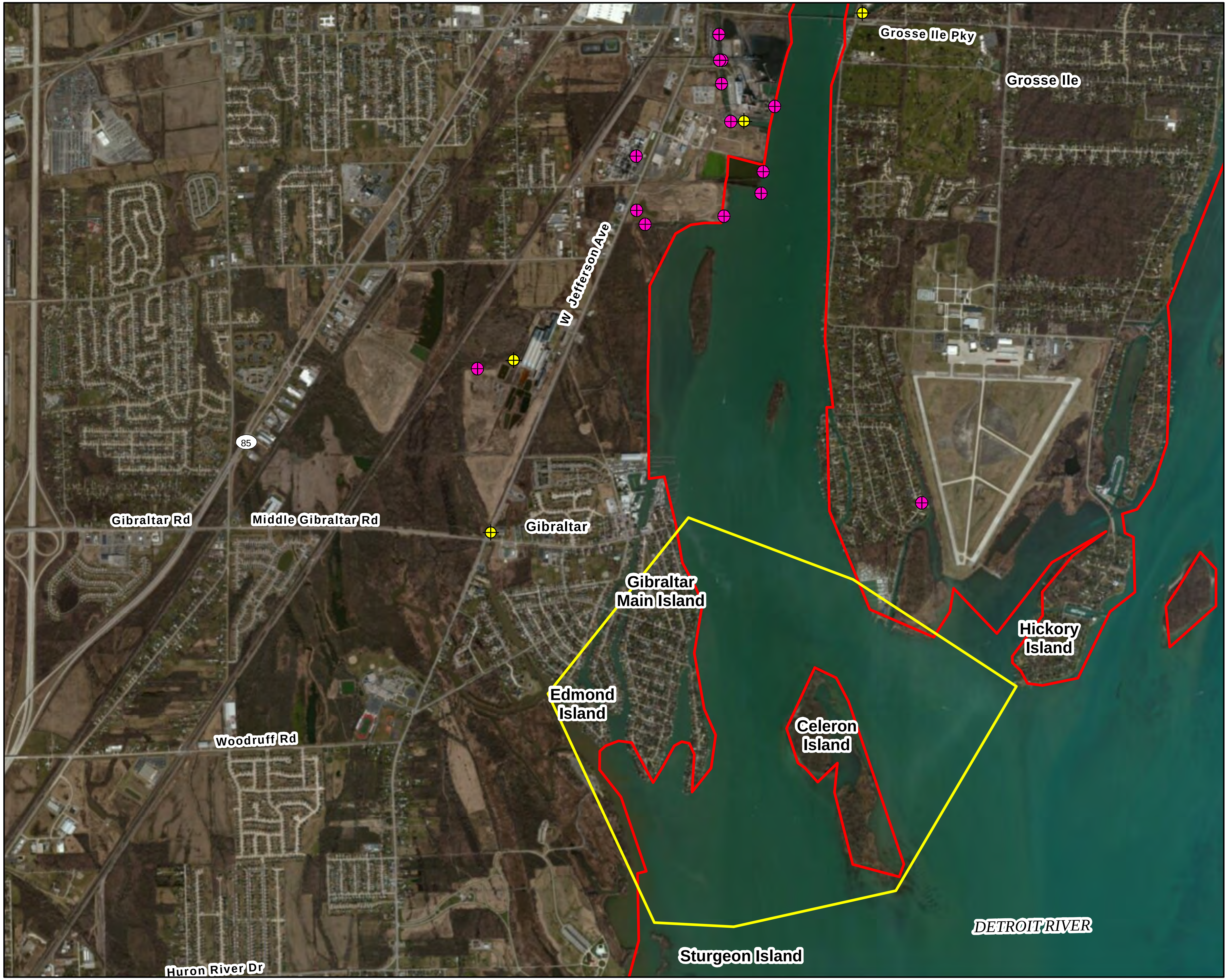
———. 2005. *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc).* EPA-600-R-02-011. Office of Research and Development. Washington, DC 20460. January.

———. 2003. *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures*. EPA-600-R-02-013. Office of Research and Development. Washington, DC 20460.

———. 2000. Prediction of sediment toxicity using consensus-based freshwater sediment quality guidelines: EPA 905/R-00/007, Great Lakes Program Office, Chicago, Illinois.

Wisconsin Department of Natural Resources (WDNR). 2003. Consensus Based Sediment Quality Guidelines, Recommendations for Use and Application. WT 732-2003. December.

FIGURES



Legend

⊕ Active Outfalls

⊕ Historical Outfalls

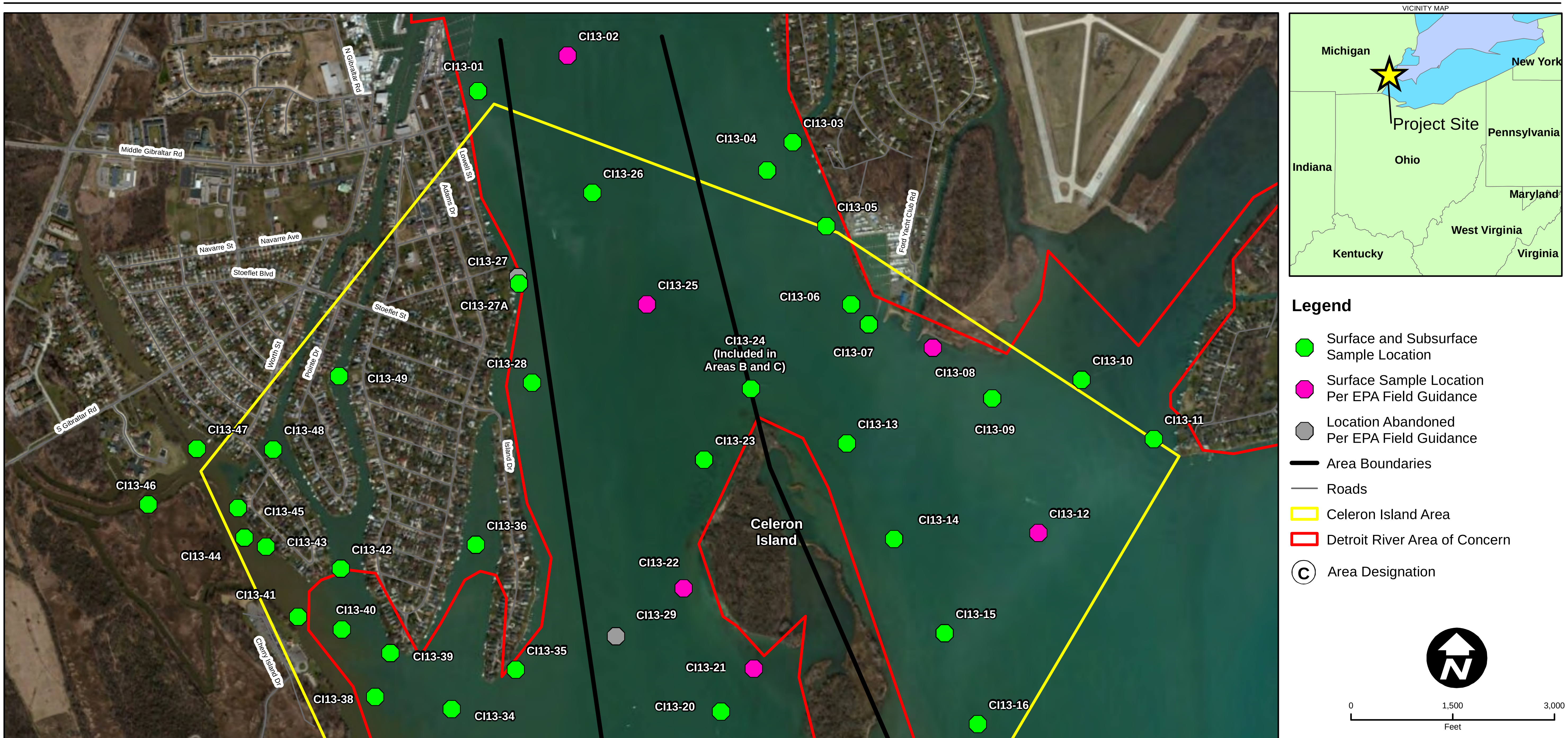
☐ Celeron Island Area

☐ Detroit River Area of Concern

Data Sources: EPA 2013
ESRI ArcGIS Online
Map Date: January 2014

FIGURE ES-1
Celeron Island Area

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

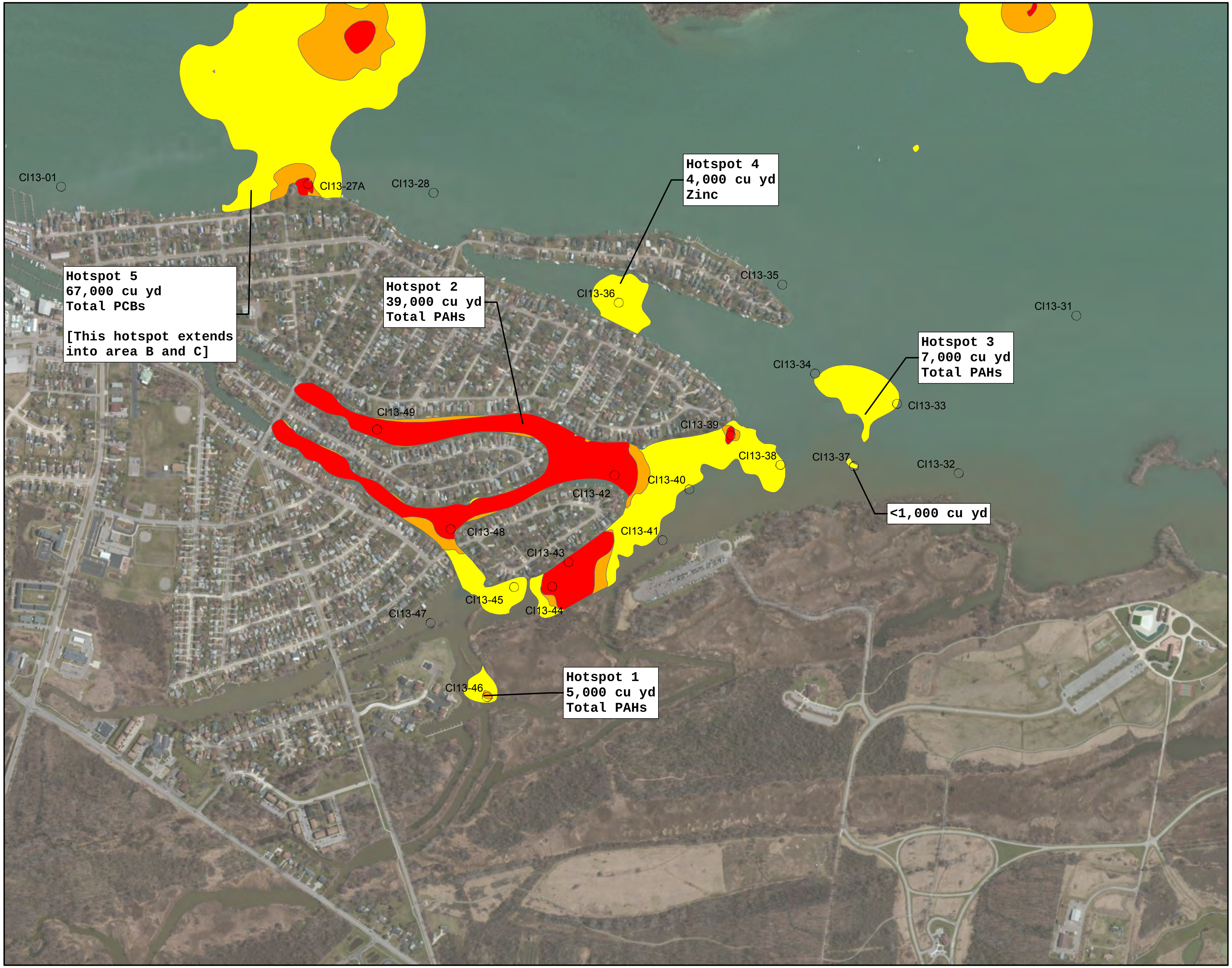


Data Sources: EPA 2013/EA 2013
Basemap: ESRI 2012
Map Created: 4/3/2014

FIGURE ES-2
Sample Locations for the
Celeron Island Area Site Characterization

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\ExecutiveSummary\Figure ES-3 Spatial Analysis for All Constits in Area A.mxd



VICINITY MAP

Legend

○ Sample Locations- Area A

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

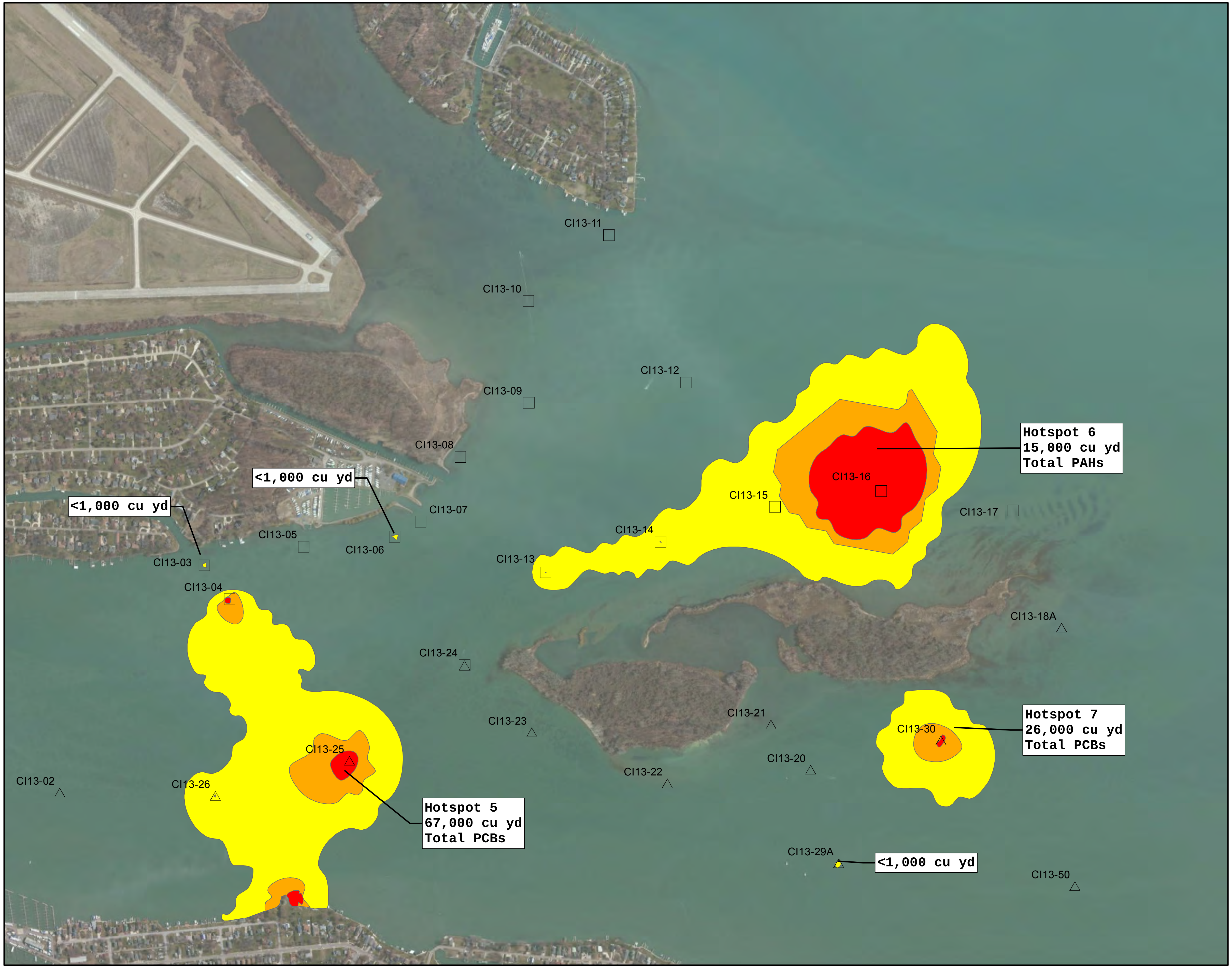
0 500 1,000 1,500 2,000
Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-3
Spatial Analysis for All Constituents in Area A

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-4 Spatial Analysis for All Constits in Areas B and C.mxd



VICINITY MAP

Legend

△ Sample Locations- Area B

☐ Sample Locations- Area C

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

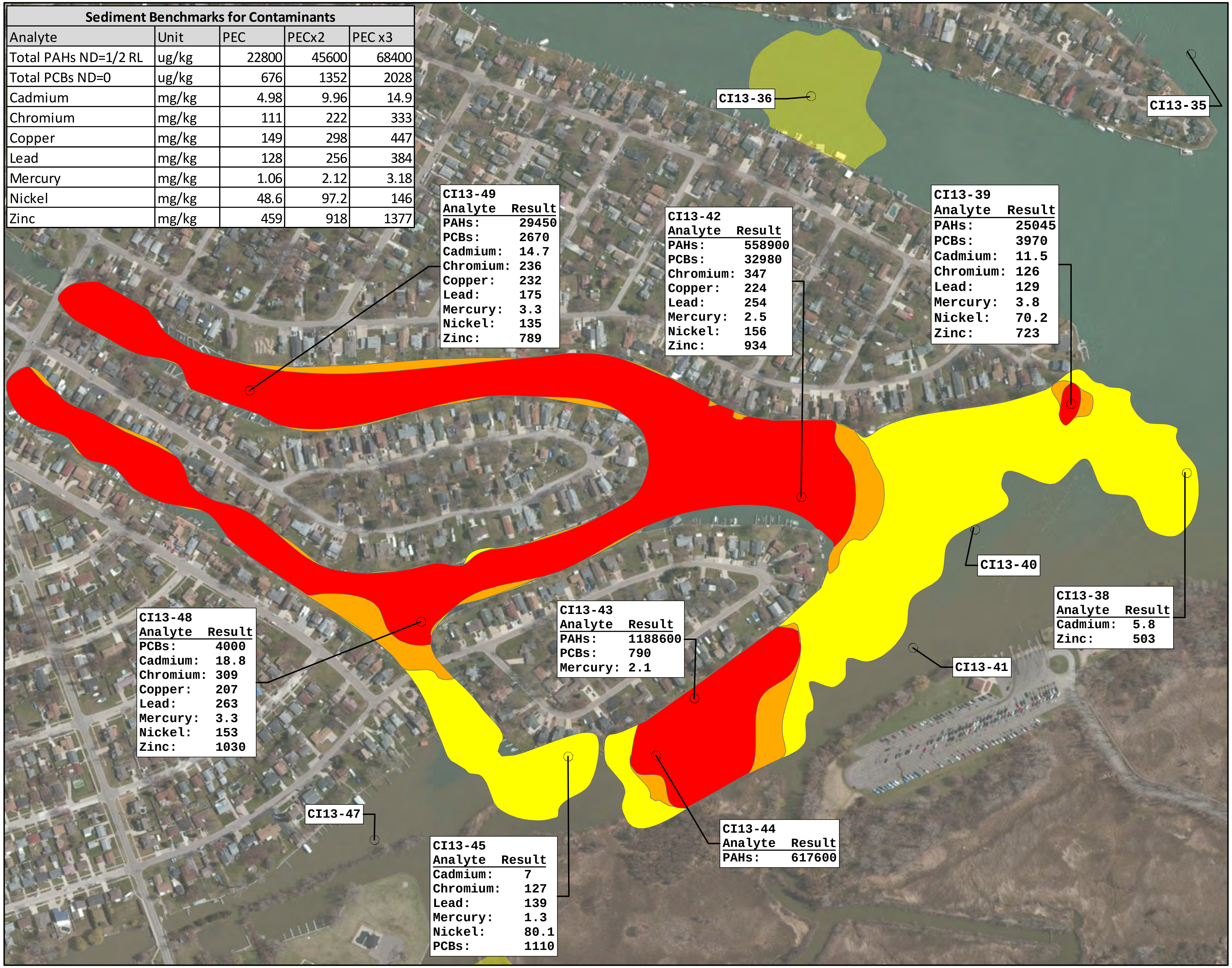
0 500 1,000 1,500 2,000
Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-4
Spatial Analysis for All Constituents in Areas B and C

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-5 Hot Spot 2.mxd



Sediment Benchmarks for Contaminants

Analyte	Unit	PEC	PECx2	PEC x3
Total PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Zinc	mg/kg	459	918	1377

CI13-49

Analyte	Result
PAHs:	29450
PCBs:	2670
Cadmium:	14.7
Chromium:	236
Copper:	232
Lead:	175
Mercury:	3.3
Nickel:	135
Zinc:	789

CI13-42

Analyte	Result
PAHs:	558900
PCBs:	32980
Chromium:	347
Copper:	224
Lead:	254
Mercury:	2.5
Nickel:	156
Zinc:	934

CI13-39

Analyte	Result
PAHs:	25045
PCBs:	3970
Cadmium:	11.5
Chromium:	126
Lead:	129
Mercury:	3.8
Nickel:	70.2
Zinc:	723

CI13-48

Analyte	Result
PCBs:	4000
Cadmium:	18.8
Chromium:	309
Copper:	207
Lead:	263
Mercury:	3.3
Nickel:	153
Zinc:	1030

CI13-43

Analyte	Result
PAHs:	1188600
PCBs:	790
Mercury:	2.1

CI13-38

Analyte	Result
Cadmium:	5.8
Zinc:	503

CI13-45

Analyte	Result
Cadmium:	7
Chromium:	127
Lead:	139
Mercury:	1.3
Nickel:	80.1
PCBs:	1110

CI13-44

Analyte	Result
PAHs:	617600

VICINITY MAP

Legend

○ Sample Locations- Area A

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 39,000 cu yd

0 250 500 750 1,000
Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

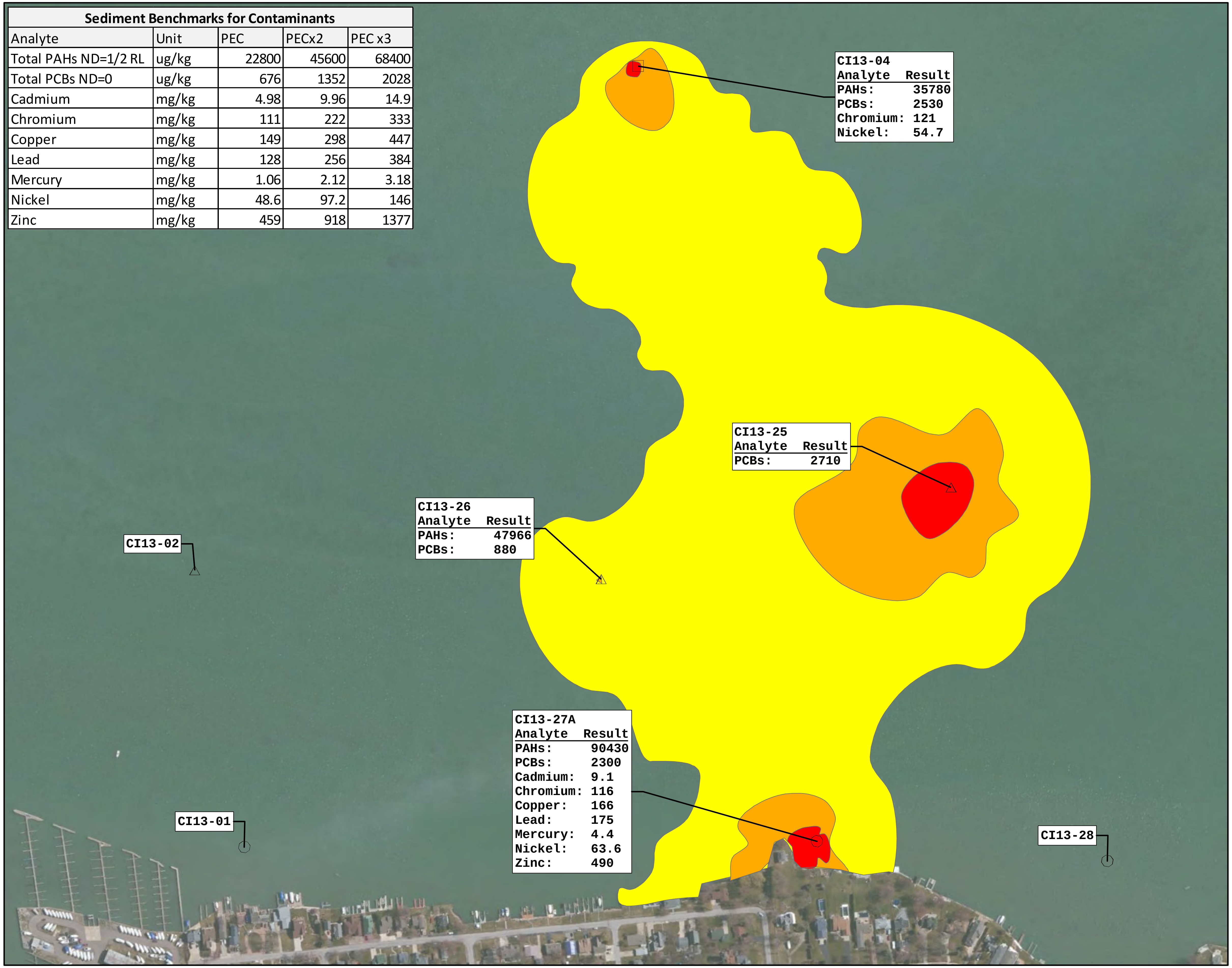
FIGURE ES-5
Hotspot 2

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-6 Hot Spot 5.mxd

Sediment Benchmarks for Contaminants

Analyte	Unit	PEC	PECx2	PEC x3
Total PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Zinc	mg/kg	459	918	1377



VICINITY MAP

Legend

- ○ Sample Locations- A
- △ Sample Locations Area B
- ☐ Sample Locations- Area C

All Constituents

- 🟥 ≥ 3x PEC
- 🟧 ≥ 2x PEC
- 🟨 ≥ PEC

NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 67,000 cu yd

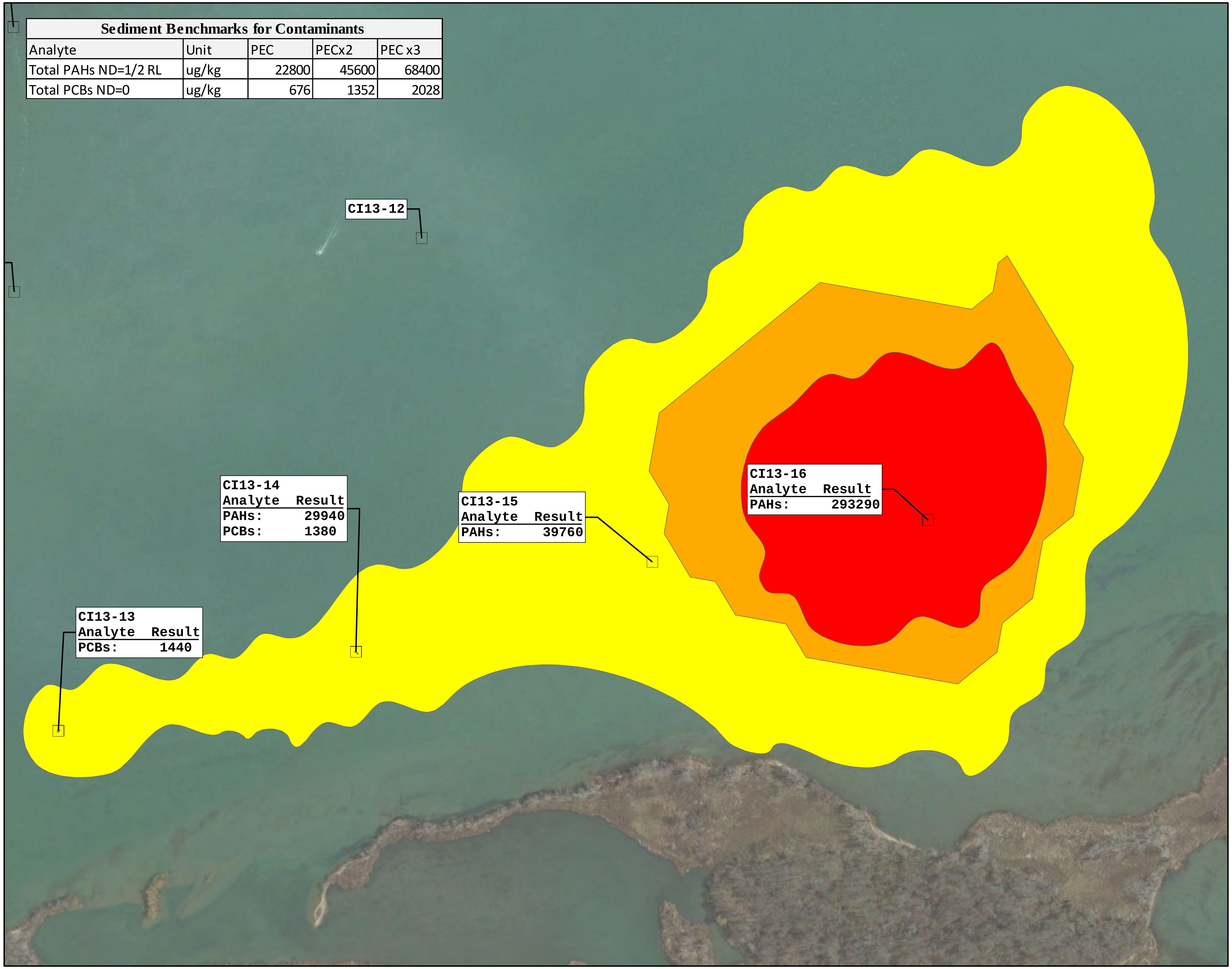
0 250 500 750 1,000
Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-6
Hotspot 5

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-7 Hot Spot 6.mxd



Sediment Benchmarks for Contaminants

Analyte	Unit	PEC	PECx2	PEC x3
Total PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028

VICINITY MAP

Legend

☐ Sample Locations- Area C

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

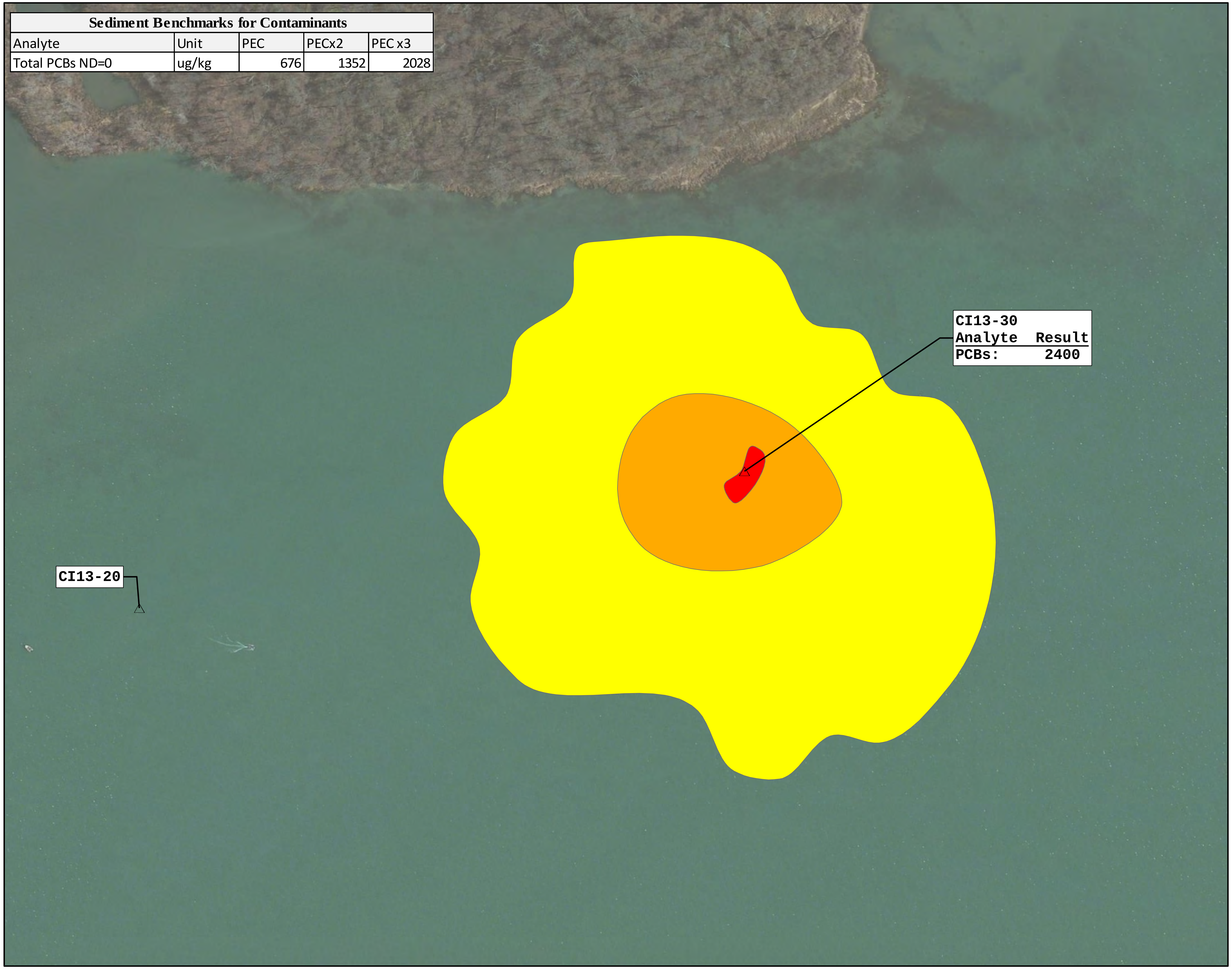
NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 15,000 cu yd

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-7
Hotspot 6

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-8 Hot Spot 7.mxd



Sediment Benchmarks for Contaminants

Analyte	Unit	PEC	PECx2	PEC x3
Total PCBs ND=0	ug/kg	676	1352	2028

VICINITY MAP

Legend

△ Sample Locations- Area B

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 26,000 cu yd

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-8
Hotspot 7

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-9 Spatial Analysis for ESBTUs in Areas A.mxd

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

☐ Sample Locations- Area C

ESBTU

🟥 > 10

🟧 7.5-10

🟨 1 - 7.4

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000
Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-9
Spatial Analysis for ESBTUs in Area A
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-10 Spatial Analysis for ESBTUs in Areas BC.mxd

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

☐ Sample Locations- Area C

ESBTU

🟥 > 10

🟧 7.5-10

🟨 1 - 7.4

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000
Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-10
Spatial Analysis for ESBTUs in Areas B and C

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-11 Spatial Analysis for PECQs in Areas A.mxd

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

□ Sample Locations- Area C

Mean PEC-Q Value (mean PEC-Qmetals + PEC-Q Total PAHs + PEC-QTotal PCBs)/3

🟥 > 1

🟨 > 0.5

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000

Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

FIGURE ES-11
Spatial Analysis for PEC-Qs in Area A

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: L:\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\Executive_Summary\Figure ES-12 Spatial Analysis for PECQs in Areas BC.mxd

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

□ Sample Locations- Area C

Mean PEC-Q Value
(mean PEC-Qmetals + PEC-Q Total PAHs + PEC-QTotal PCBs)/3

🟥 > 1

🟨 > 0.5

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000
Feet

Map Created: 7/21/2014
Basemap: ESRI 2012

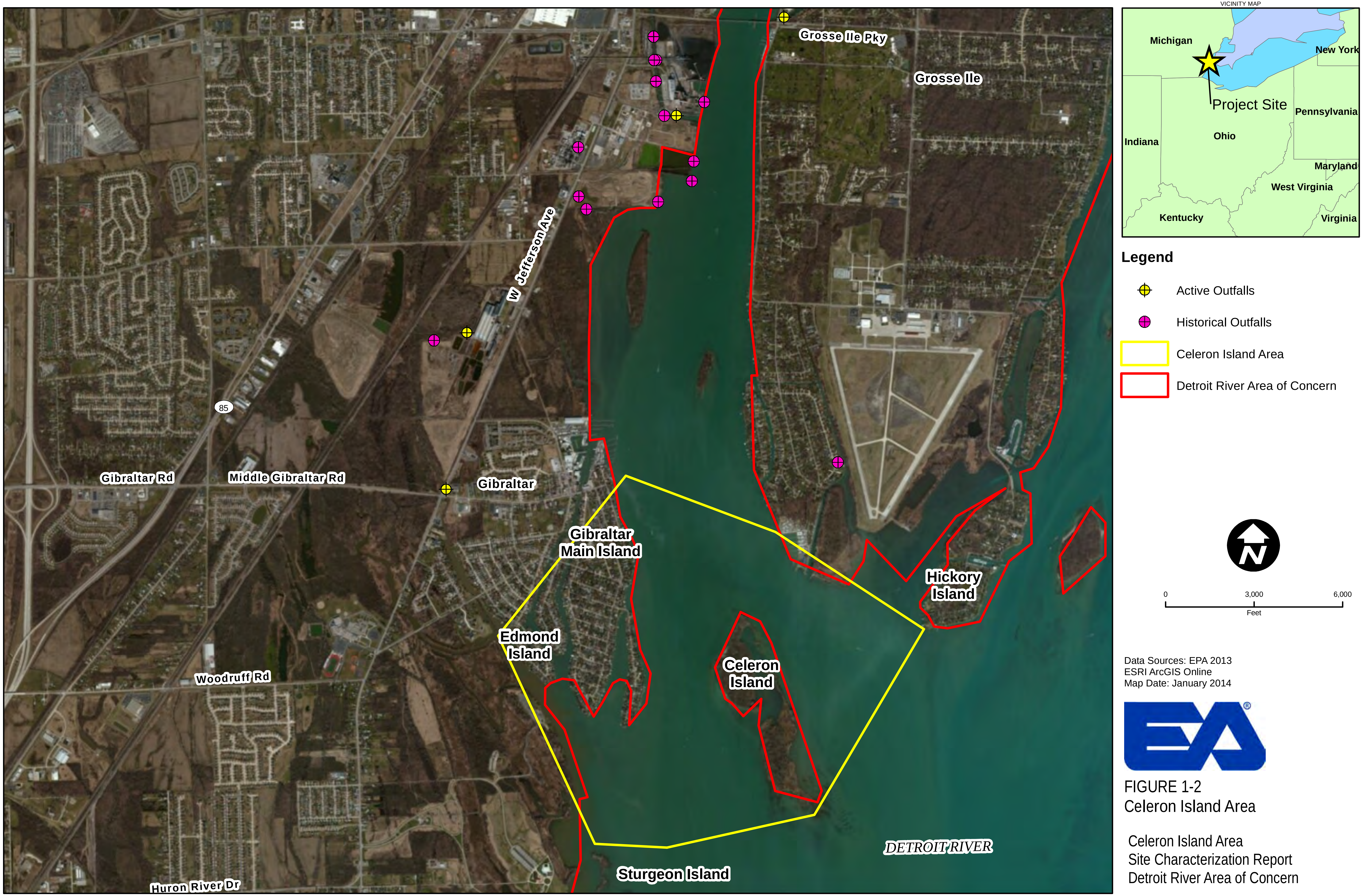
FIGURE ES-12
Spatial Analysis for PEC-Qs in Areas B and C

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Data Sources: EPA 2013b
Basemap: ESRI 2012
Map Created: 4/3/2014

FIGURE 1-1
Project Site Location

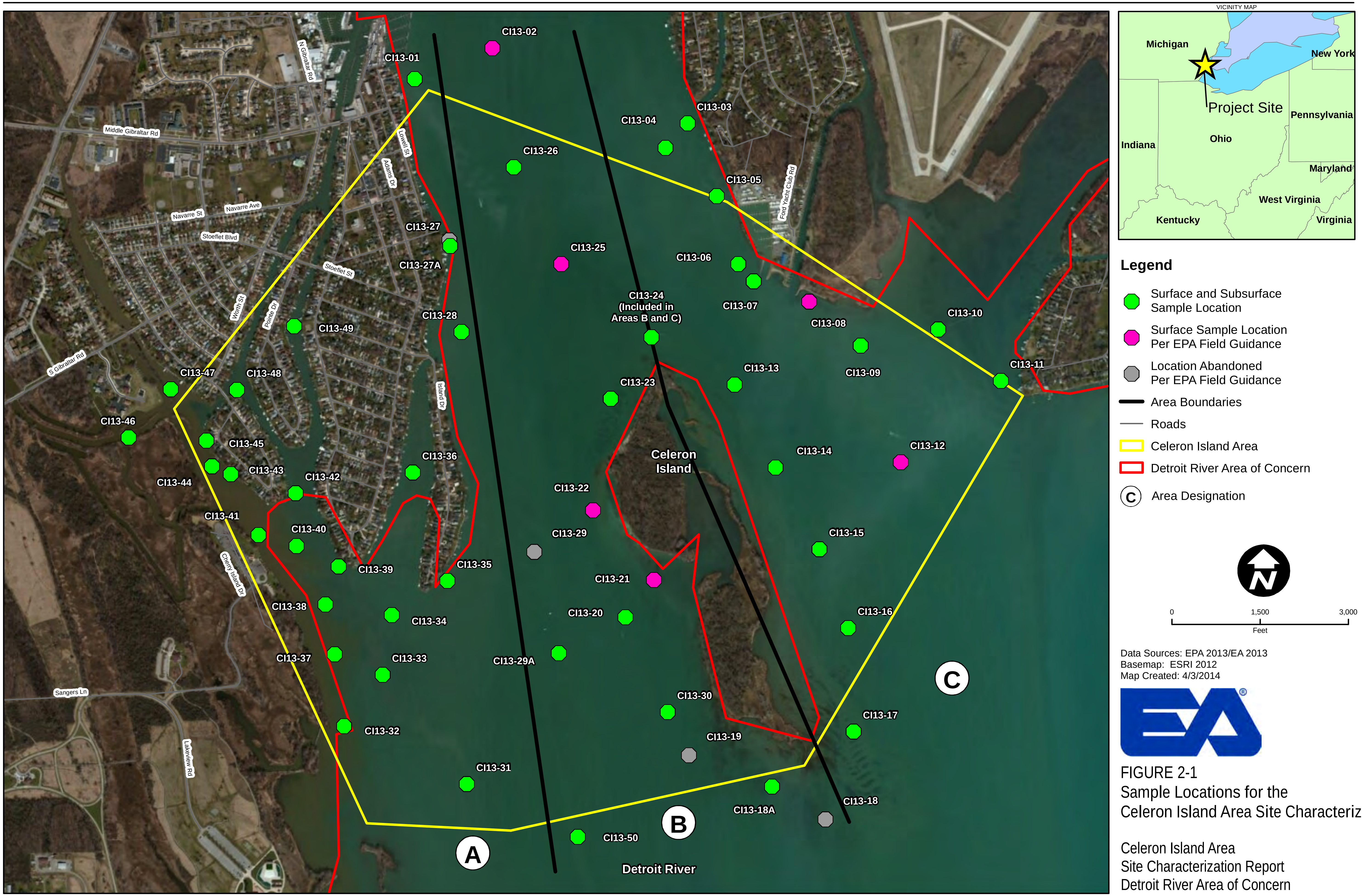
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern



Data Sources: EPA 2013
ESRI ArcGIS Online
Map Date: January 2014

FIGURE 1-2
Celeron Island Area

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

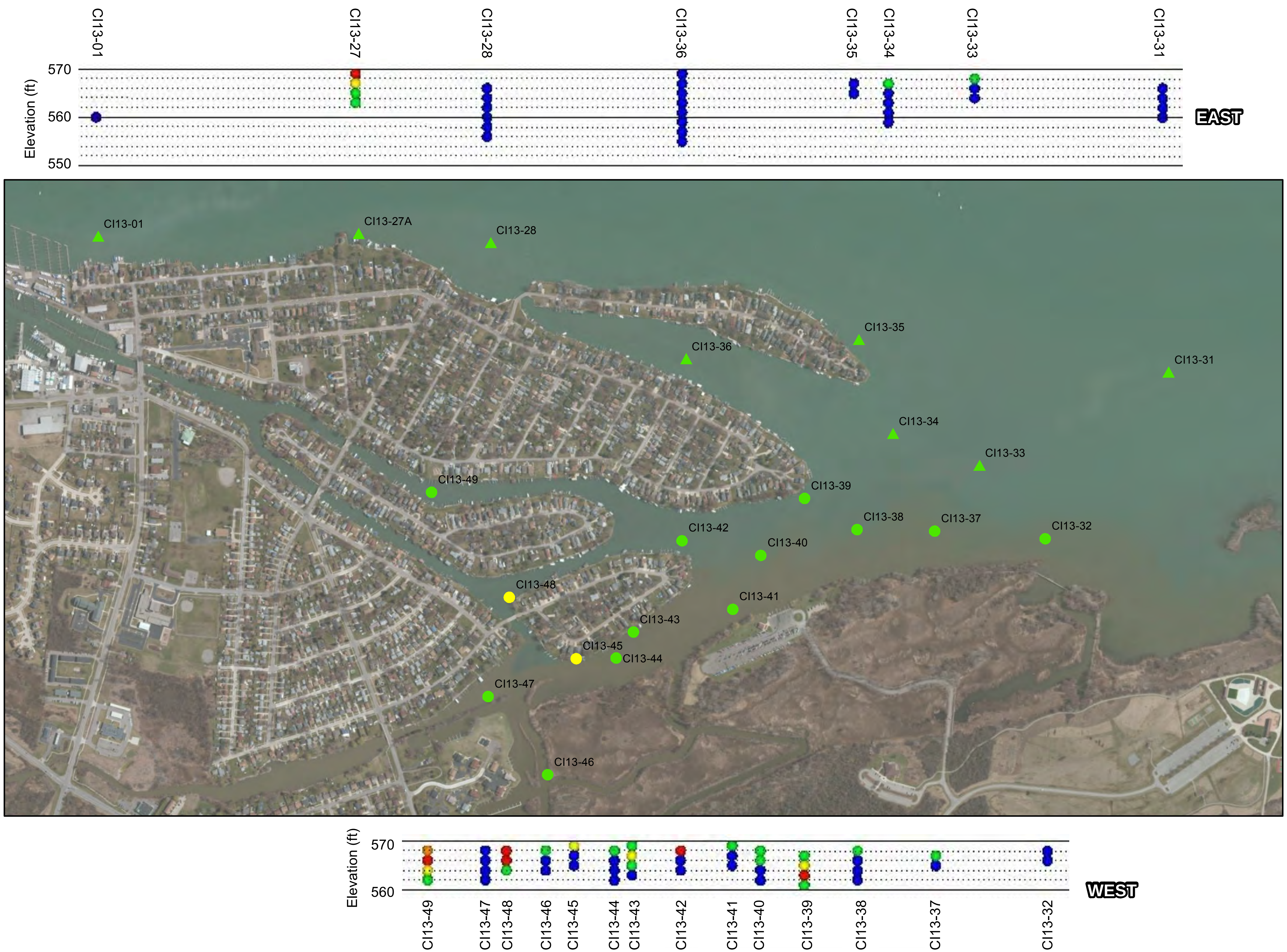


Data Sources: EPA 2013/EA 2013
Basemap: ESRI 2012
Map Created: 4/3/2014

FIGURE 2-1
Sample Locations for the
Celeron Island Area Site Characterization

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaA\Celeron_PCB_AreaA_elev.mxd



Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon Total (ND = 0) PCB Aroclor results.

Total (ND = 0) PCB Aroclor Concentrations

- 🟥 ≥ 3x PEC (2,028 µg/kg)
- 🟧 ≥ 2x PEC (1,352 µg/kg)
- 🟨 ≥ PEC (676 µg/kg)
- 🟩 ≥ TEC (59.8 µg/kg)
- 🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-1A
Total (ND=0) PCB Aroclor Concentrations (µg/kg) Detected in Area A – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_PCB_AreaB_elev.mxd

VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon Total (ND = 0) PCB Aroclor results.

Total (ND = 0) PCB Aroclor Concentrations

🟥 ≥ 3x PEC (2,028 µg/kg)
🟧 ≥ 2x PEC (1,352 µg/kg)
🟨 ≥ PEC (676 µg/kg)
🟩 ≥ TEC (59.8 µg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

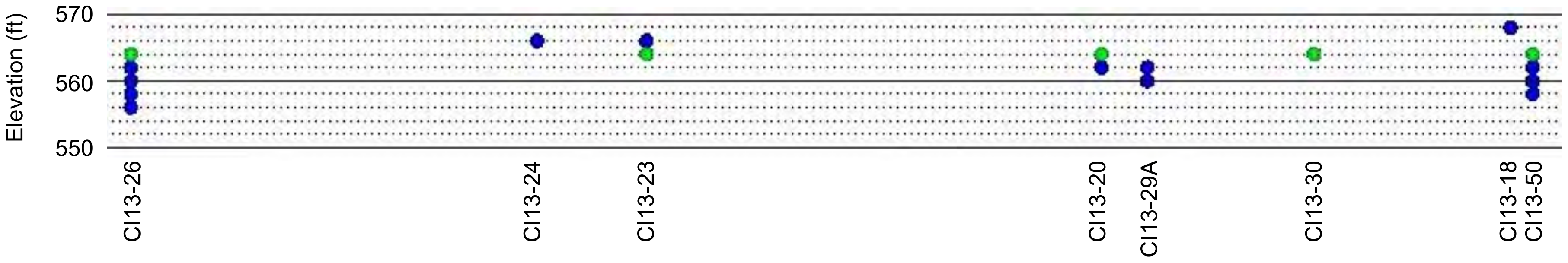
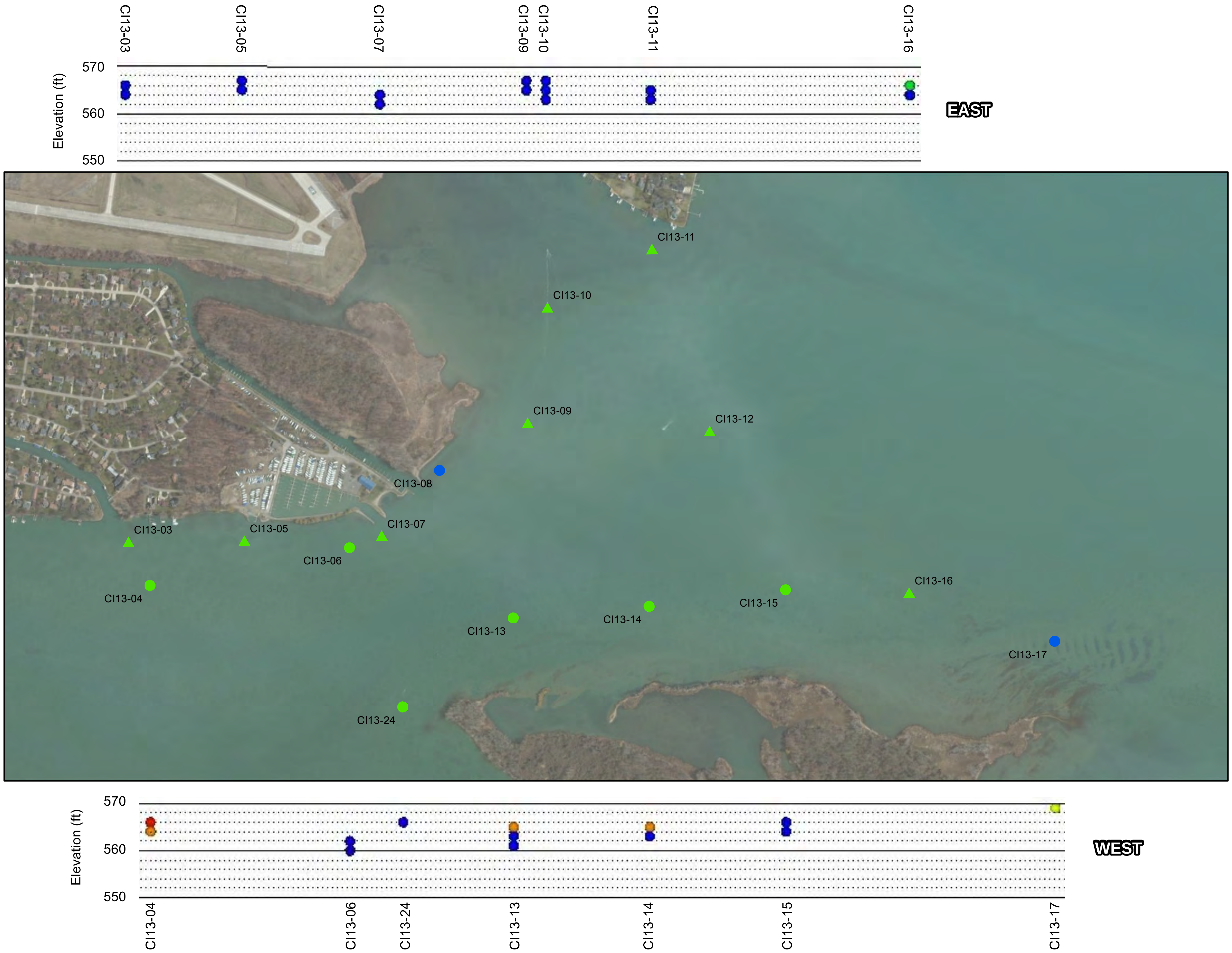


FIGURE 3-1B
Total (ND = 0) PCB Aroclor Concentrations (µg/kg) Detected in Area B – Celeron Island Area Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_PCB_AreaC_elev.mxd



VICINITY MAP

Legend

▲ Area C (east side)

● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon Total (ND = 0) PCB Aroclor results.

Total (ND = 0) PCB Aroclor Concentrations

🟥 ≥ 3x PEC (2,028 µg/kg)

🟧 ≥ 2x PEC (1,352 µg/kg)

🟨 ≥ PEC (676.0 µg/kg)

🟩 ≥ TEC (59.80 µg/kg)

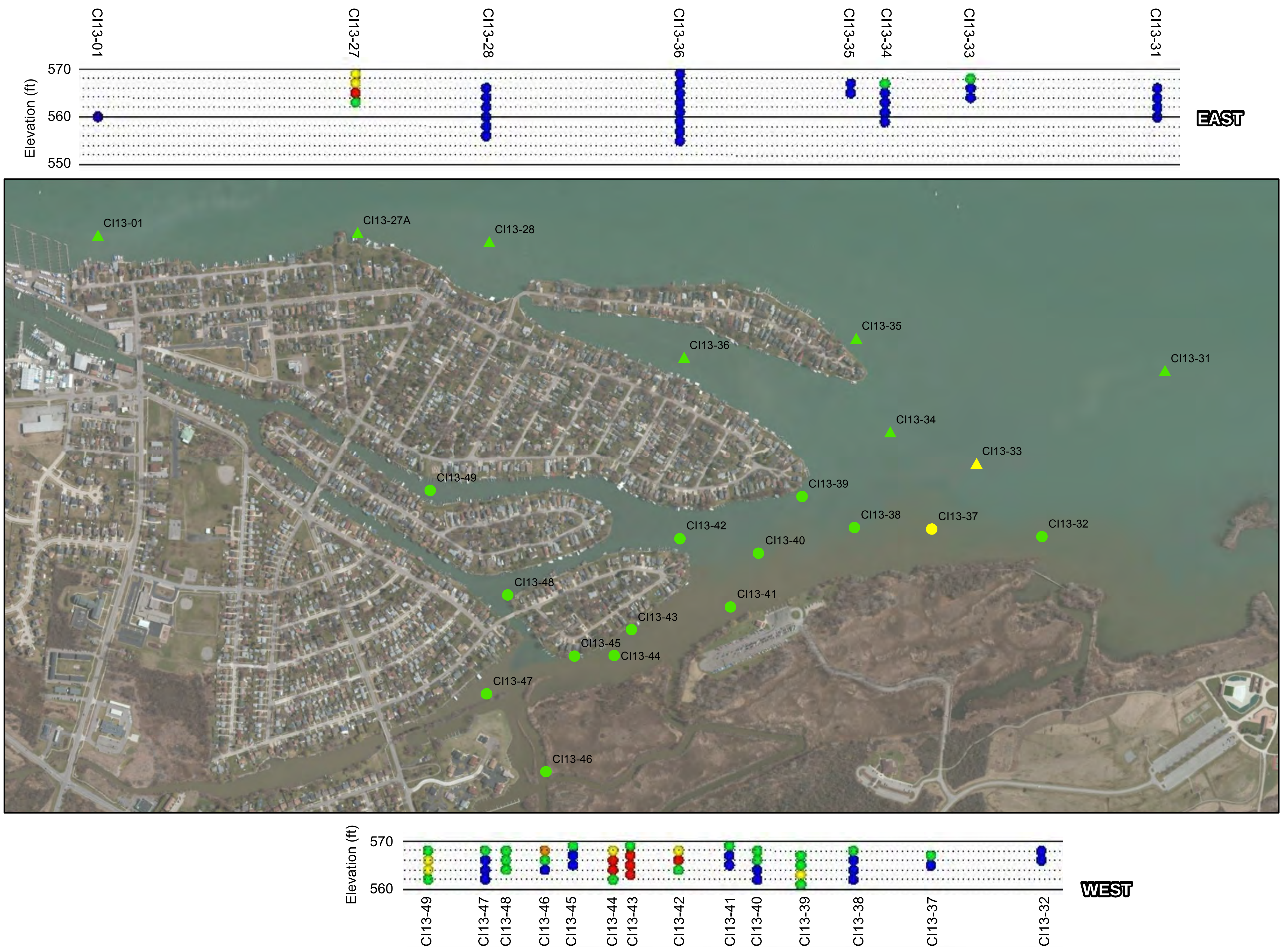
🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-1C
Total (ND = 0) PCB Aroclor Concentrations (µg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaA\Celeron_PAH_AreaA_elev.mxd



VICINITY MAP

Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.

Vibracore sample results are shown on the graphs.

Locations are color coded based upon Total (ND = ½ RL) 17PAH results.

Total (ND = ½ RL) 17PAH Concentrations

🟥 ≥ 3x PEC (68,400 µg/kg)

🟧 ≥ 2x PEC (45,600 µg/kg)

🟨 ≥ PEC (22,800 µg/kg)

🟩 ≥ TEC (1,610 µg/kg)

🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-2A
Total (ND=1/2 RL) 17PAH Concentrations (µg/kg) Detected in Area A – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_PAH_AreaB_elev.mxd

VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon Total (ND = ½ RL) 17PAH results.

Total (ND = ½ RL) 17PAH Concentrations

🟥 ≥ 3x PEC (68,400 µg/kg)
🟧 ≥ 2x PEC (45,600 µg/kg)
🟨 ≥ PEC (22,800 µg/kg)
🟩 ≥ TEC (1,610 µg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

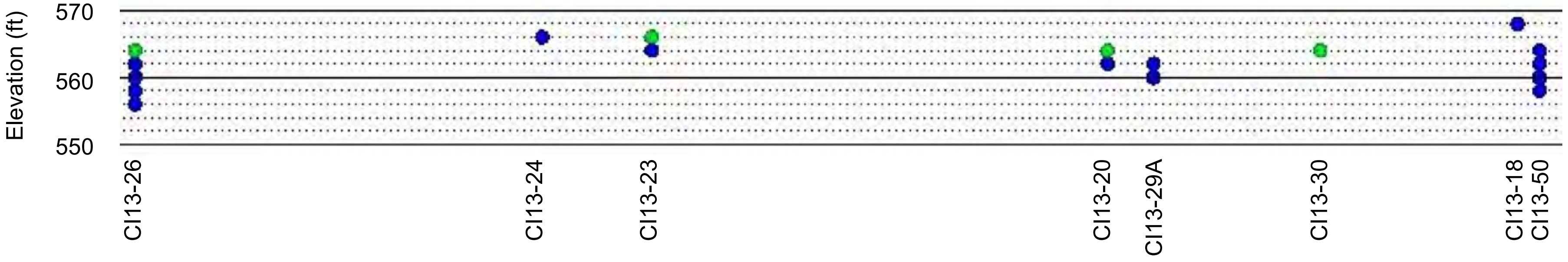
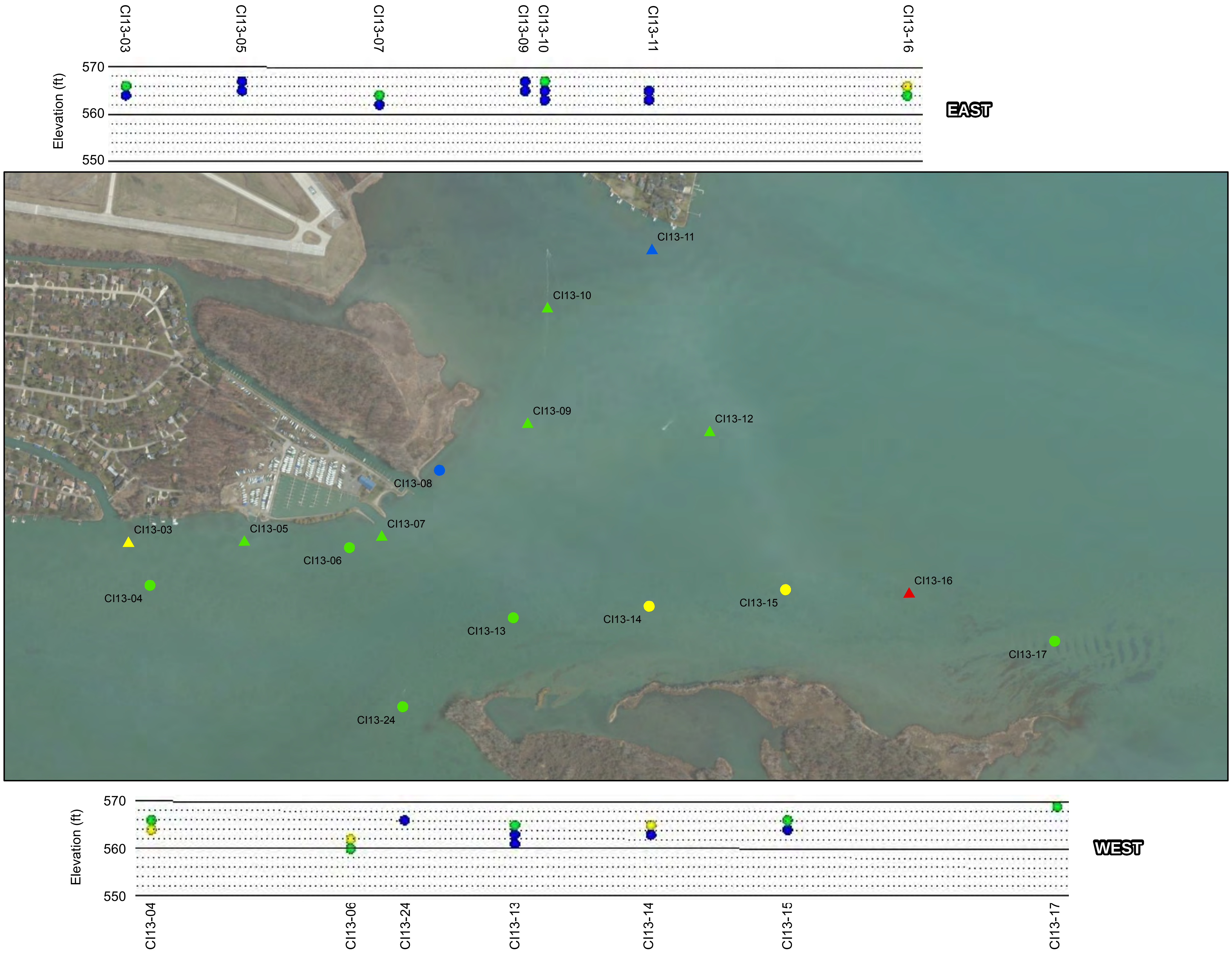


FIGURE 3-2B
Total (ND = ½ RL) 17PAH Concentrations (µg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_PAH_AreaC_elev.mxd



VICINITY MAP

Legend

▲ Area C (east side)

● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon Total (ND= ½ RL) 17PAH results.

Total (ND= ½ RL) 17PAH Concentrations

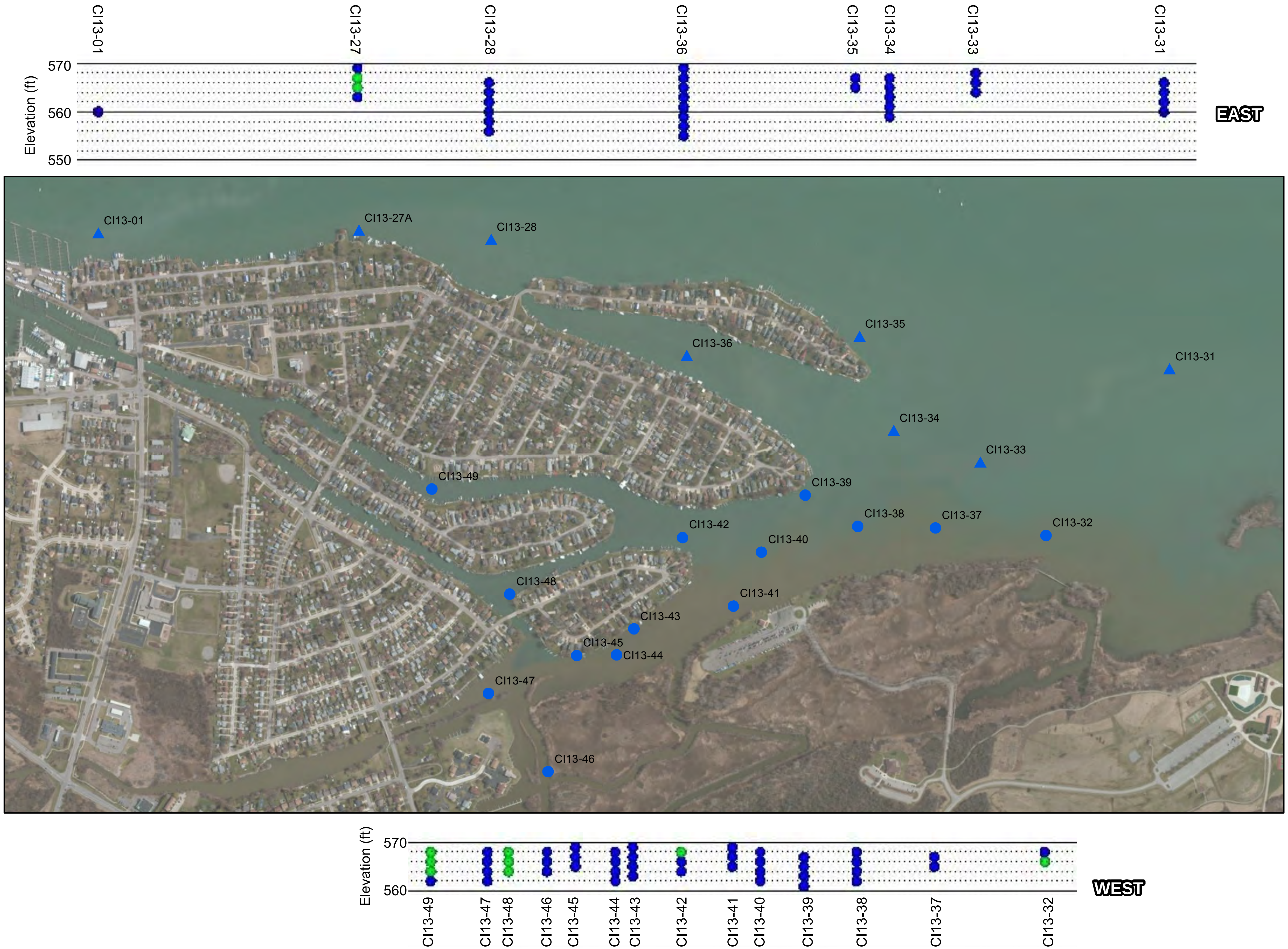
🟥 ≥ 3x PEC (68,400 µg/kg)
🟧 ≥ 2x PEC (45,600 µg/kg)
🟨 ≥ PEC (22,800 µg/kg)
🟩 ≥ TEC (1,610 µg/kg)
🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-2C
Total (ND= ½ RL) 17PAH Concentrations (µg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaA\Celeron_Arsenic_AreaA_elev.mxd



VICINITY MAP

Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon arsenic results.

Arsenic Concentrations

🟥 ≥ 3x PEC (99 mg/kg)
🟧 ≥ 2x PEC (66 mg/kg)
🟨 ≥ PEC (33 mg/kg)
🟩 ≥ TEC (9.79 mg/kg)
🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-3A
Arsenic Concentrations (mg/kg) Detected in Area A – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_Arsenic_AreaB_elev.mxd

VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon arsenic results.

Arsenic Concentrations

🟥 ≥ 3x PEC (99 mg/kg)
🟧 ≥ 2x PEC (66 mg/kg)
🟨 ≥ PEC (33.00 mg/kg)
🟩 ≥ TEC (9.79 mg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

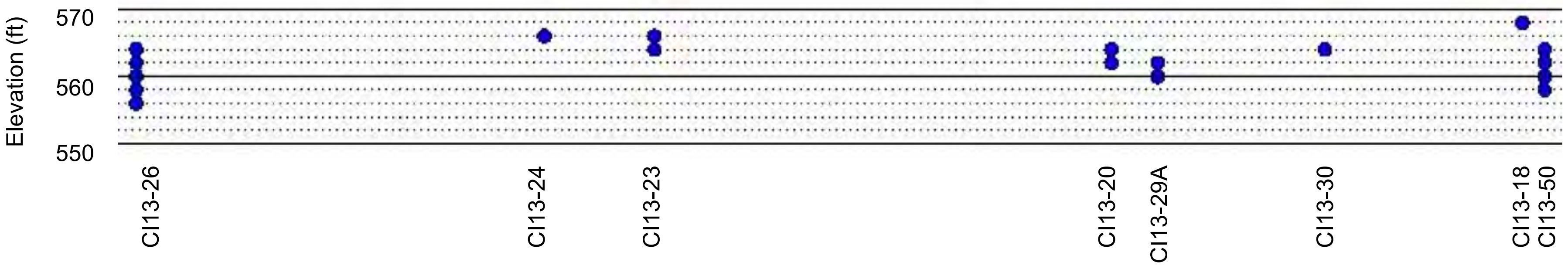
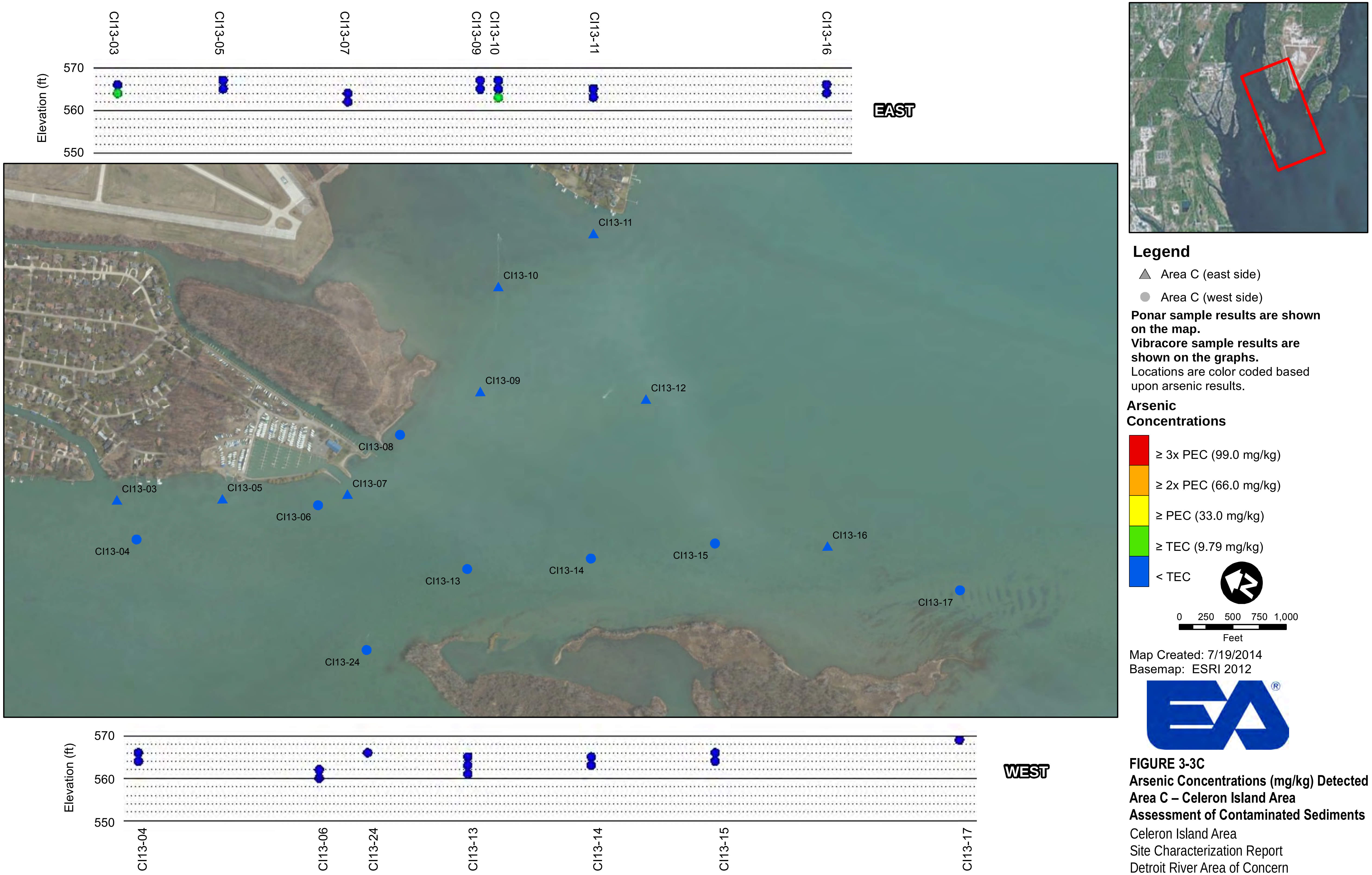


FIGURE 3-3B
Arsenic Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_Arsenic_AreaC_elev.mxd



Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon arsenic results.

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-3C
Arsenic Concentrations (mg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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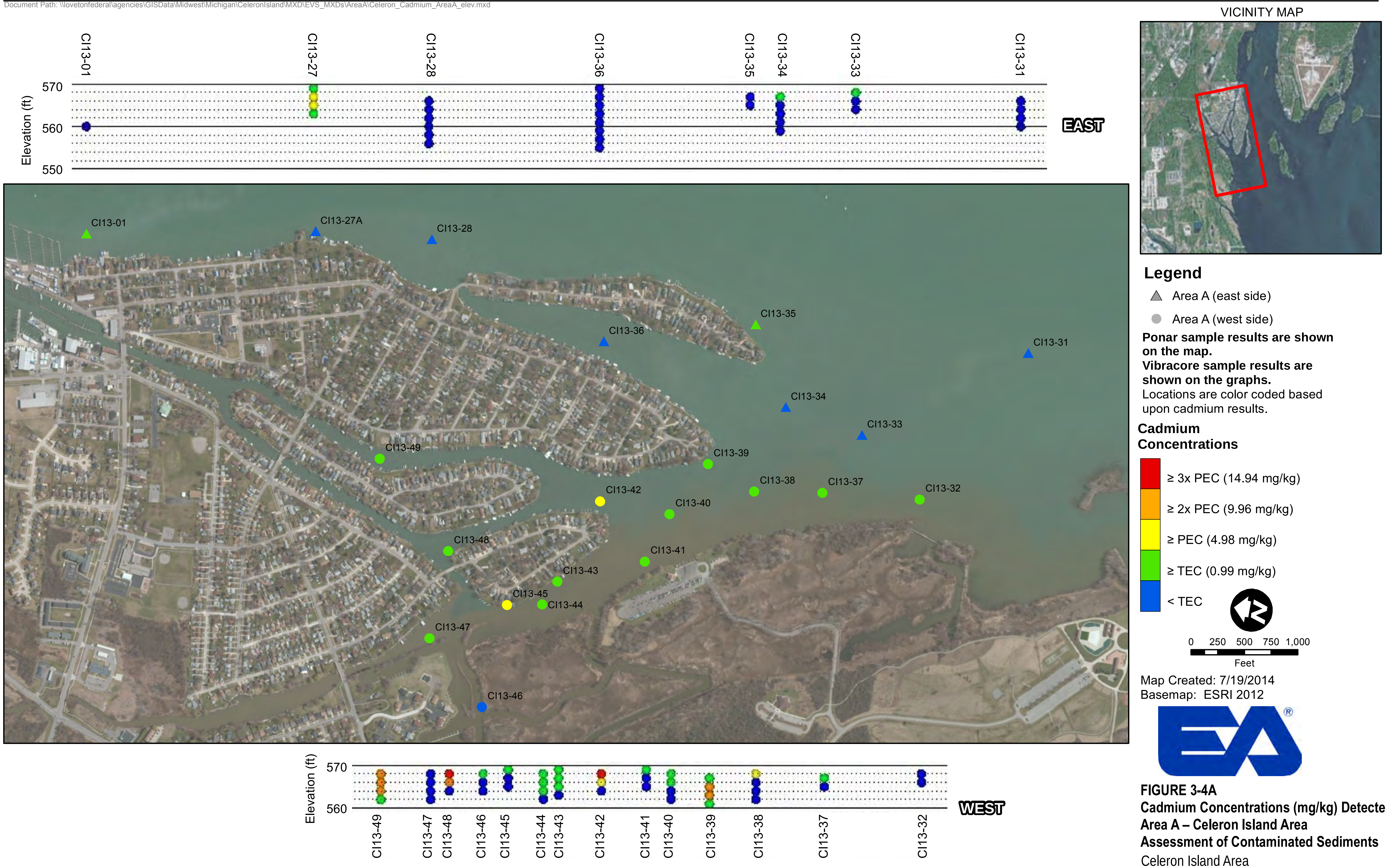
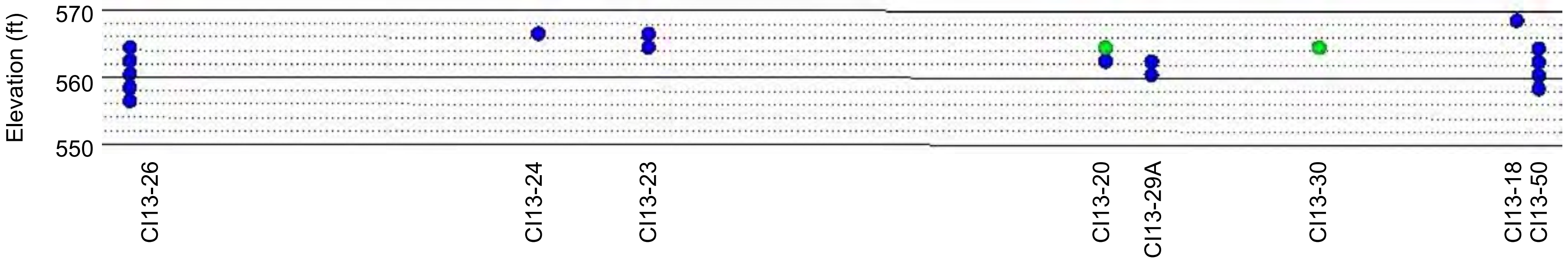


Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-4A
Cadmium Concentrations (mg/kg) Detected in Area A – Celeron Island Area
Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_Cadmium_AreaB_elev.mxd



VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon cadmium results.

Cadmium Concentrations

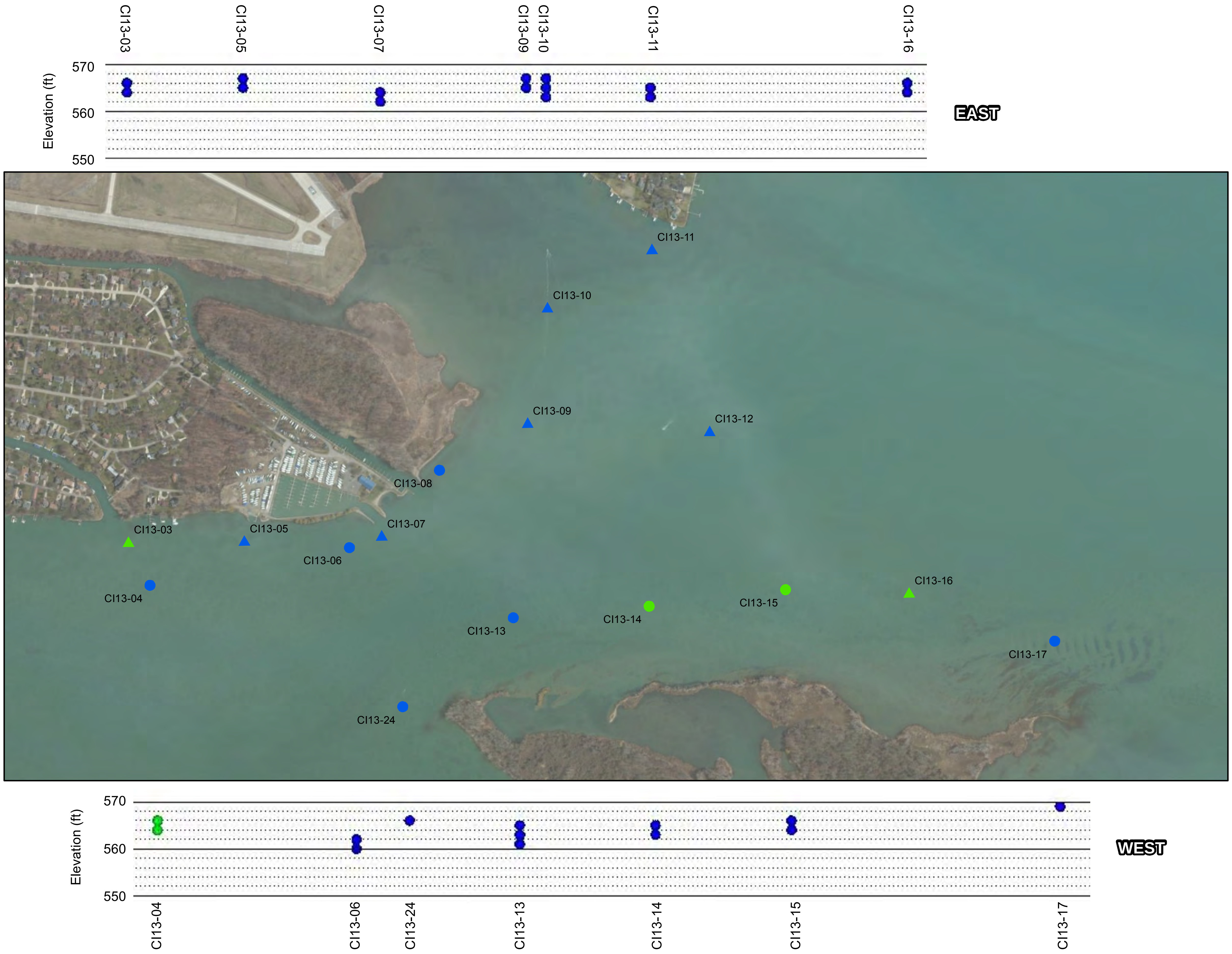
🟥 ≥ 3x PEC (14.94 mg/kg)
🟧 ≥ 2x PEC (9.96 mg/kg)
🟨 ≥ PEC (4.98 mg/kg)
🟩 ≥ TEC (0.99 mg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-4B
Cadmium Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_Cadmium_AreaC_elev.mxd



VICINITY MAP

Legend

- ▲ Area C (east side)
- ● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon cadmium results.

Cadmium Concentrations

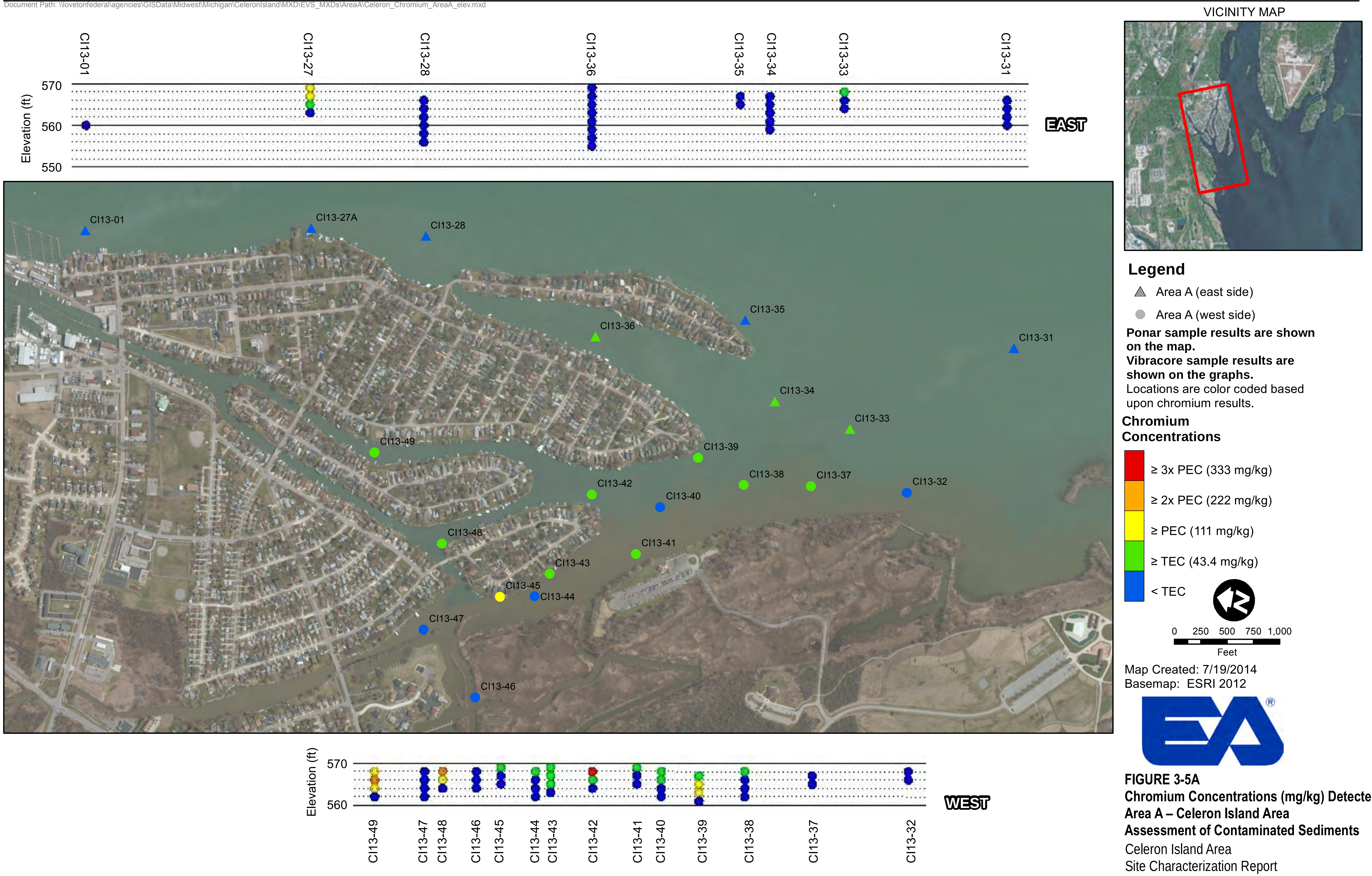
- 🟥 ≥ 3x PEC (14.94 mg/kg)
- 🟧 ≥ 2x PEC (9.96 mg/kg)
- 🟨 ≥ PEC (4.98 mg/kg)
- 🟩 ≥ TEC (0.99 mg/kg)
- 🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-4C
Cadmium Concentrations (mg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaA\Celeron_Chromium_AreaA_elev.mxd

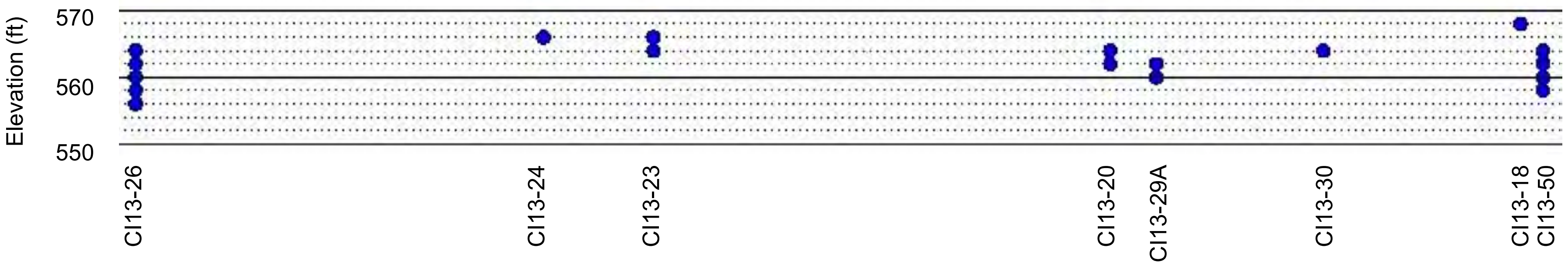


Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-5A
Chromium Concentrations (mg/kg) Detected in Area A – Celeron Island Area Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_Chromium_AreaB_elev.mxd



VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon chromium results.

Chromium Concentrations

🟥 ≥ 3x PEC (333 mg/kg)
🟧 ≥ 2x PEC (222 mg/kg)
🟨 ≥ PEC (111 mg/kg)
🟩 ≥ TEC (43.4 mg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-5B
Chromium Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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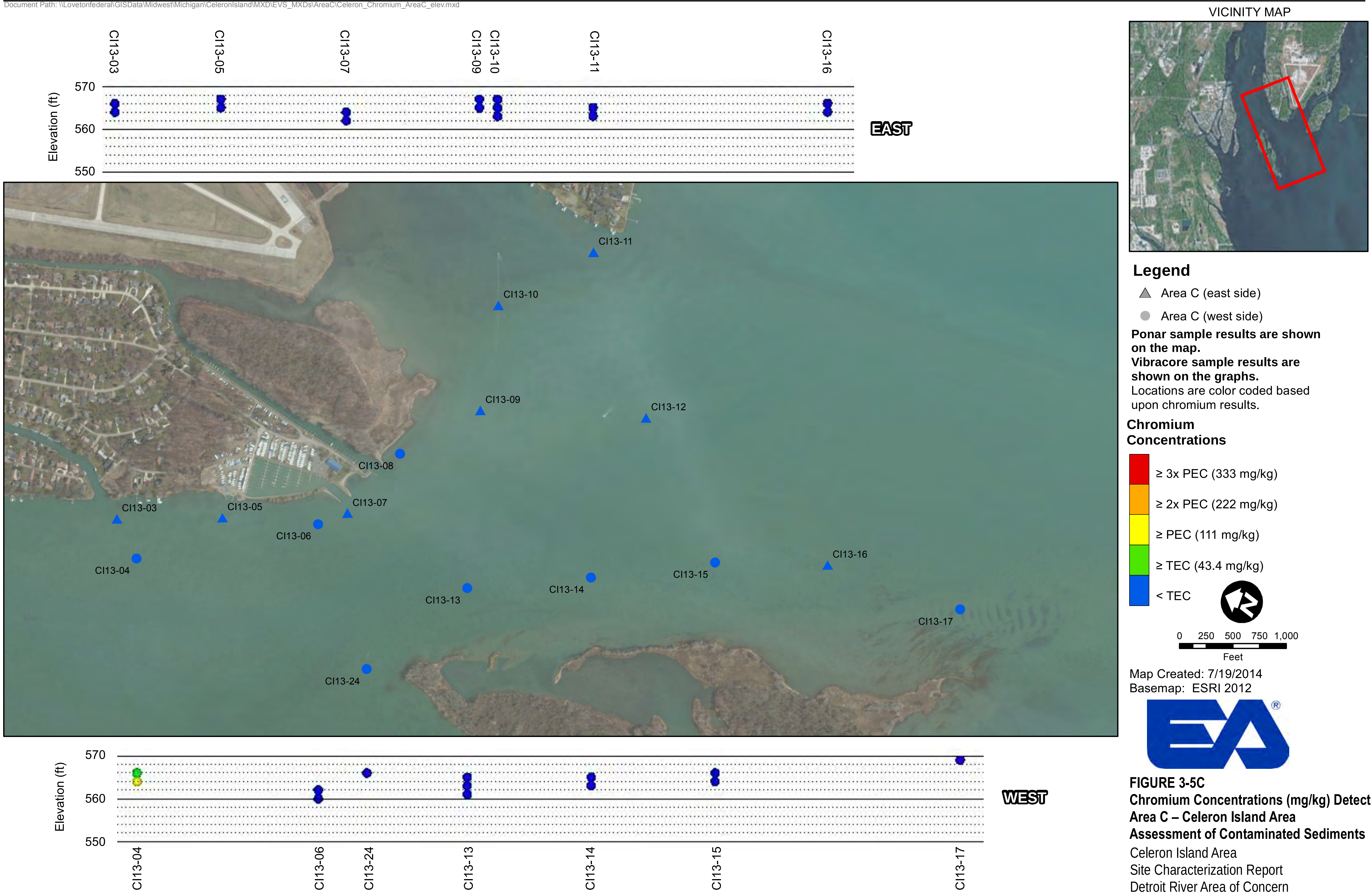

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon chromium results.

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-5C
Chromium Concentrations (mg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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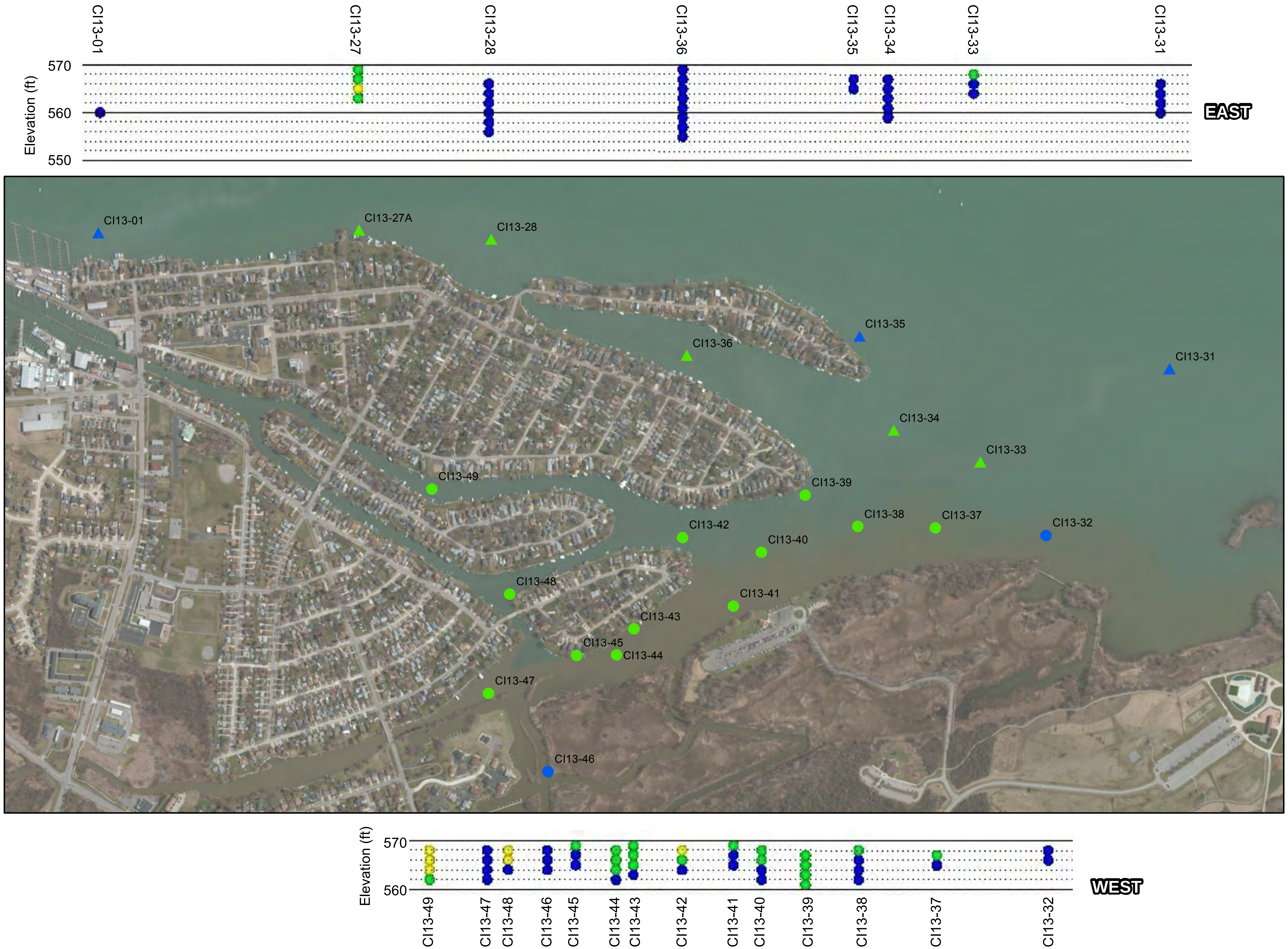

VICINITY MAP

Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon copper results.

Copper Concentrations

🟥 ≥ 3x PEC (447 mg/kg)

🟧 ≥ 2x PEC (298 mg/kg)

🟨 ≥ PEC (149 mg/kg)

🟩 ≥ TEC (31.6 mg/kg)

🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-6A
Copper Concentrations (mg/kg) Detected in Area A – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon copper results.

Copper Concentrations

🟥 ≥ 3x PEC (447 mg/kg)
🟧 ≥ 2x PEC (298 mg/kg)
🟨 ≥ PEC (149 mg/kg)
🟩 ≥ TEC (31.6 mg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

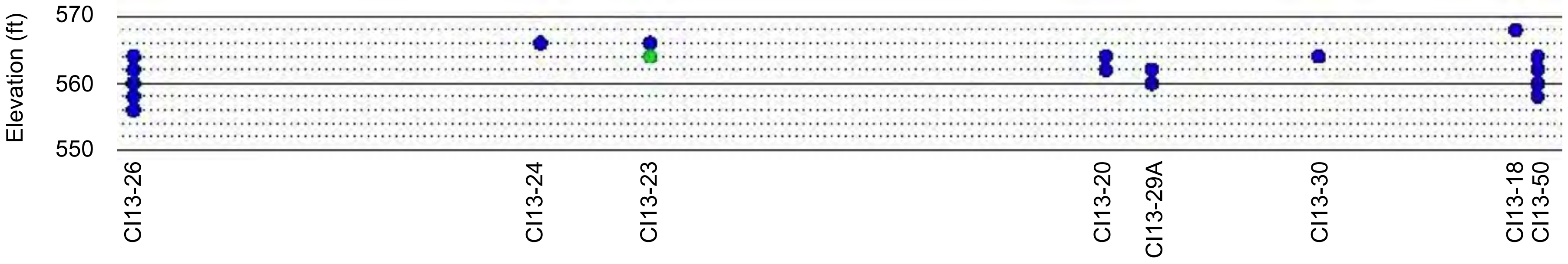

FIGURE 3-6B
Copper Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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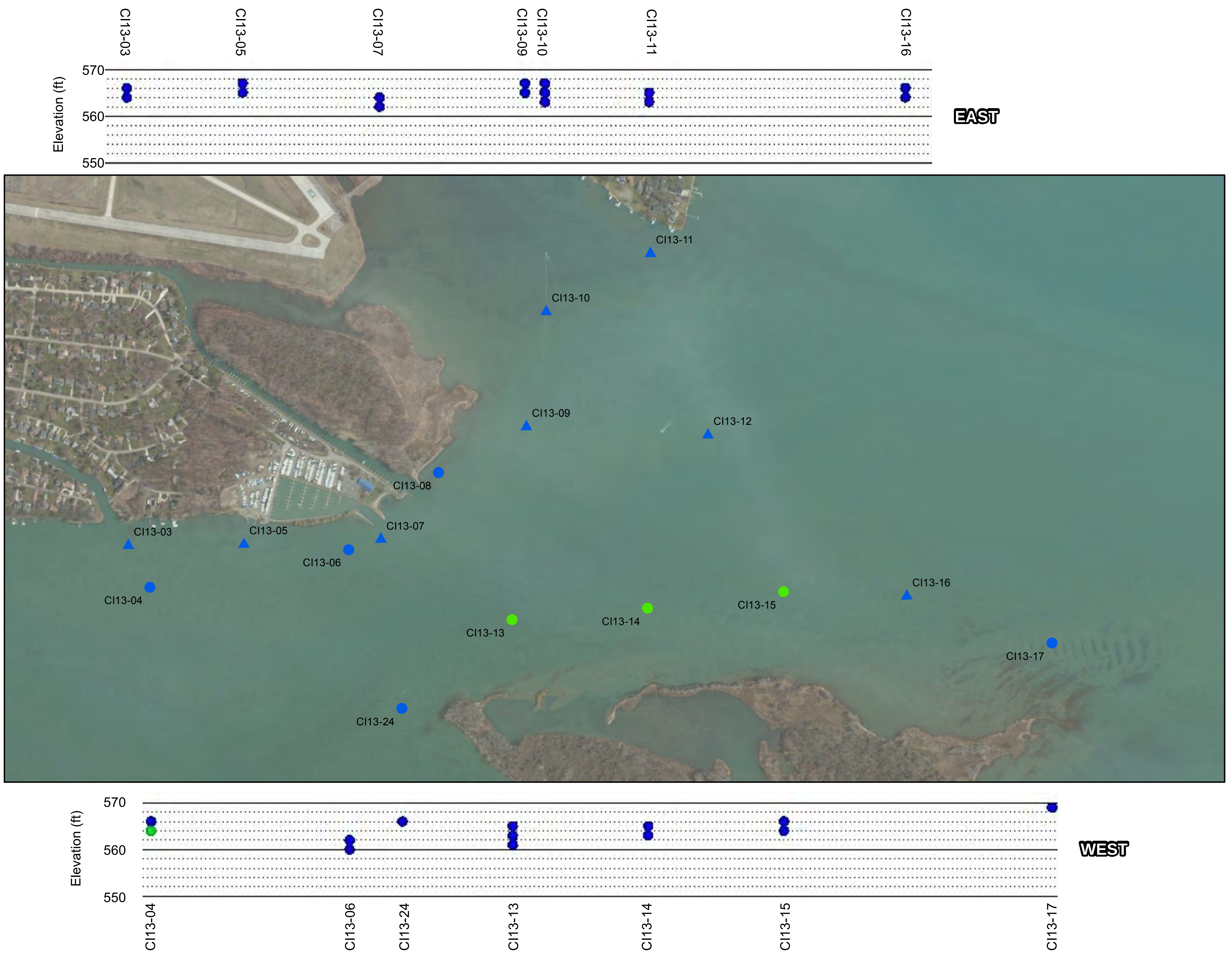

VICINITY MAP

Legend

▲ Area C (east side)

● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon copper results.

Copper Concentrations

🟥 ≥ 3x PEC (447 mg/kg)
🟧 ≥ 2x PEC (298 mg/kg)
🟨 ≥ PEC (149 mg/kg)
🟩 ≥ TEC (31.6 mg/kg)
🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-6C
Copper Concentrations (mg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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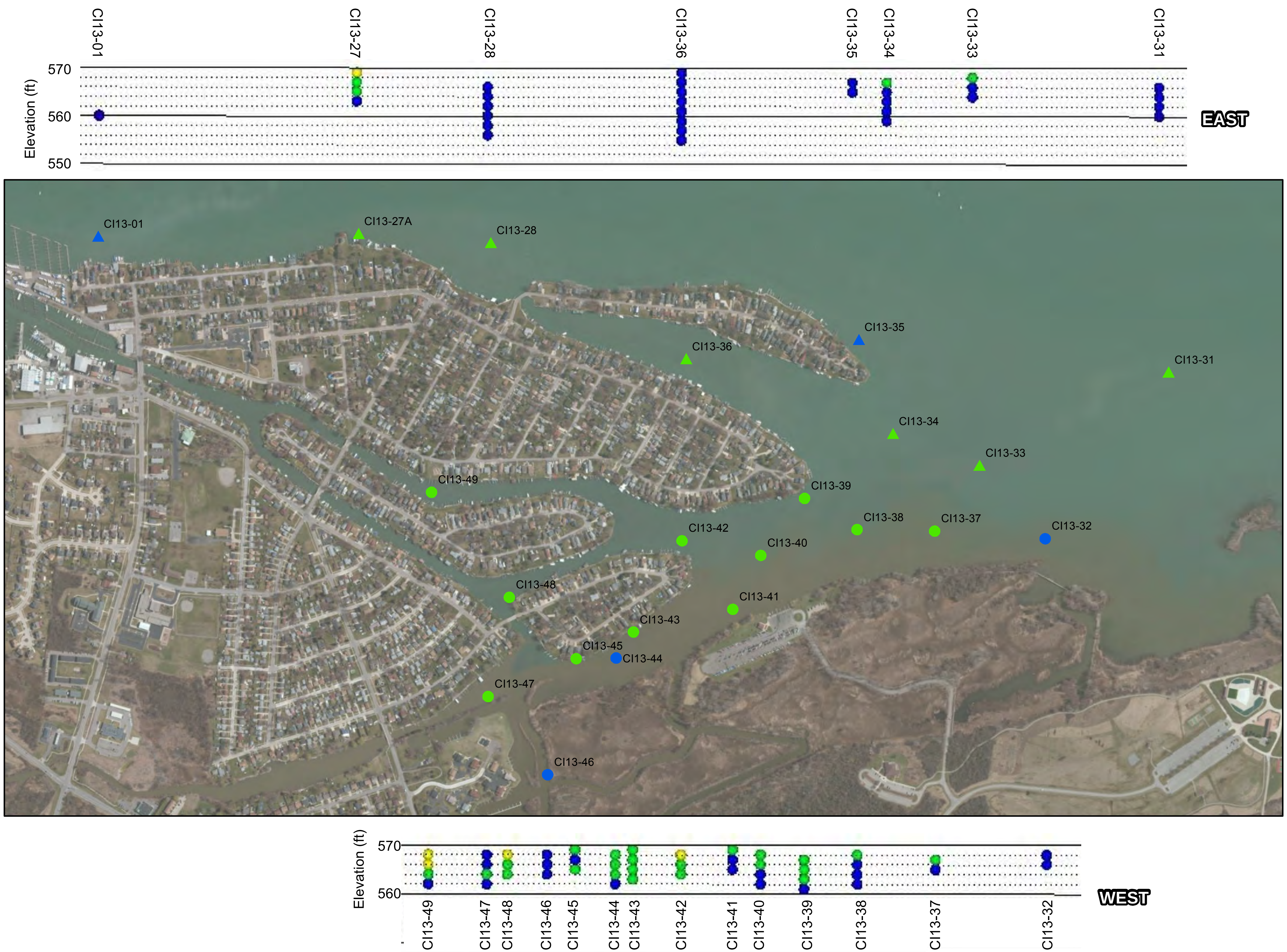

VICINITY MAP

Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon iron results.

Iron Concentrations

🟥 ≥ 3x PEC (120,000 mg/kg)
🟧 ≥ 2x PEC (80,000 mg/kg)
🟨 ≥ PEC (40,000 mg/kg)
🟩 ≥ TEC (20,000 mg/kg)
🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-7A
Iron Concentrations (mg/kg) Detected in Area A – Celeron Island Area Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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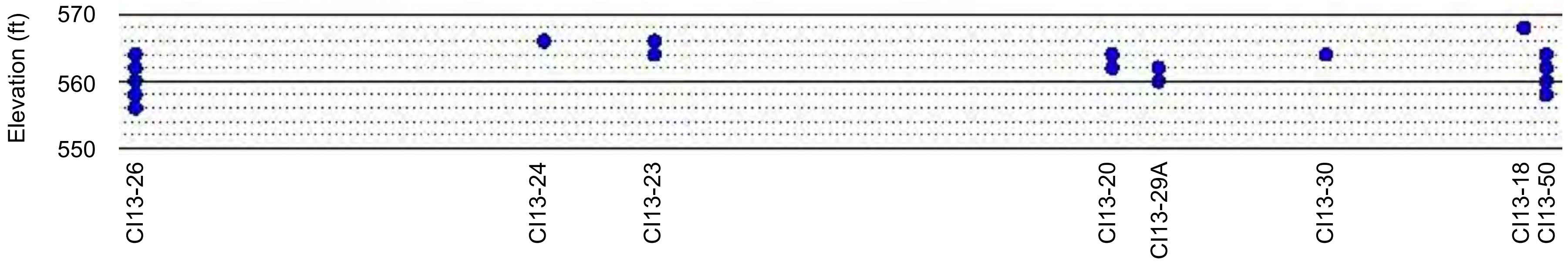

VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon iron results.

Iron Concentrations

🟥 ≥ 3x PEC (120,000 mg/kg)
🟧 ≥ 2x PEC (80,000 mg/kg)
🟨 ≥ PEC (40,000 mg/kg)
🟩 ≥ TEC (20,000 mg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-7B
Iron Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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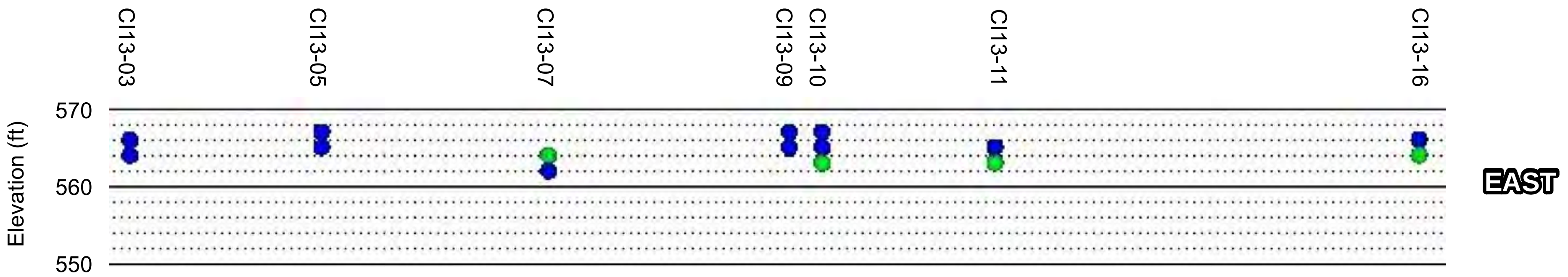

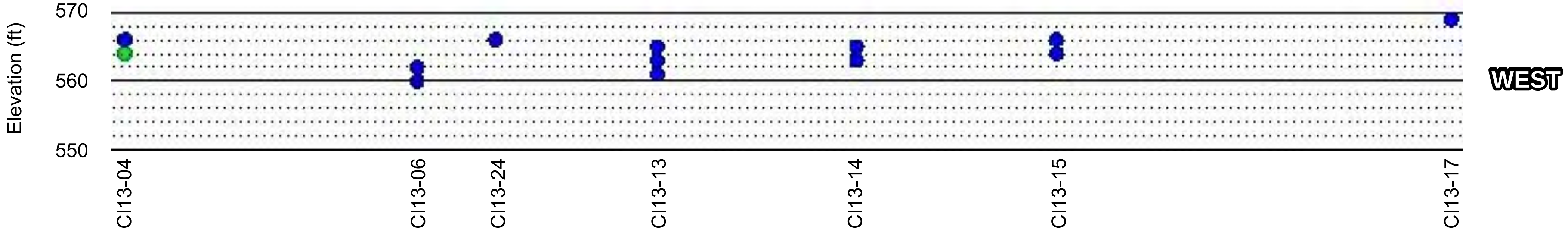

VICINITY MAP

Legend

▲ Area C (east side)

● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon iron results.

Iron Concentrations

🟥 ≥ 3x PEC (120,000 mg/kg)

🟧 ≥ 2x PEC (80,000 mg/kg)

🟨 ≥ PEC (40,000 mg/kg)

🟩 ≥ TEC (20,000 mg/kg)

🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-7C
Iron Concentrations (mg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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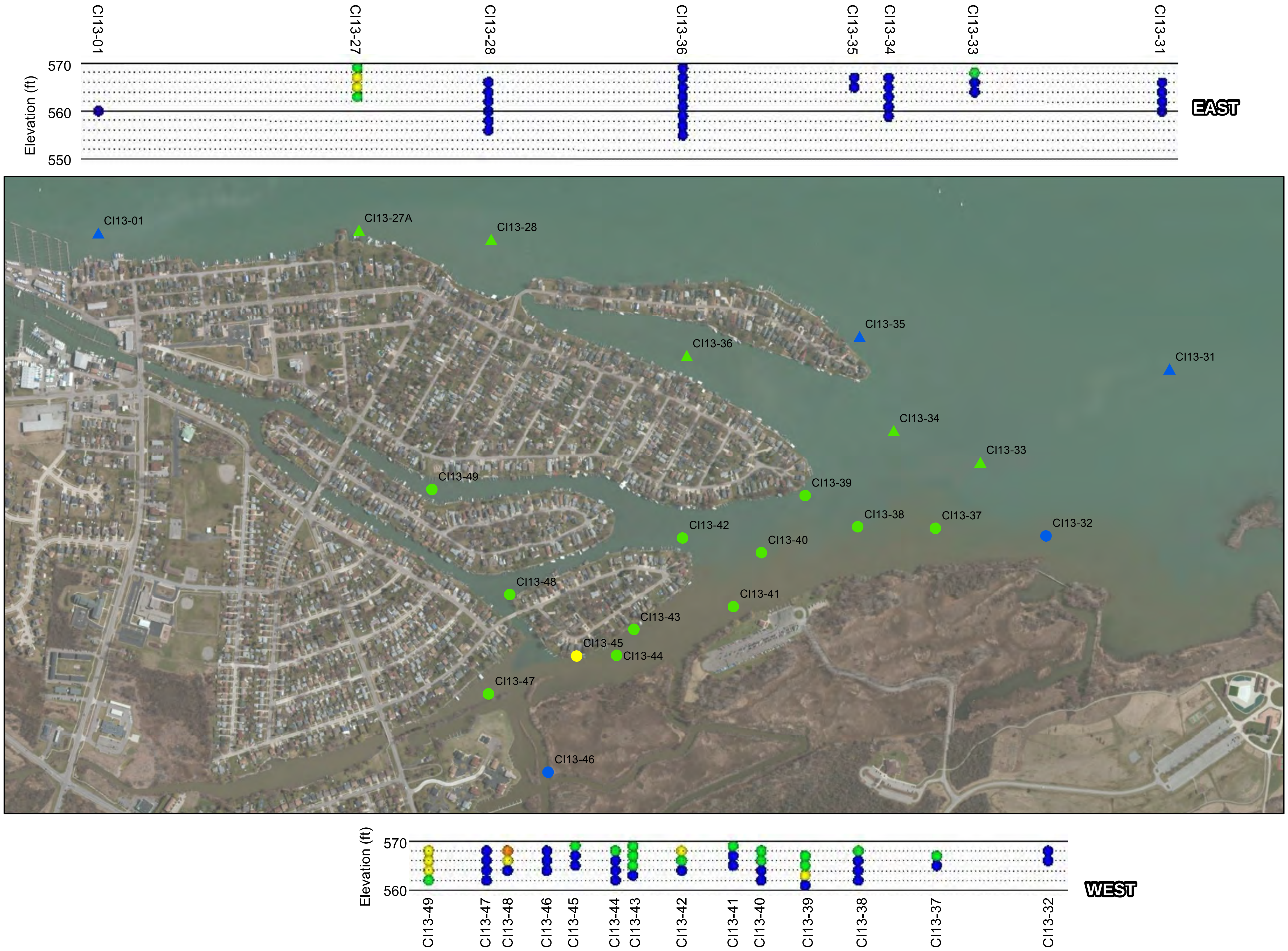


VICINITY MAP

Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon lead results.

Lead Concentrations

🟥 ≥ 3x PEC (384 mg/kg)

🟧 ≥ 2x PEC (256 mg/kg)

🟨 ≥ PEC (128 mg/kg)

🟩 ≥ TEC (35.8 mg/kg)

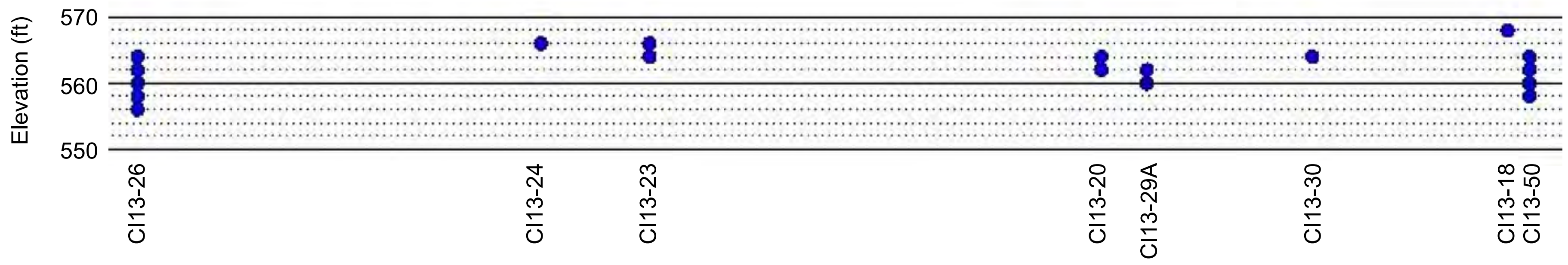
🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-8A
Lead Concentrations (mg/kg) Detected in Area A – Celeron Island Area Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_Lead_AreaB_elev.mxd



VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon lead results.

Lead Concentrations

🟥 ≥ 3x PEC (384 mg/kg)
🟧 ≥ 2x PEC (256 mg/kg)
🟨 ≥ PEC (128 mg/kg)
🟩 ≥ TEC (35.8 mg/kg)
🟦 < TEC

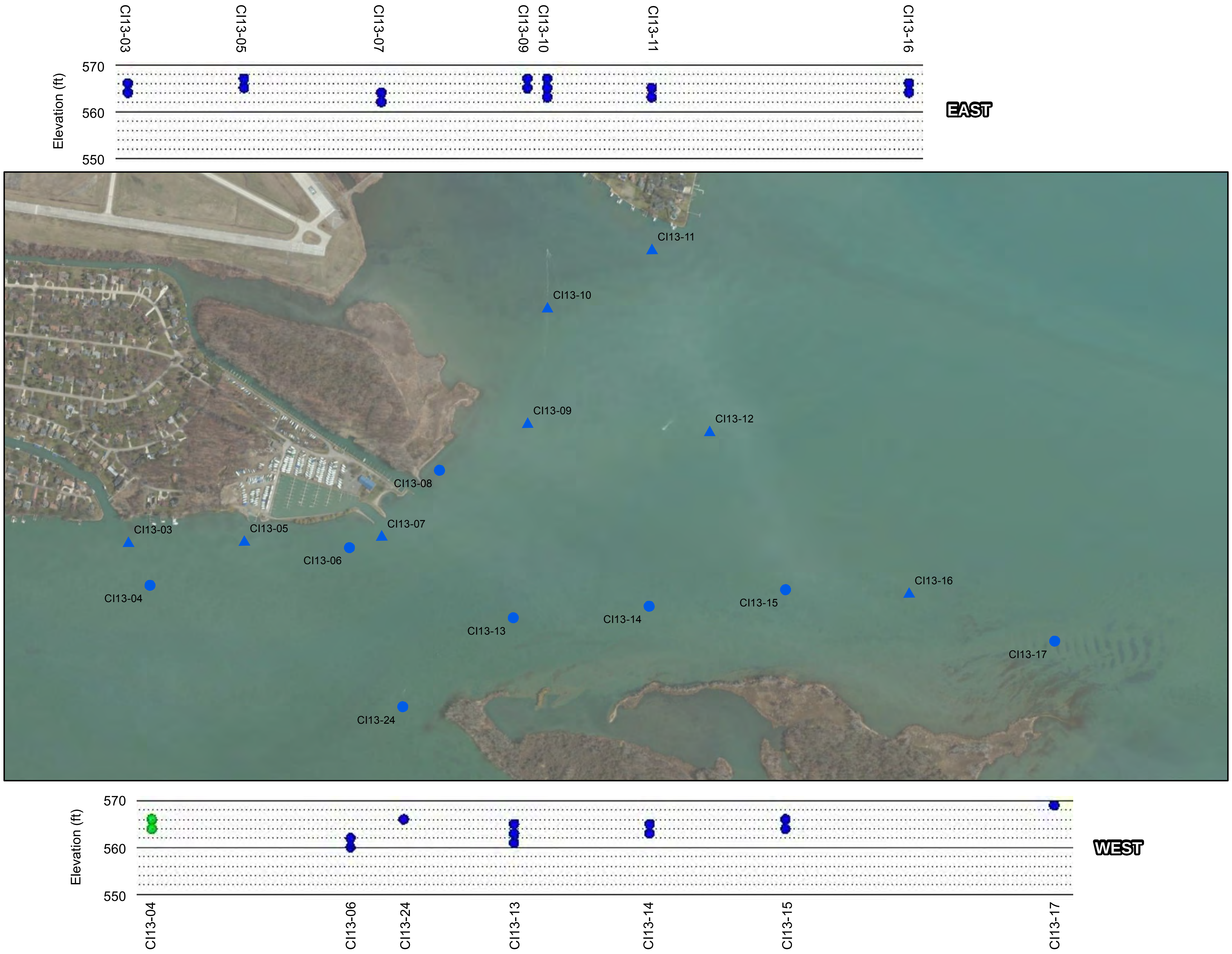
0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-8B
Lead Concentrations (mg/kg) Detected in Area B – Celeron Island Area Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_Lead_AreaC_elev.mxd



VICINITY MAP

Legend

- ▲ Area C (east side)
- ● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon lead results.

Lead Concentrations

- 🟥 ≥ 3x PEC (384 mg/kg)
- 🟧 ≥ 2x PEC (256 mg/kg)
- 🟨 ≥ PEC (128 mg/kg)
- 🟩 ≥ TEC (35.8 mg/kg)
- 🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-8C
Lead Concentrations (mg/kg) Detected in Area C – Celeron Island Area Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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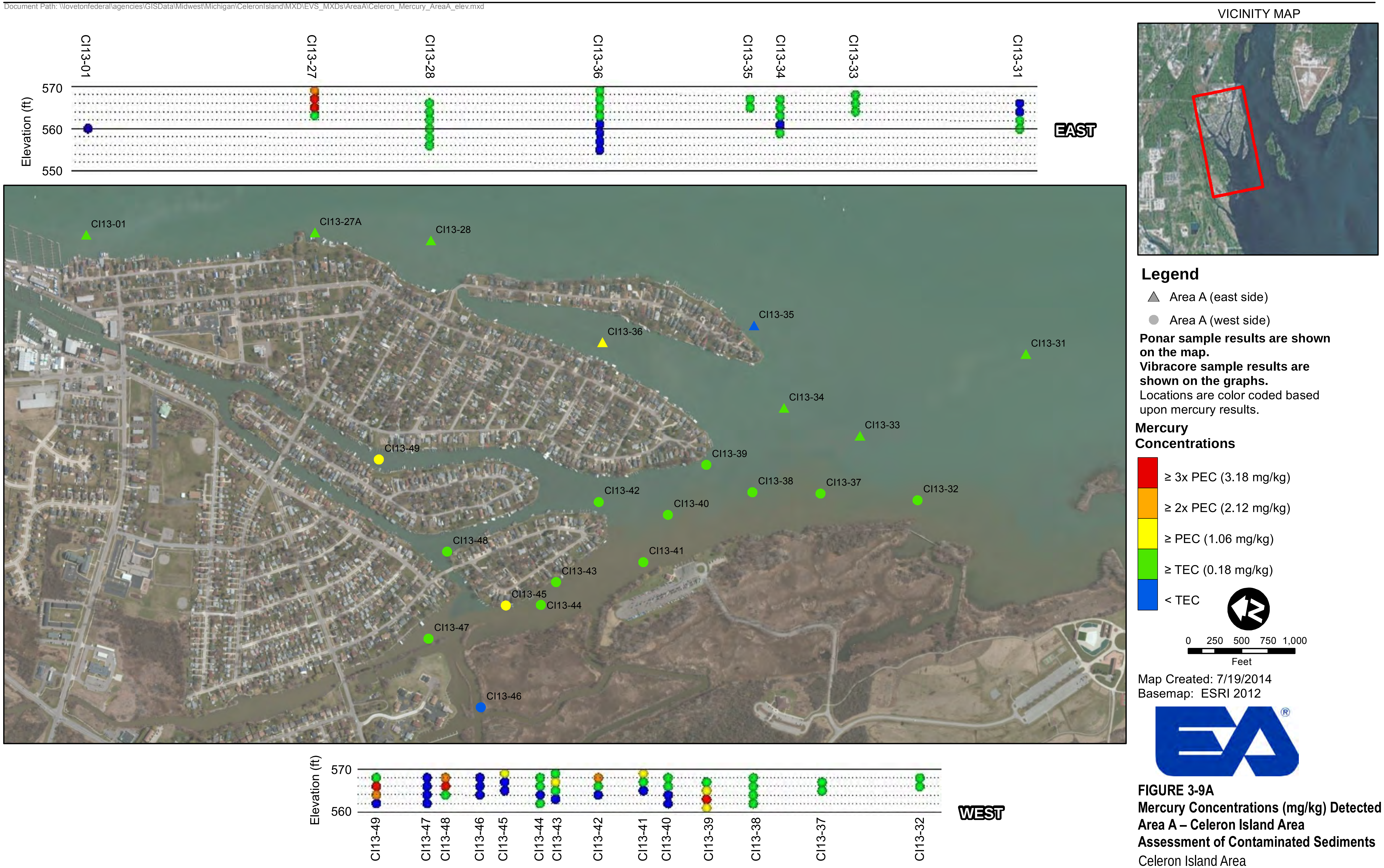


Legend

▲	Area A (east side)
●	Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon mercury results.

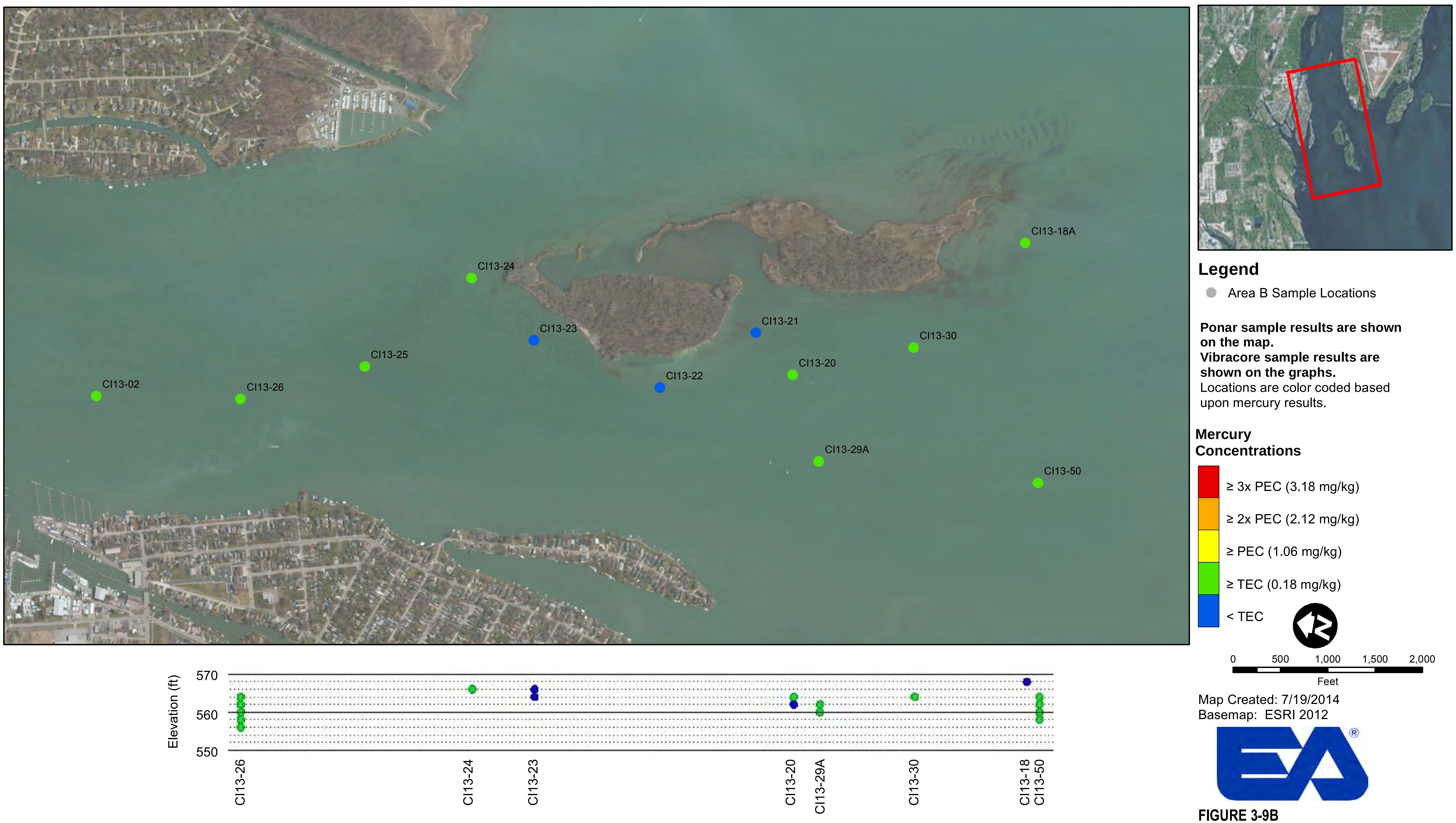
Mercury Concentrations

🟥	≥ 3x PEC (3.18 mg/kg)
🟧	≥ 2x PEC (2.12 mg/kg)
🟨	≥ PEC (1.06 mg/kg)
🟩	≥ TEC (0.18 mg/kg)
🟦	< TEC

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-9A
Mercury Concentrations (mg/kg) Detected in Area A – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_Mercury_AreaB_elev.mxd



Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon mercury results.

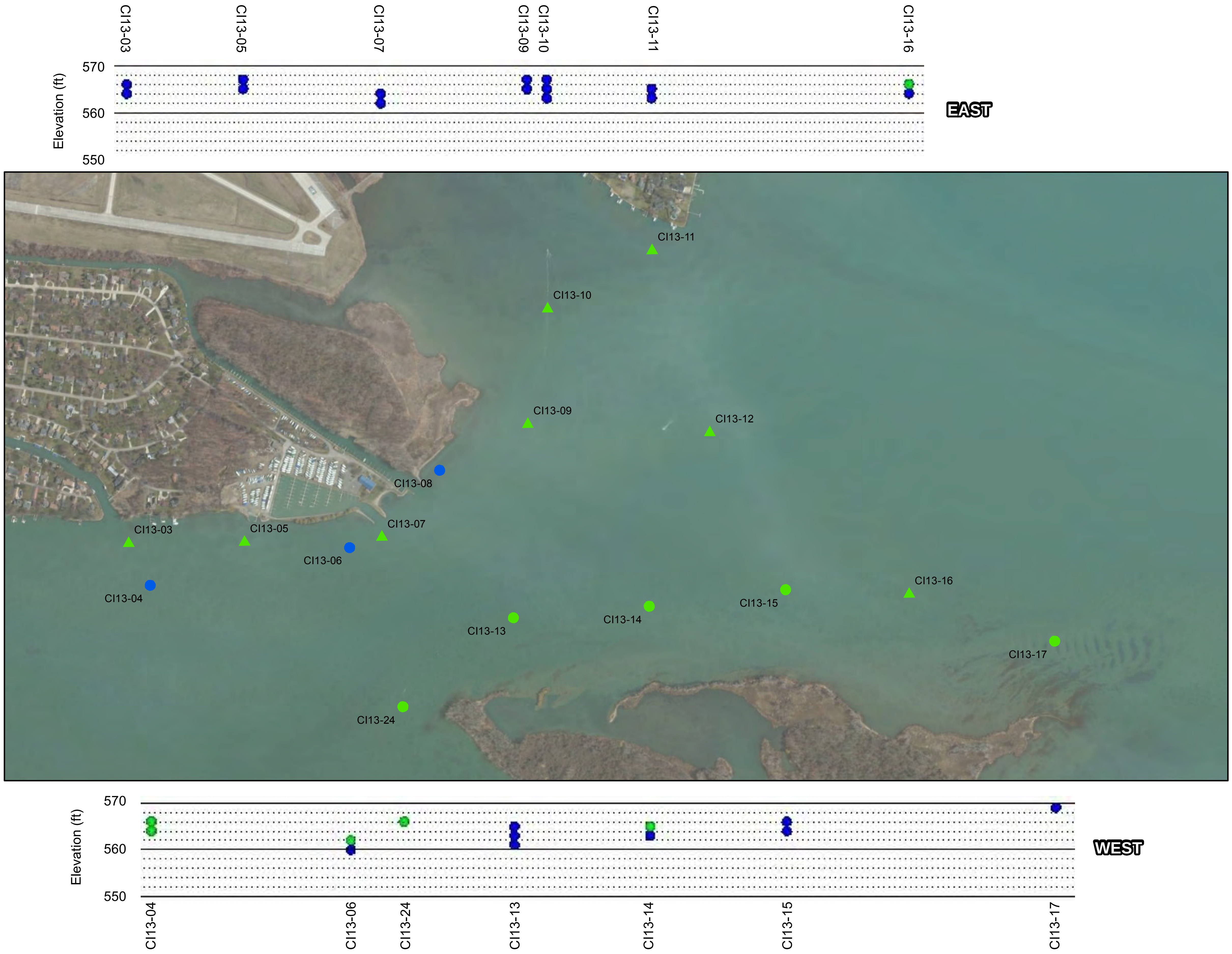
Mercury Concentrations

🟥	≥ 3x PEC (3.18 mg/kg)
🟧	≥ 2x PEC (2.12 mg/kg)
🟨	≥ PEC (1.06 mg/kg)
🟩	≥ TEC (0.18 mg/kg)
🟦	< TEC

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-9B
Mercury Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_Mercury_AreaC_elev.mxd



VICINITY MAP

Legend

▲ Area C (east side)

● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon mercury results.

Mercury Concentrations

🟥 ≥ 3x PEC (3.18 mg/kg)

🟧 ≥ 2x PEC (2.12 mg/kg)

🟨 ≥ PEC (1.06 mg/kg)

🟩 ≥ TEC (0.18 mg/kg)

🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-9C
Mercury Concentrations (mg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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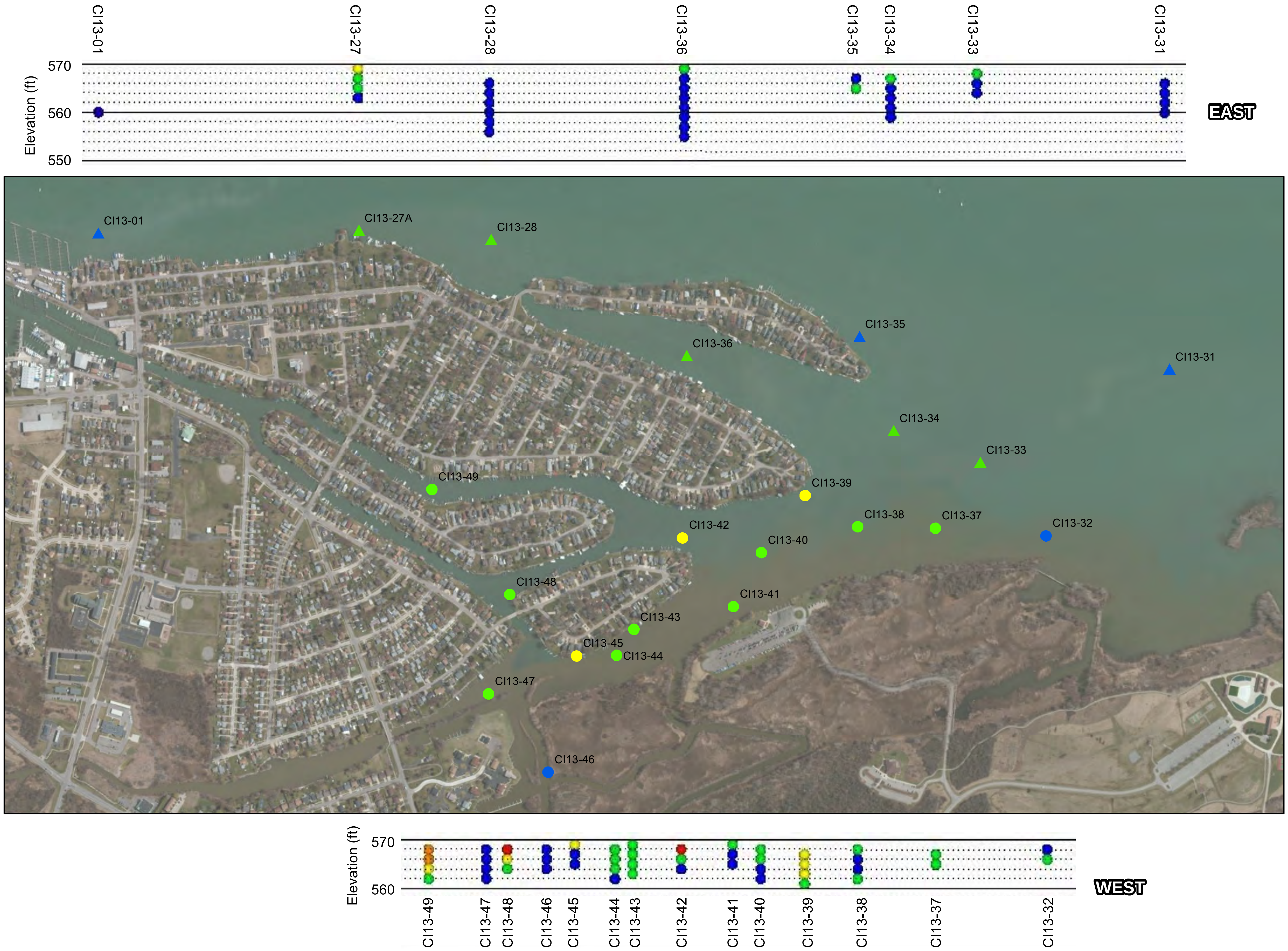

VICINITY MAP

Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon nickel results.

Nickel Concentrations

🟥 ≥ 3x PEC (145.8 mg/kg)
🟧 ≥ 2x PEC (97.2 mg/kg)
🟨 ≥ PEC (48.6 mg/kg)
🟩 ≥ TEC (22.7 mg/kg)
🟦 < TEC

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-10A
Nickel Concentrations (mg/kg) Detected in Area A – Celeron Island Area Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

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VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon nickel results.

Nickel Concentrations

🟥 ≥ 3x PEC (145.8 mg/kg)

🟧 ≥ 2x PEC (97.2 mg/kg)

🟨 ≥ PEC (48.6 mg/kg)

🟩 ≥ TEC (22.7 mg/kg)

🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

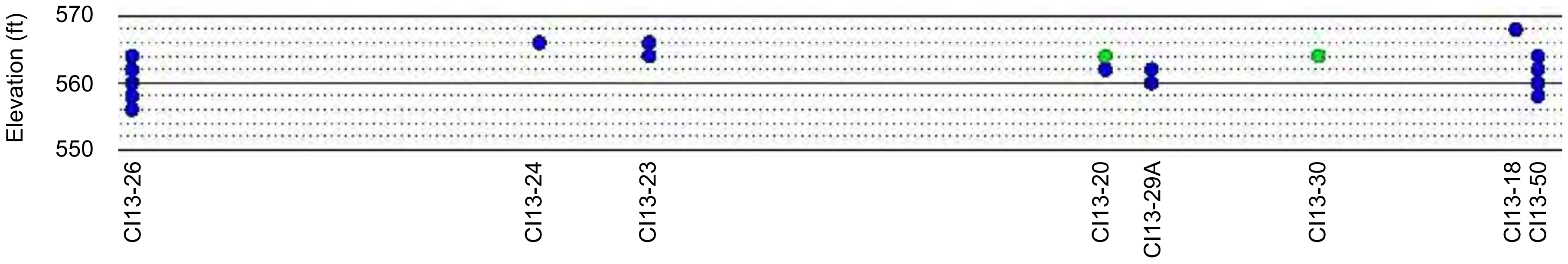


FIGURE 3-10B
Nickel Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

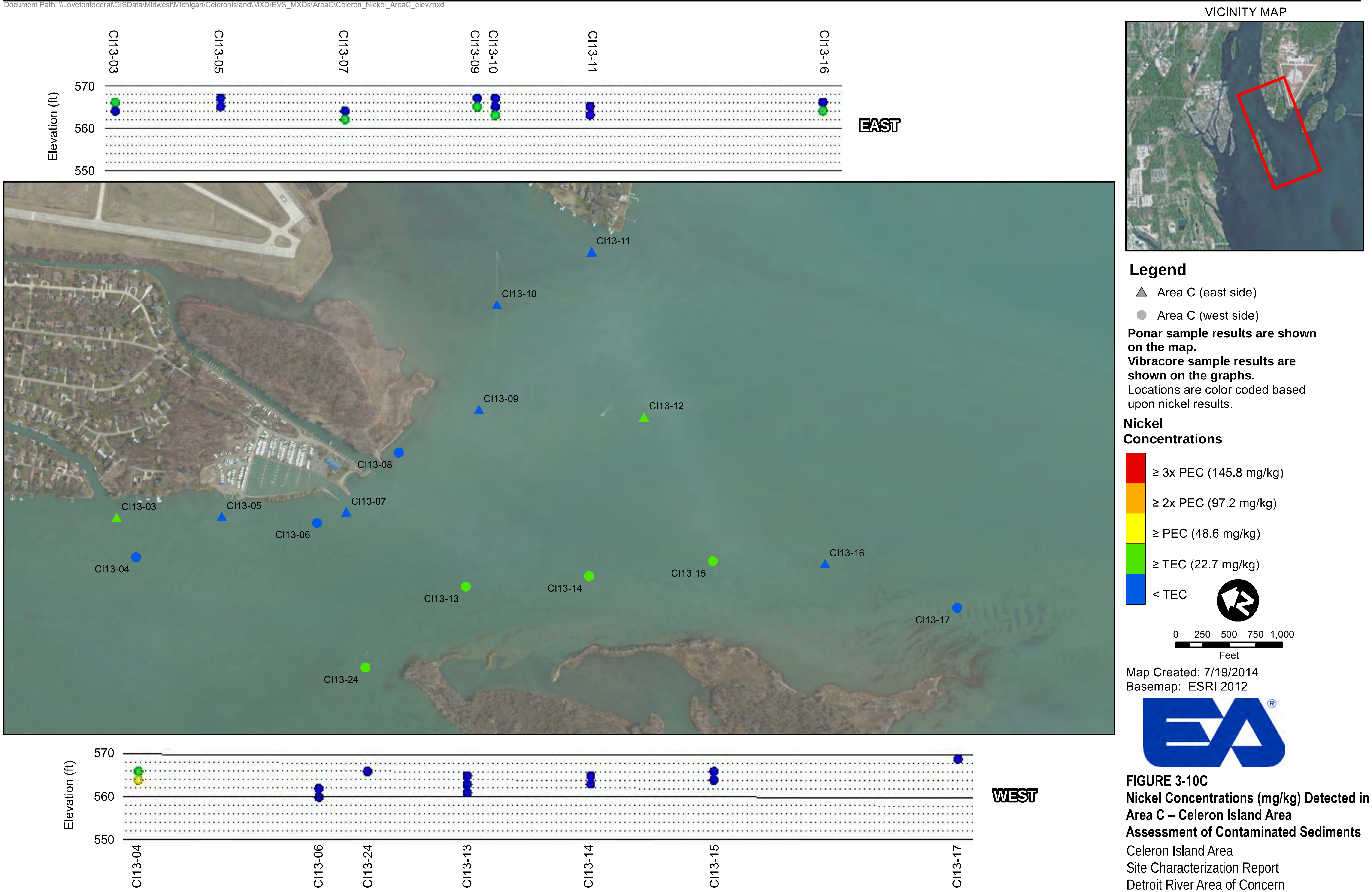
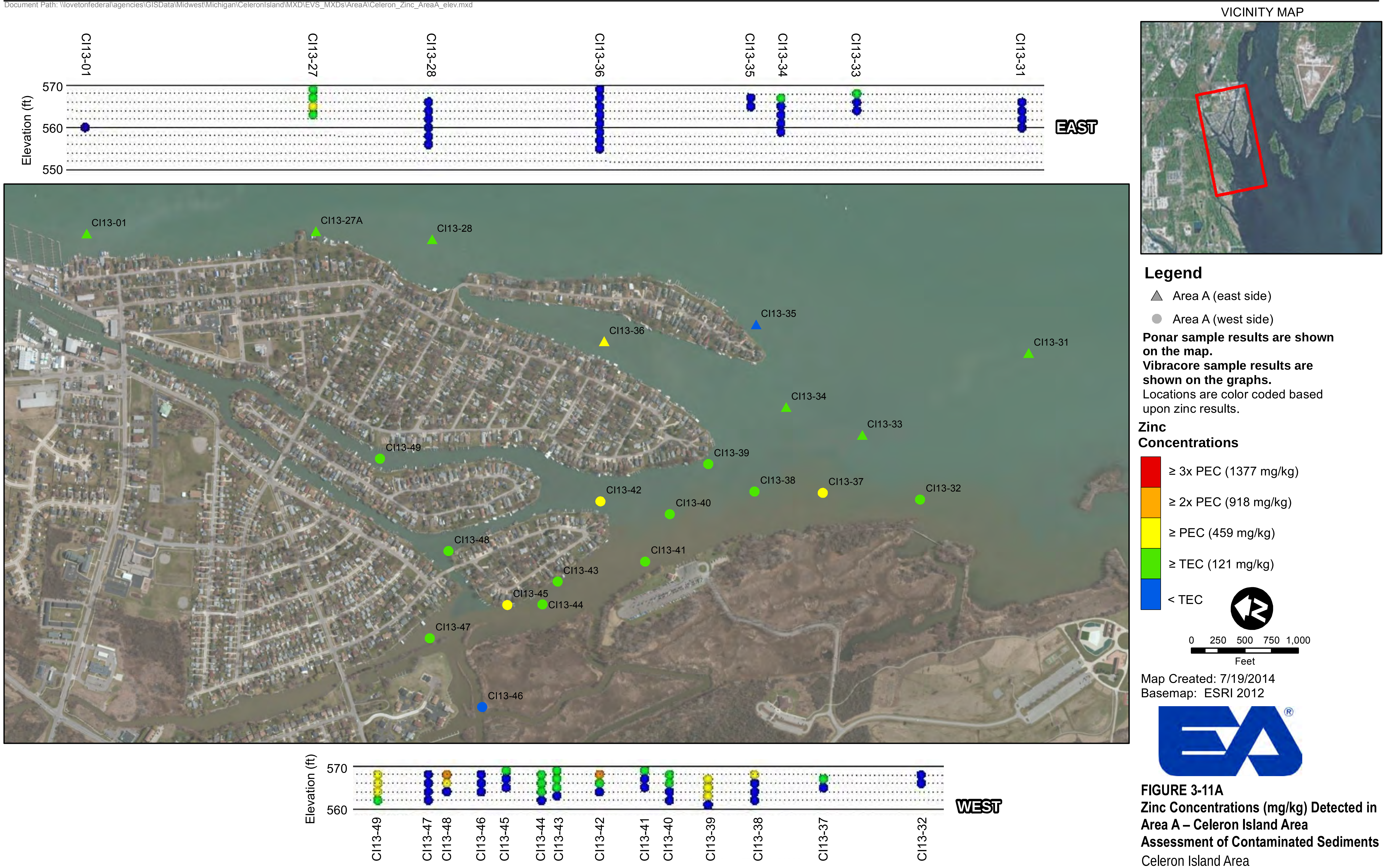


FIGURE 3-10C
Nickel Concentrations (mg/kg) Detected in Area C – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaA\Celeron_Zinc_AreaA_elev.mxd



Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon zinc results.

Zinc Concentrations

- 🟥 ≥ 3x PEC (1377 mg/kg)
- 🟧 ≥ 2x PEC (918 mg/kg)
- 🟨 ≥ PEC (459 mg/kg)
- 🟩 ≥ TEC (121 mg/kg)
- 🟦 < TEC

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-11A
Zinc Concentrations (mg/kg) Detected in Area A – Celeron Island Area Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_Zinc_AreaB_elev.mxd

VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon Zinc results.

Zinc Concentrations

🟥 ≥ 3x PEC (1,377 mg/kg)
🟧 ≥ 2x PEC (918 mg/kg)
🟨 ≥ PEC (459 mg/kg)
🟩 ≥ TEC (121 mg/kg)
🟦 < TEC

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

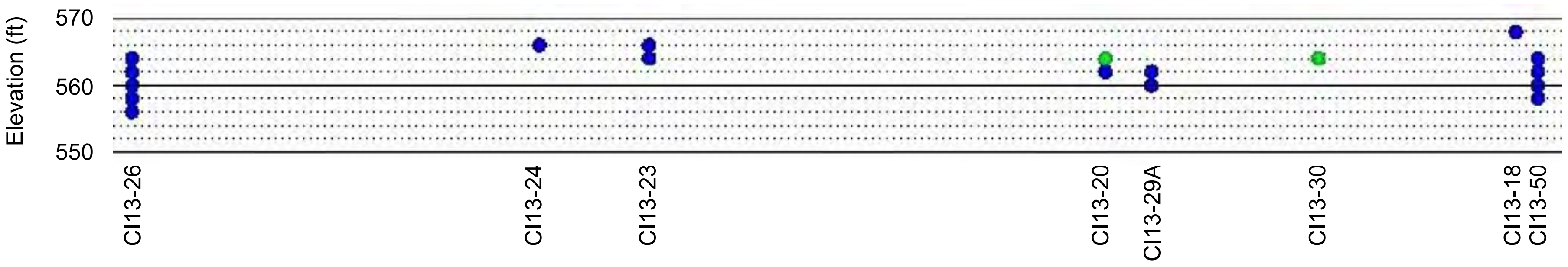
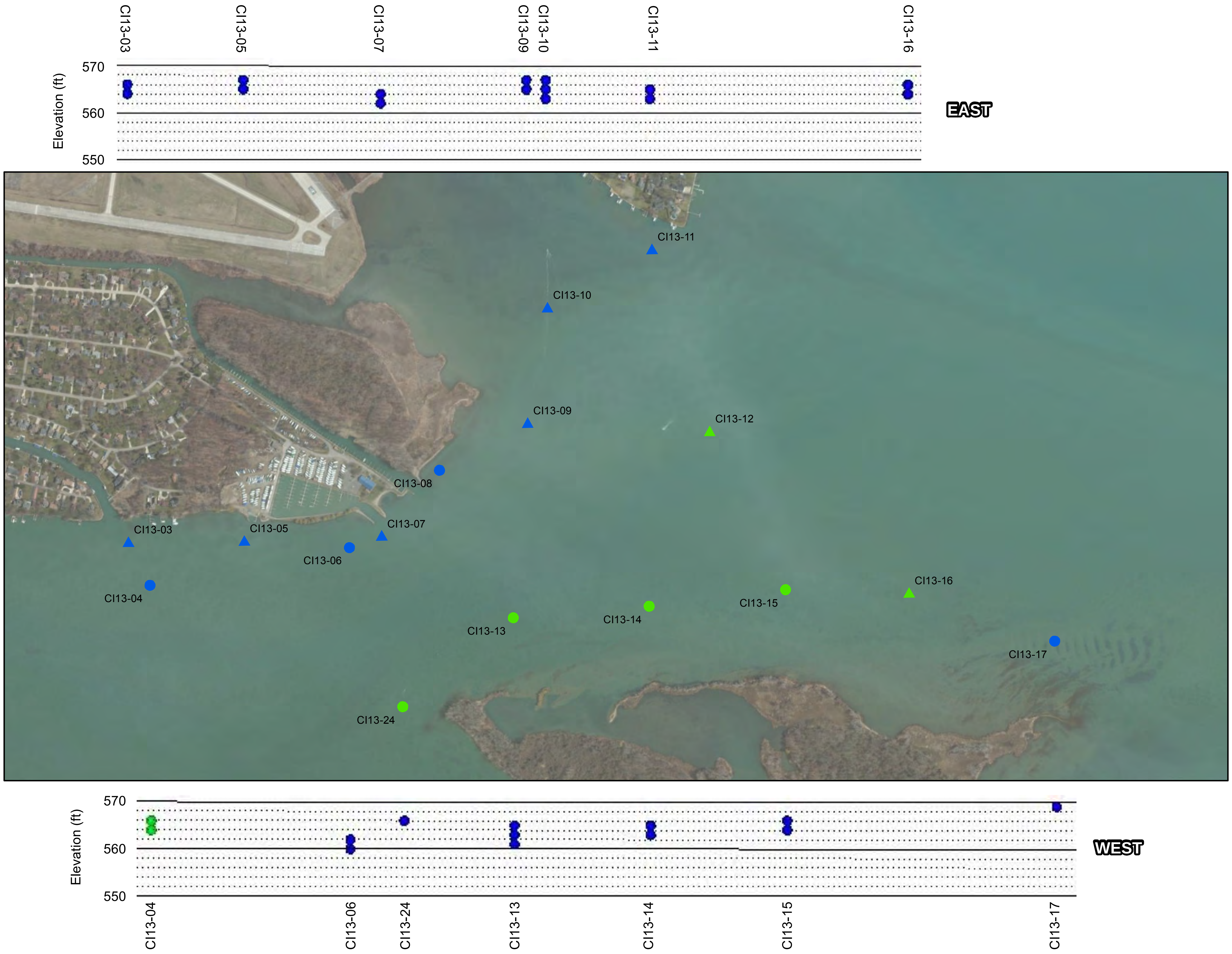


FIGURE 3-11B
Zinc Concentrations (mg/kg) Detected in Area B – Celeron Island Area
Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_Zinc_AreaC_elev.mxd



VICINITY MAP

Legend

- ▲ Area C (east side)
- ● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon zinc results.

Nickel Concentrations

- 🟥 ≥ 3x PEC (1,377 mg/kg)
- 🟧 ≥ 2x PEC (918 mg/kg)
- 🟨 ≥ PEC (459 mg/kg)
- 🟩 ≥ TEC (121 mg/kg)
- 🟦 < TEC

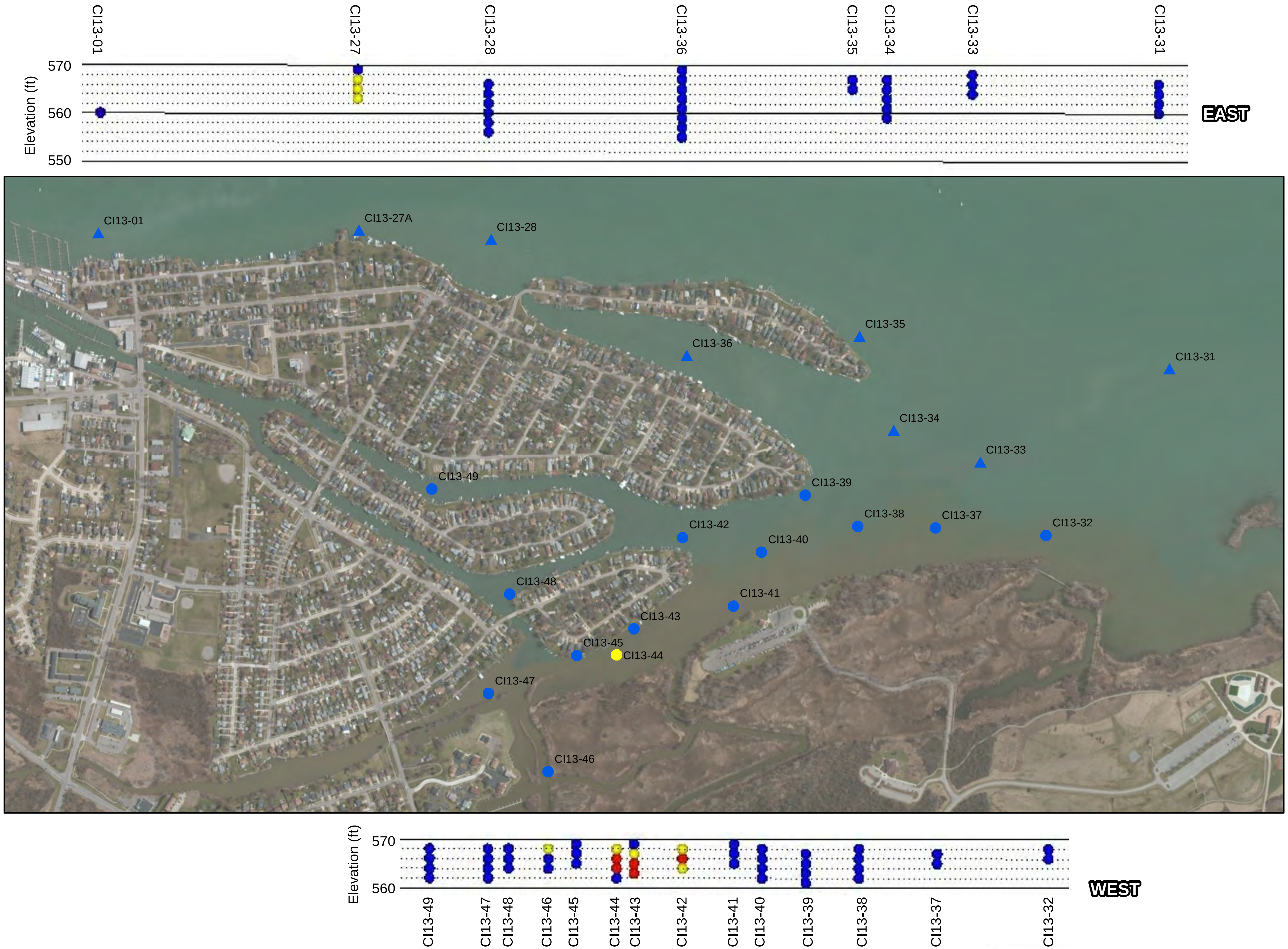
0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 3-11C
Zinc Concentrations (mg/kg) Detected in Area C – Celeron Island Area Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaA\Celeron_ESBTU_AreaA_elev.mxd



VICINITY MAP

Legend

▲ Area A (east side)

● Area A (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon ESBTU results.

ESBTU

🟥 > 10

🟨 1 - 10

🟦 < 1

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 4-1A
Equilibrium Sediment Benchmark Toxic Units for Polycyclic Aromatic Hydrocarbons in Area A- Celeron Island Area Assessment of Contaminated Sediments
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\lovetonfederal\agencies\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_ESBTU_AreaB_elev.mxd

VICINITY MAP

Legend

● Area B Sample Locations

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon ESBTU results.

ESBTU

🟥 > 10
🟨 1 - 10
🟦 < 1

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

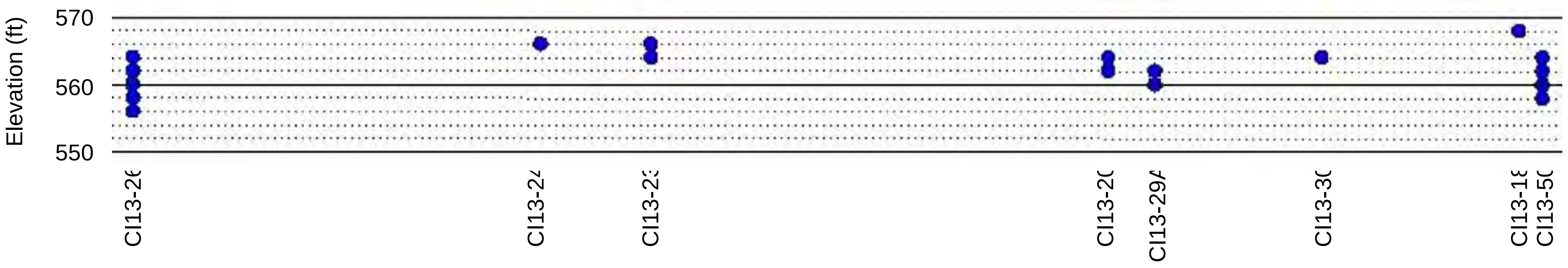
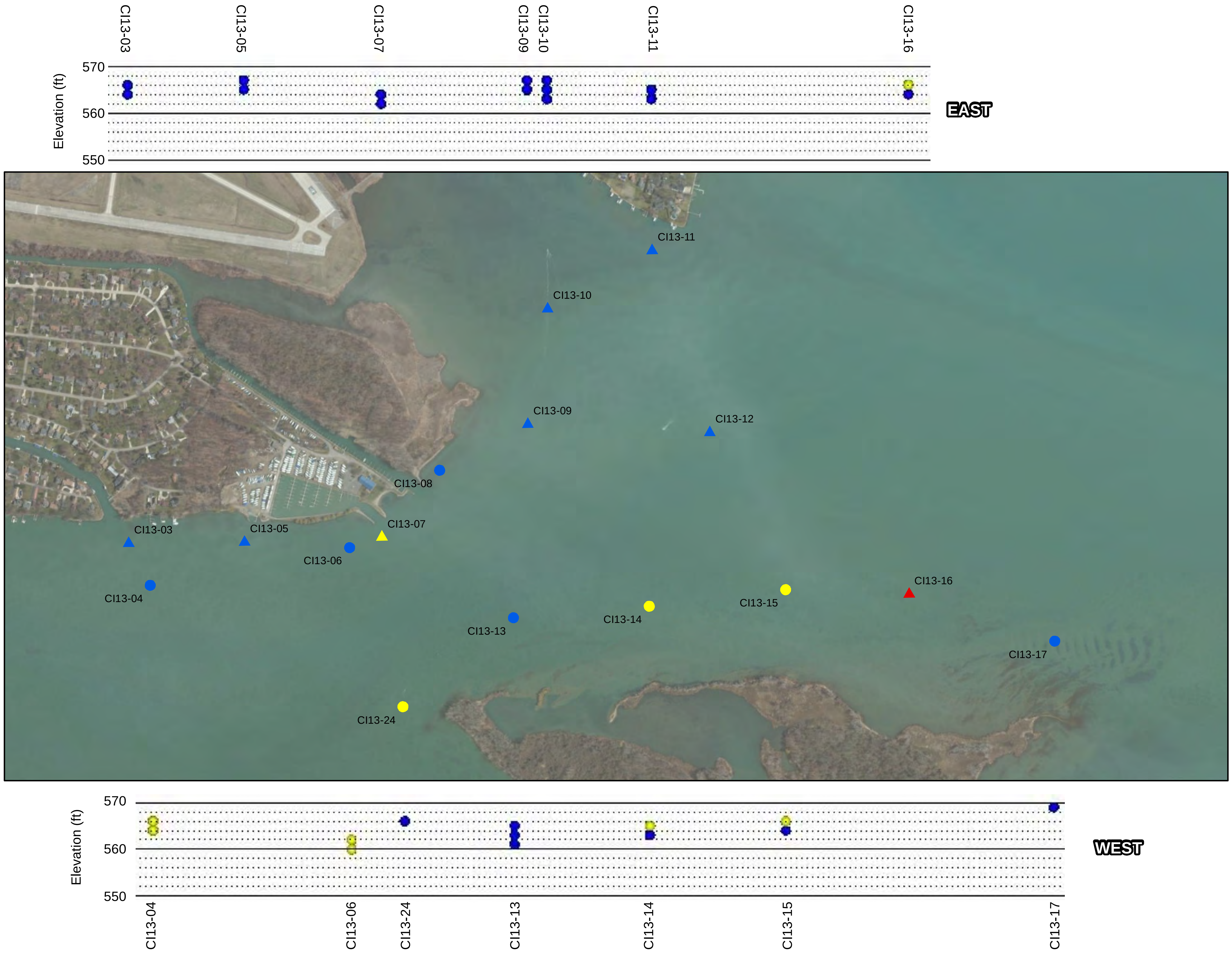


FIGURE 4-1B
Equilibrium Partitioning Sediment Benchmark Toxic Unit (ESBTU) for total Polycyclic Aromatic Hydrocarbons (PAHs) in Area B – Celeron Island Area
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_ESBTU_AreaC_elev.mxd



VICINITY MAP

Legend

▲ Area C (east side)

● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon ESBTU results.

ESBTU

🟥 > 10

🟨 1 - 10

🟦 < 1

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 4-1C
Equilibrium Partitioning Sediment Benchmark Toxic Unit (ESBTU) for total Polycyclic Aromatic Hydrocarbons (PAHs) in Area C – Celeron Island Area
Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

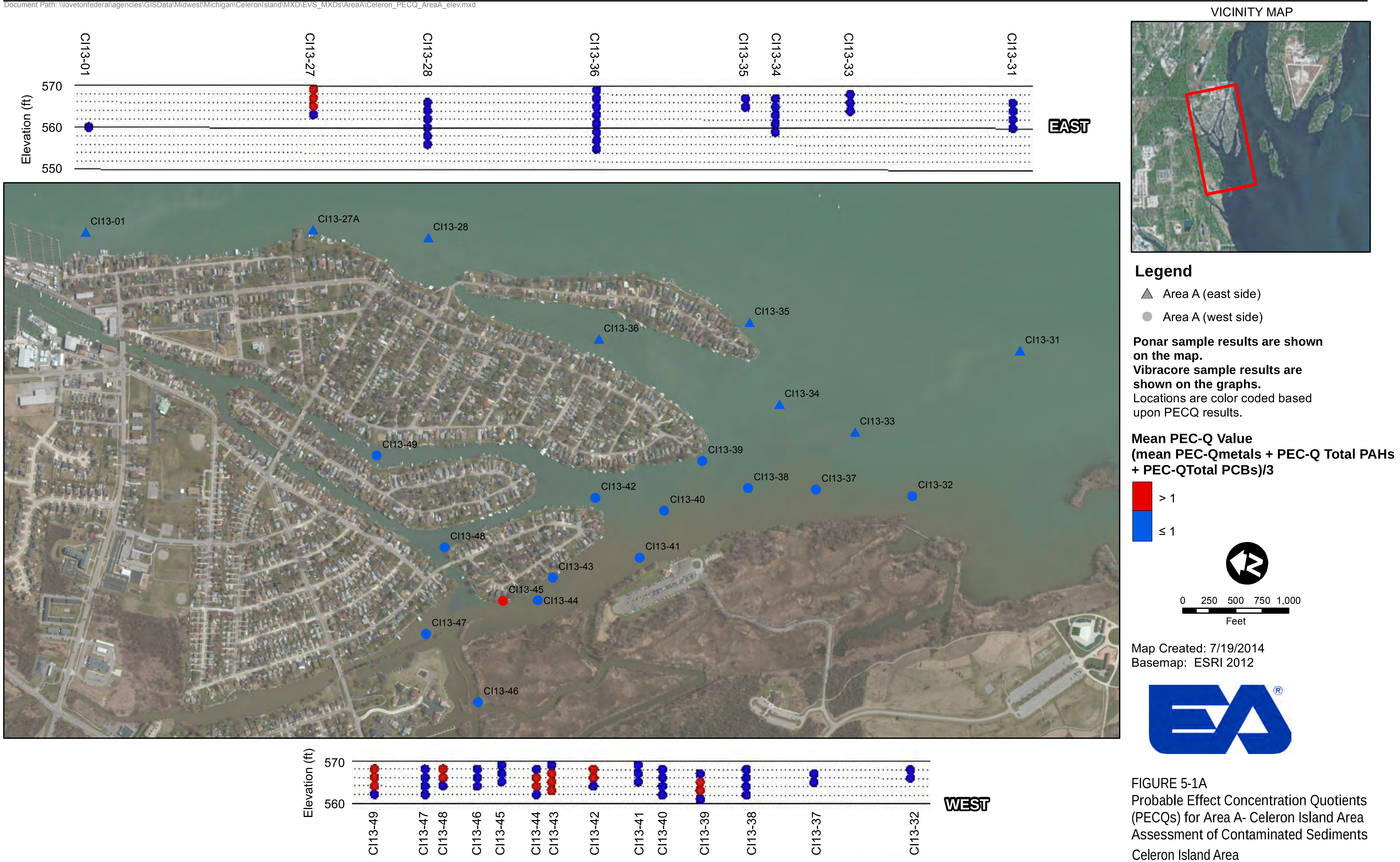


FIGURE 5-1A
Probable Effect Concentration Quotients (PECQs) for Area A- Celeron Island Area Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaB\Celeron_PECQ_AreaB_elev.mxd

VICINITY MAP

Legend

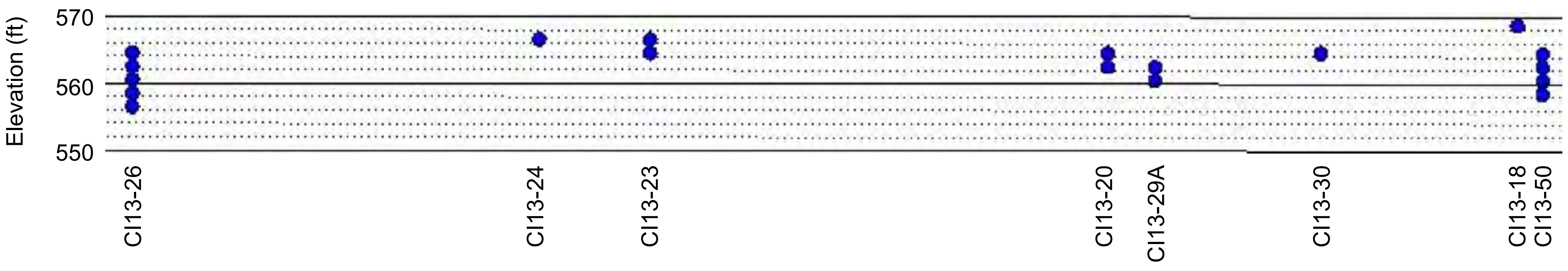
● Area B Sample Locations

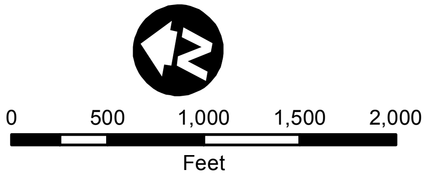
Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon PECQ results.

Mean PEC-Q Value
(mean PEC-Qmetals +
PEC-Q Total PAHs + PEC-QTotal PCBs)/3

🟥 > 1

🟦 ≤ 1



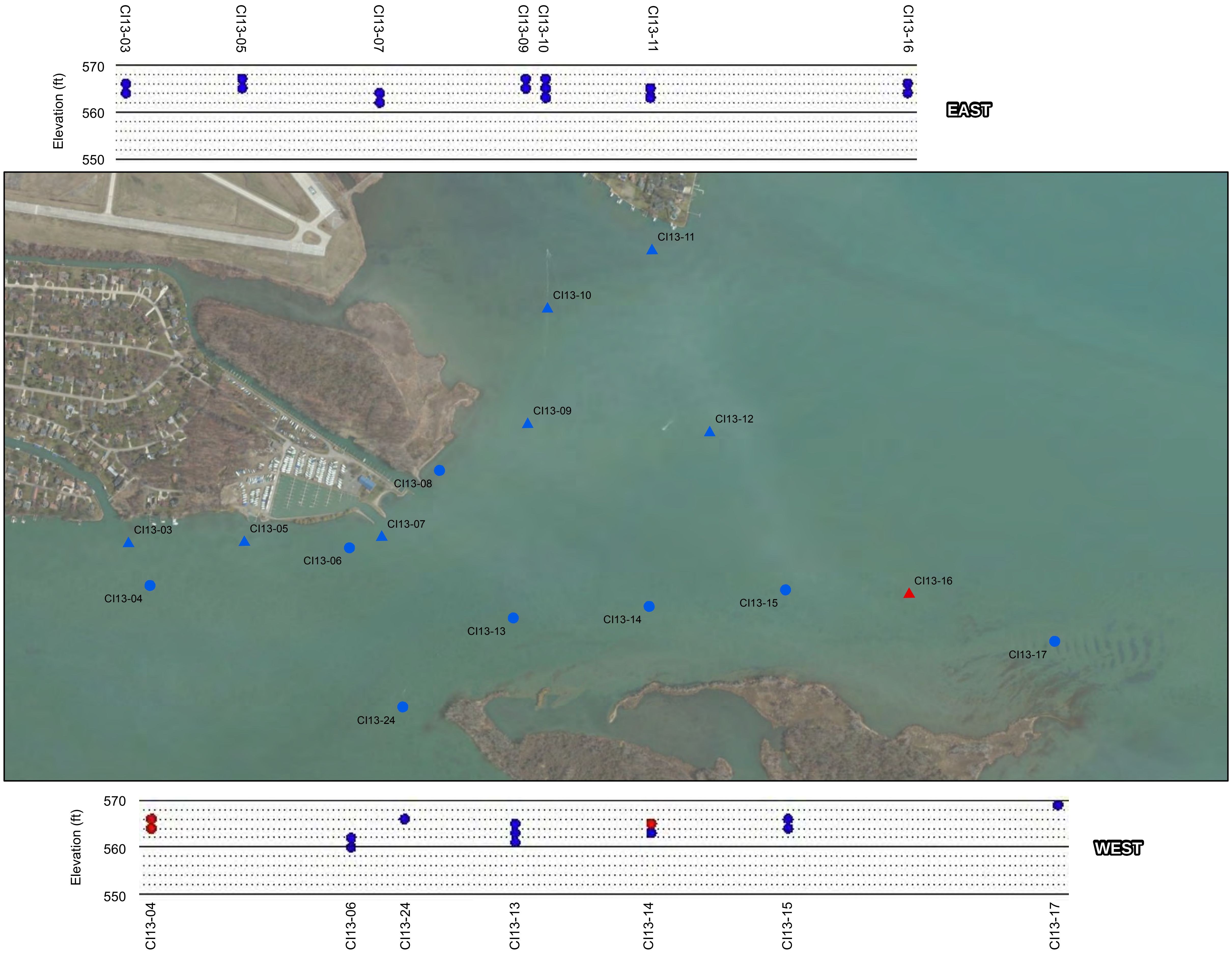


Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 5-1B
Probable Effect Concentration Quotients (PECQs) for Area B- Celeron Island Area
Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\AreaC\Celeron_PECQ_AreaC_elev.mxd



VICINITY MAP

Legend

▲ Area C (east side)

● Area C (west side)

Ponar sample results are shown on the map.
Vibracore sample results are shown on the graphs.
Locations are color coded based upon PECQ results.

Mean PEC-Q Value
(mean PEC-Qmetals +
PEC-Q Total PAHs + PEC-QTotal PCBs)/3

🟥 > 1

🟦 ≤ 1

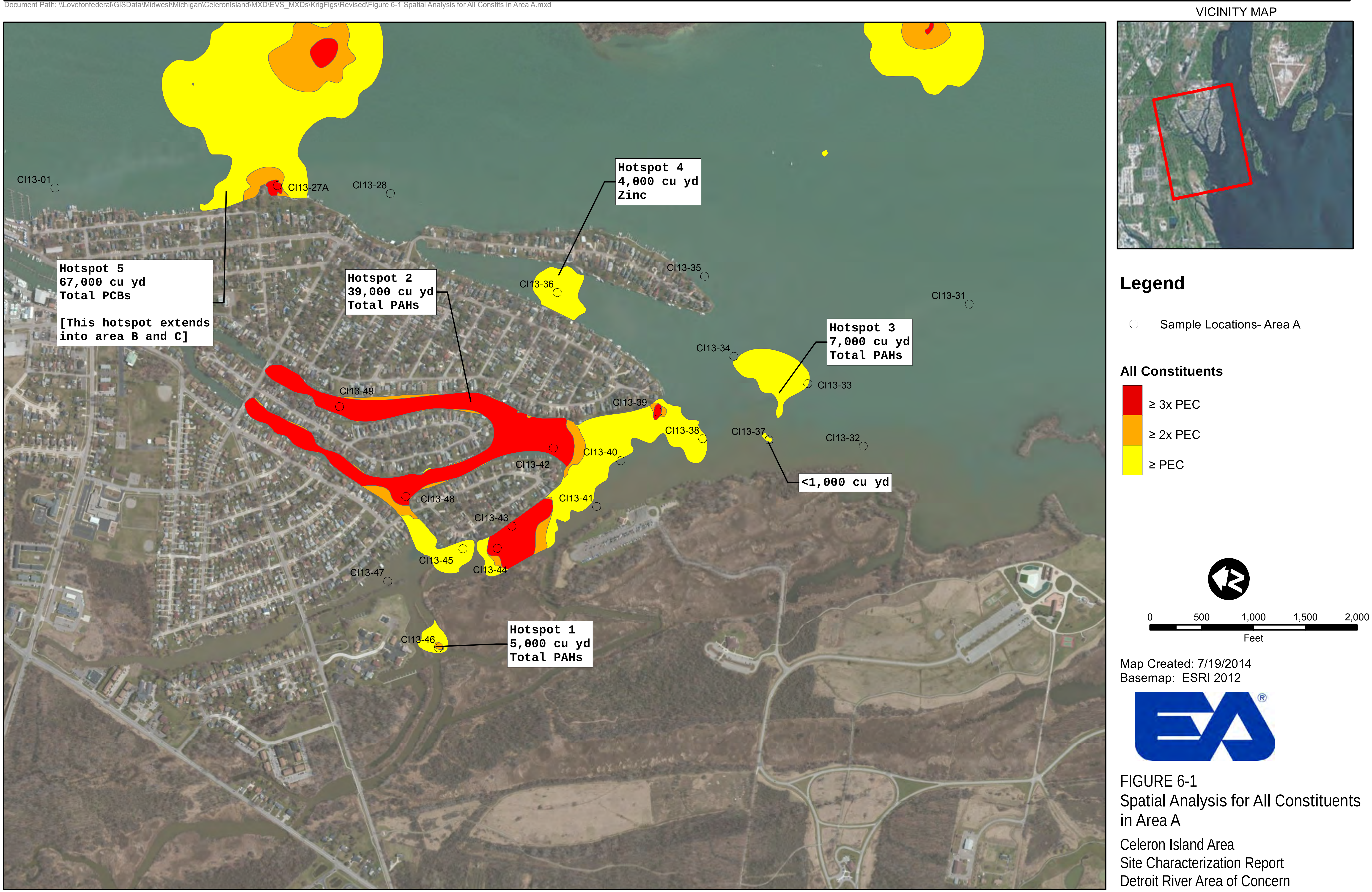
0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 5-1C
Probable Effect Concentration Quotients (PECQs) for Area C- Celeron Island Area
Assessment of Contaminated Sediments

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-1 Spatial Analysis for All Constits in Area A.mxd

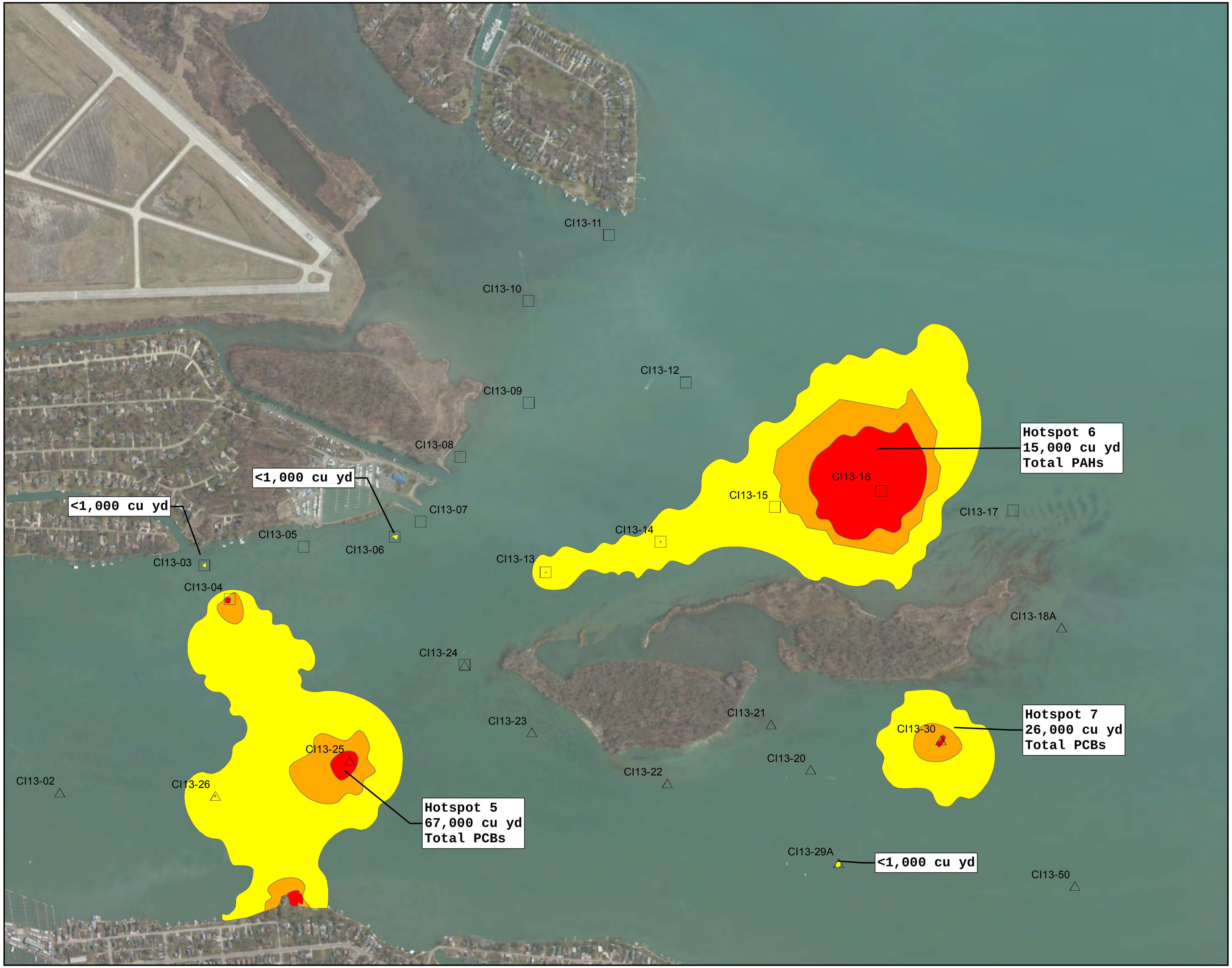


Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-1
Spatial Analysis for All Constituents in Area A

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-2 Spatial Analysis for All Constits in Areas B and C.mxd



VICINITY MAP

Legend

△ Sample Locations- Area B

☐ Sample Locations- Area C

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

Map Created: 7/19/2014
Basemap: ESRI 2012

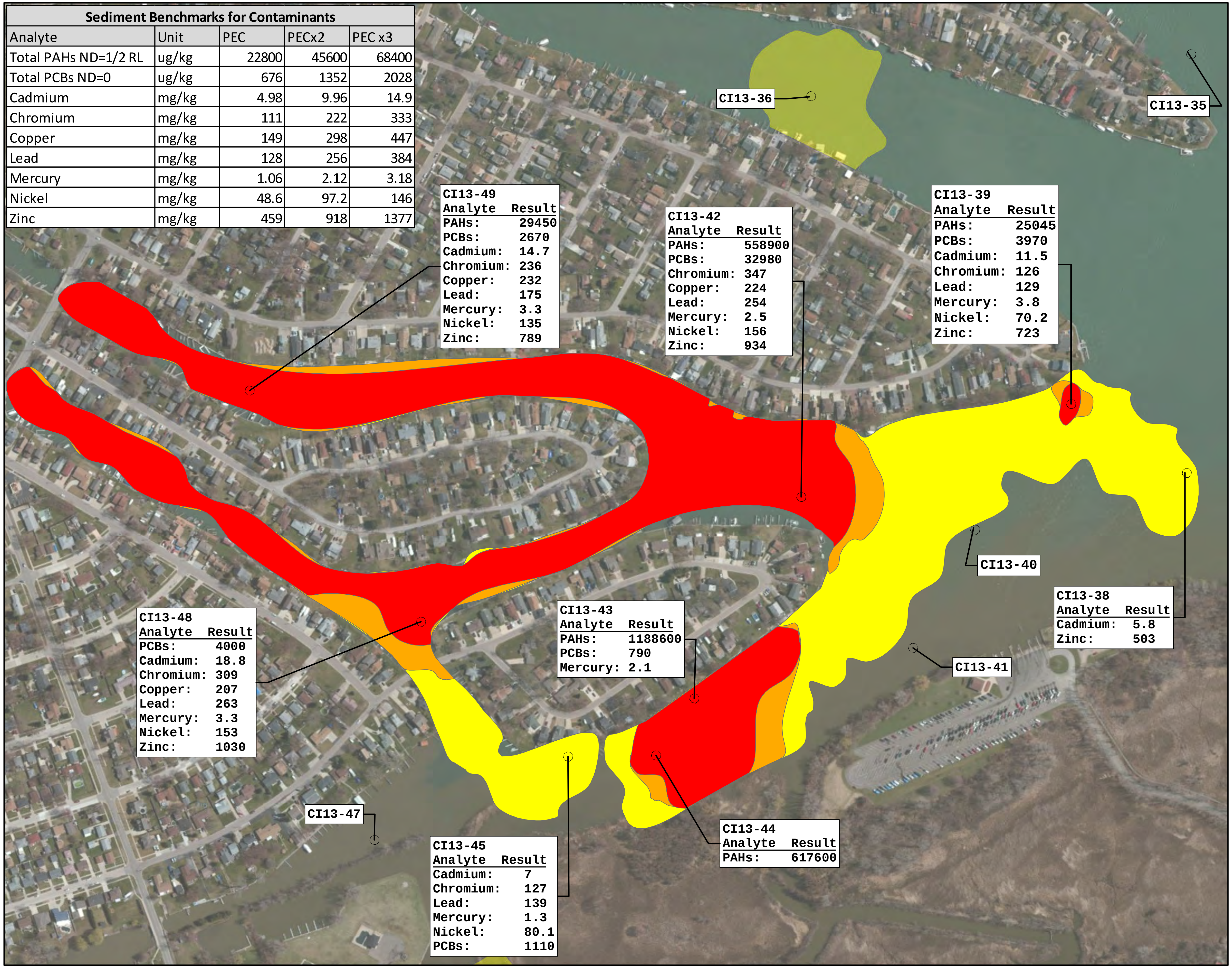
FIGURE 6-2
Spatial Analysis for All Constituents in Areas B and C

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-3 Hot Spot 2.mxd

Sediment Benchmarks for Contaminants

Analyte	Unit	PEC	PECx2	PEC x3
Total PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Zinc	mg/kg	459	918	1377



CI13-49

Analyte	Result
PAHs:	29450
PCBs:	2670
Cadmium:	14.7
Chromium:	236
Copper:	232
Lead:	175
Mercury:	3.3
Nickel:	135
Zinc:	789

CI13-42

Analyte	Result
PAHs:	558900
PCBs:	32980
Chromium:	347
Copper:	224
Lead:	254
Mercury:	2.5
Nickel:	156
Zinc:	934

CI13-39

Analyte	Result
PAHs:	25045
PCBs:	3970
Cadmium:	11.5
Chromium:	126
Lead:	129
Mercury:	3.8
Nickel:	70.2
Zinc:	723

CI13-38

Analyte	Result
Cadmium:	5.8
Zinc:	503

CI13-48

Analyte	Result
PCBs:	4000
Cadmium:	18.8
Chromium:	309
Copper:	207
Lead:	263
Mercury:	3.3
Nickel:	153
Zinc:	1030

CI13-43

Analyte	Result
PAHs:	1188600
PCBs:	790
Mercury:	2.1

CI13-45

Analyte	Result
Cadmium:	7
Chromium:	127
Lead:	139
Mercury:	1.3
Nickel:	80.1
PCBs:	1110

CI13-44

Analyte	Result
PAHs:	617600

VICINITY MAP

Legend

○ Sample Locations- Area A

All Constituents

🟥 ≥ 3x PEC
🟧 ≥ 2x PEC
🟨 ≥ PEC

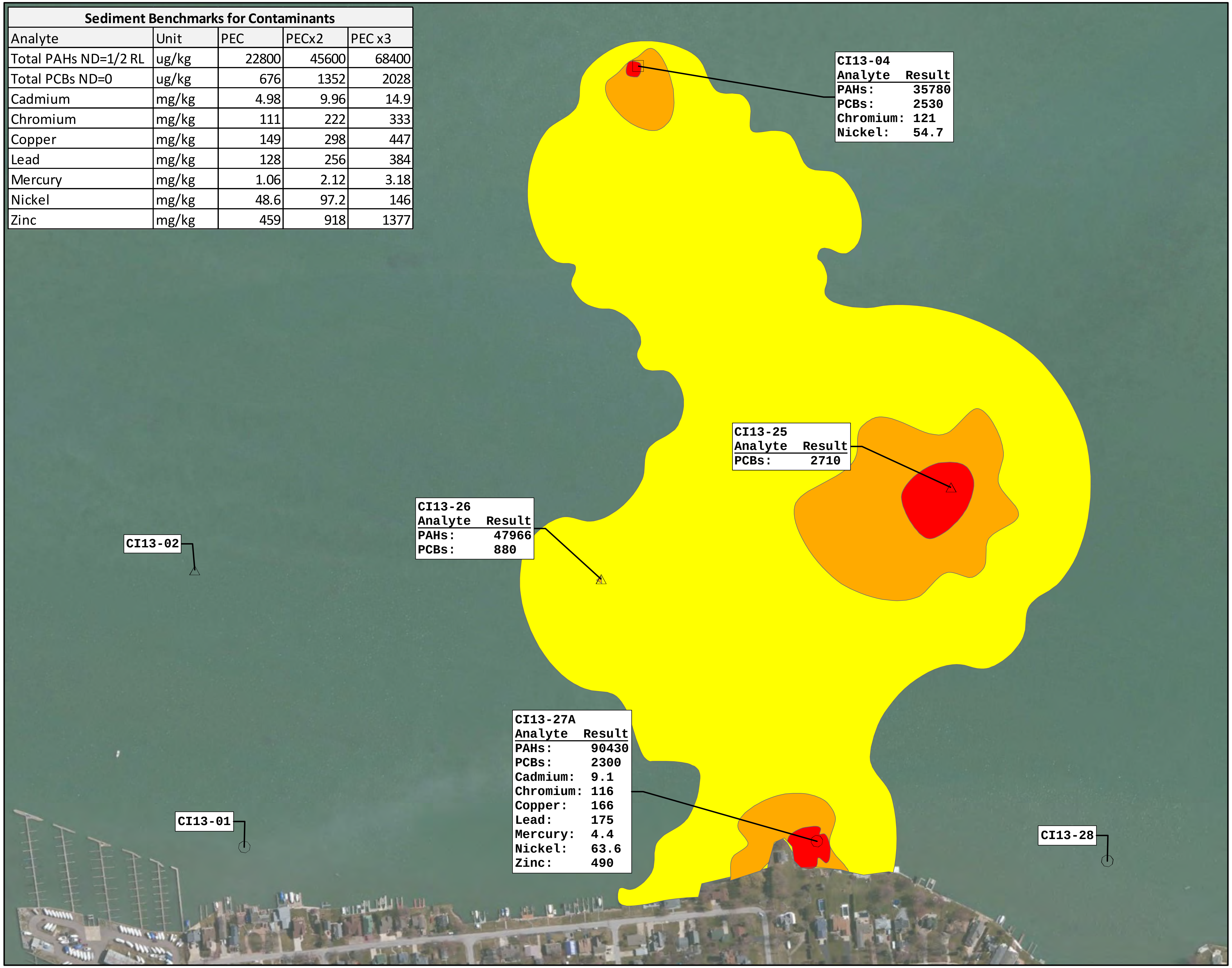
NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 39,000 cu yd

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-3
Hotspot 2

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-4 Hot Spot 5.mxd



Sediment Benchmarks for Contaminants

Analyte	Unit	PEC	PECx2	PEC x3
Total PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Zinc	mg/kg	459	918	1377

VICINITY MAP

Legend

○ Sample Locations- A

△ Sample Locations Area B

☐ Sample Locations- Area C

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 67,000 cu yd

0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

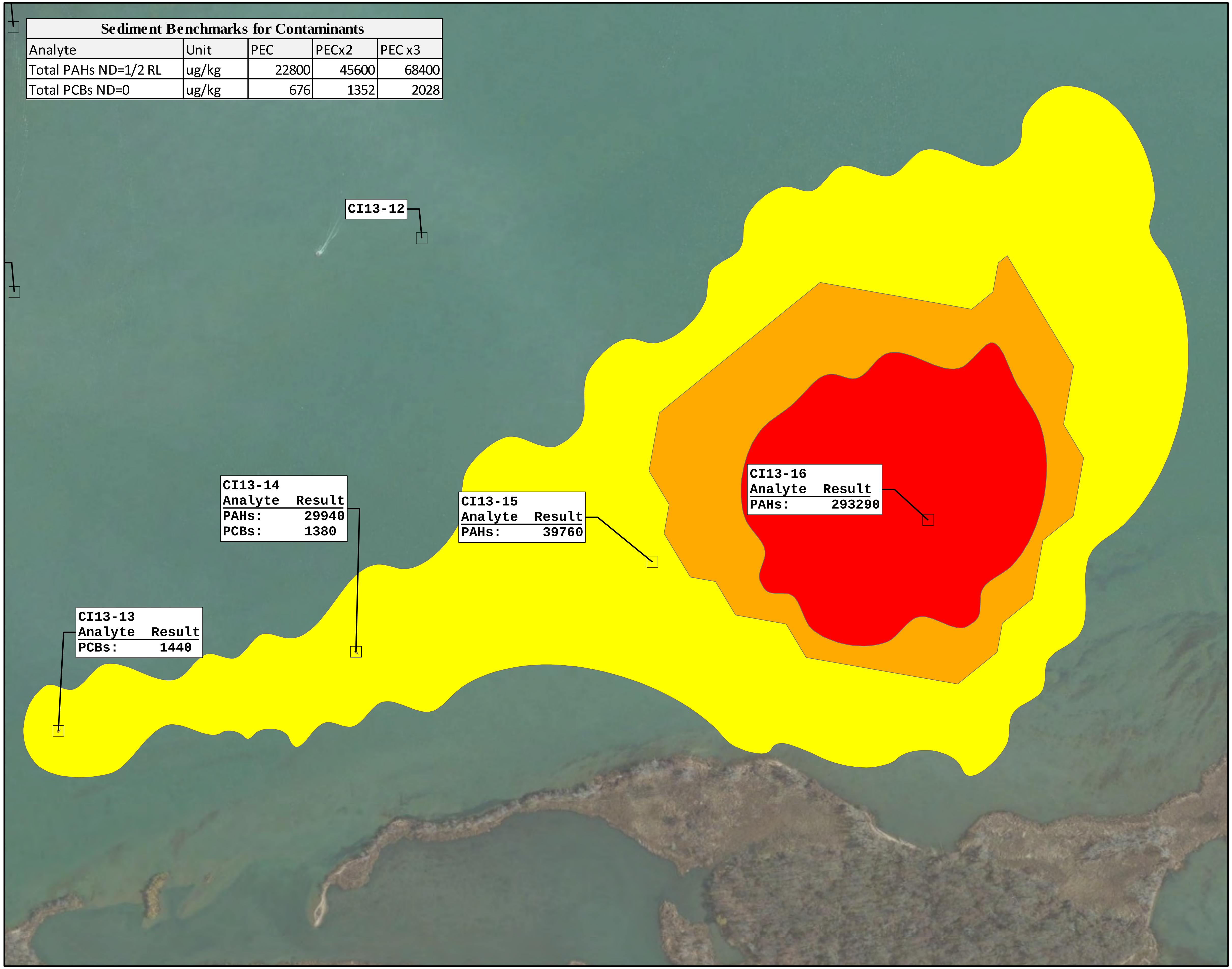
FIGURE 6-4
Hotspot 5

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-5 Hot Spot 6.mxd

Sediment Benchmarks for Contaminants

Analyte	Unit	PEC	PECx2	PEC x3
Total PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028



VICINITY MAP

Legend

☐ Sample Locations- Area C

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 15,000 cu yd

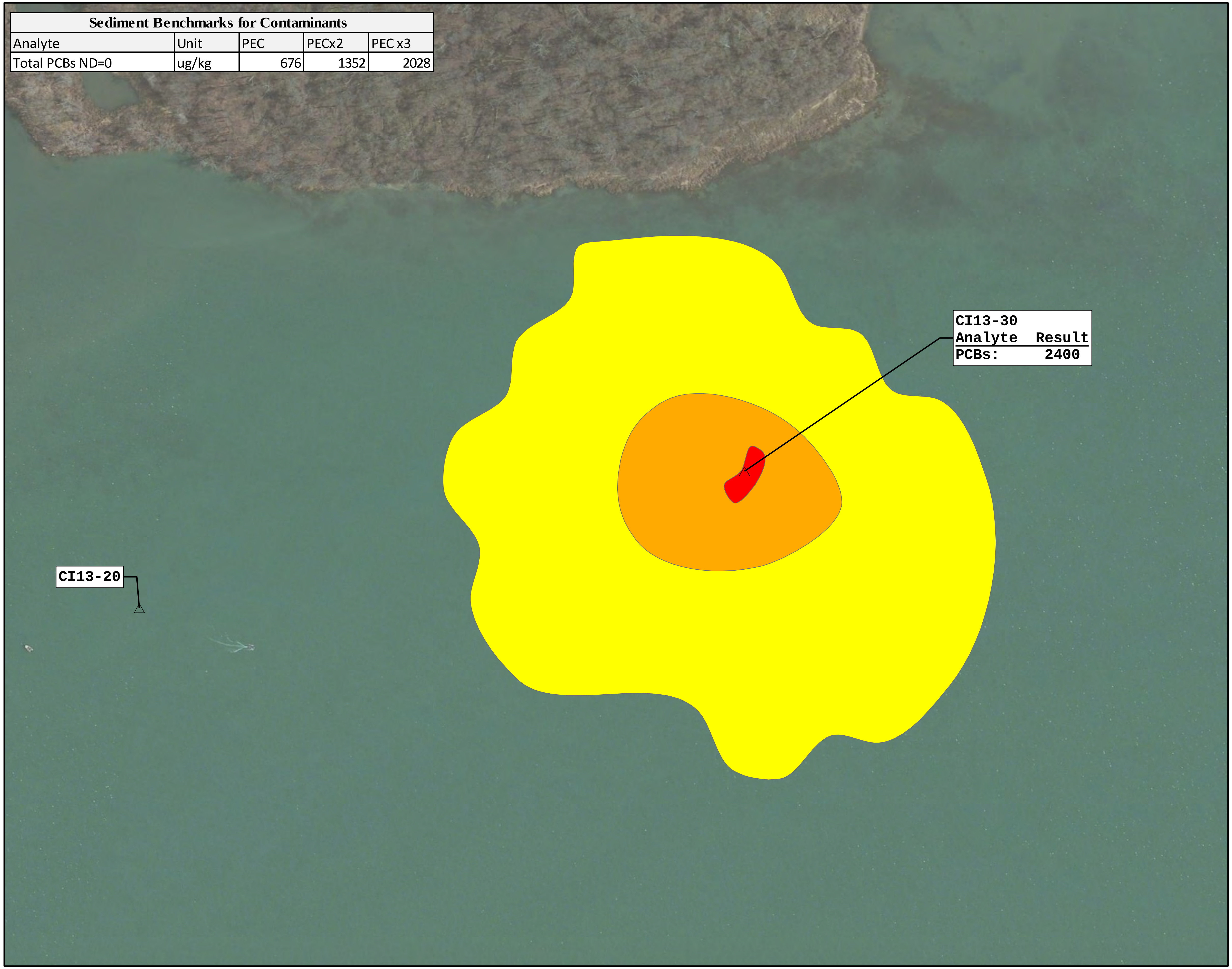
0 250 500 750 1,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-5
Hotspot 6

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-6 Hot Spot 7.mxd



Sediment Benchmarks for Contaminants				
Analyte	Unit	PEC	PECx2	PEC x3
Total PCBs ND=0	ug/kg	676	1352	2028

VICINITY MAP

Legend

△ Sample Locations- Area B

All Constituents

🟥 ≥ 3x PEC

🟧 ≥ 2x PEC

🟨 ≥ PEC

NOTE:
Results shown are maximum exceedances of PEC
Estimated volume = 26,000 cu yd

0 100 200 300 400
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-6
Hotspot 7

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-7 Spatial Analysis for ESBTUs in Areas A.mxd

CI13-27A
Ratio (3-5 ft): 3.42

CI13-42
Ratio (1-3 ft): 25.18

CI13-43
Ratio (3-5 ft): 70.64

CI13-44
Ratio (3-5 ft): 43.98

CI13-46
Ratio (0-1 ft): 4.64

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

☐ Sample Locations- Area C

ESBTU

🟥 > 10

🟧 7.5-10

🟨 1 - 7.4

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-7
Spatial Analysis for ESBTUs in Area A

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-8 Spatial Analysis for ESBTUs in Areas BC.mxd

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

☐ Sample Locations- Area C

ESBTU

🟥 > 10

🟧 7.5-10

🟨 1 - 7.4

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000

Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-8
Spatial Analysis for ESBTUs in Areas B and C

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-9 Spatial Analysis for PECQs in Areas A.mxd

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

☐ Sample Locations- Area C

Mean PEC-Q Value
(mean PEC-Qmetals + PEC-Q Total PAHs + PEC-QTotal PCBs)/3

🟥 > 1

🟨 > 0.5

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-9
Spatial Analysis for PEC-Qs in Area A

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

Document Path: \\Lovetonfederal\GISData\Midwest\Michigan\CeleronIsland\MXD\EVS_MXDs\KrigFigs\Revised\Figure 6-10 Spatial Analysis for PECQs in Areas BC.mxd

VICINITY MAP

Legend

○ Sample Locations- Area A

△ Sample Locations- Area B

☐ Sample Locations- Area C

Mean PEC-Q Value
(mean PEC-Qmetals + PEC-Q Total PAHs + PEC-QTotal PCBs)/3

🟥 > 1

🟨 > 0.5

NOTE: Ratio value shown represents highest result with associated depth (ft)

0 500 1,000 1,500 2,000
Feet

Map Created: 7/19/2014
Basemap: ESRI 2012

FIGURE 6-10
Spatial Analysis for PEC-Qs in Areas B and C

Celeron Island Area
Site Characterization Report
Detroit River Area of Concern

TABLES

TABLE 2-1. SEDIMENT CORE AND SURFACE PONAR COORDINATES
CELERON ISLAND SITE CHARACTERIZATION GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	SEDIMENT CORE					SURFACE PONAR					
Location ID	Date Collected	Time Collected	Latitude	Longitude	Distance from Target Coordinate (ft)	Date Collected	Time Collected	Latitude	Longitude	Distance from Target Coordinate (ft)	NOTES
			D D.M					D D.M			
CI13-01	9/23/2013	10:58	42° 05.7901	-83° 11.2194	44.29	9/27/2013	15:01	42° 05.7910	-83° 11.2230	44.25	Ponar re-sampled.
CI13-02	9/23/2013	12:00	42° 05.8541	-83° 11.0024	68.94	9/27/2013	15:45	42° 05.8438	-83° 11.0032	129.97	Vibracore attempts unsuccessful -- ponar collected only. Ponar re-sampled.
CI13-03	9/23/2013	14:25	42° 05.6982	-83° 10.4576	8.37	9/27/2013	16:20	42° 05.6982	-83° 10.4576	8.37	Ponar re-sampled.
CI13-04	9/23/2013	13:08	42° 05.6475	-83° 10.5191	38.05	9/27/2013	16:55	42° 05.6439	-83° 10.5088	83.30	Ponar re-sampled.
CI13-05	9/23/2013	15:42	42° 05.5470	-83° 10.3758	65.40	9/27/2013	16:45	42° 05.5424	-83° 10.3806	81.13	Ponar re-sampled.
CI13-06	9/23/2013	16:13	42° 05.4064	-83° 10.3155	13.57	9/27/2013	17:00	42° 05.4031	-83° 10.3197	35.43	Ponar re-sampled.
CI13-07	9/23/2013	16:56	42° 05.3701	-83° 10.2725	166.99	9/27/2013	17:20	42° 05.3693	-83° 10.2662	150.41	Location moved by EPA (R. Ellison) upriver of entrance to Ford Yacht Club to avoid possible influence of contamination from marina. Ponar re-sampled.
CI13-08	9/24/2013	8:44	42° 05.3281	-83° 10.1176	50.43	9/27/2013	17:35	42° 05.3292	-83° 10.1205	35.72	Location moved by EPA (R. Ellison) because target location was too close to shore and obstructed by large rock. Vibracore attempts unsuccessful -- ponar collected only. Ponar re-sampled.
CI13-09	9/24/2013	9:15	42° 05.2374	-83° 09.9737	2.70	9/30/2013	15:00	42° 05.2413	-83° 09.9742	21.12	Ponar re-sampled.
CI13-10	9/24/2013	9:48	42° 05.2707	-83° 09.7572	34.87	9/30/2013	15:15	42° 05.2752	-83° 09.7555	10.20	Ponar re-sampled.
CI13-11	9/24/2013	10:23	42° 05.1642	-83° 09.5828	46.34	9/30/2013	15:25	42° 05.1647	-83° 09.5779	68.70	Ponar re-sampled.
CS13-12	9/24/2013	10:54	42° 04.9954	-83° 09.8623	21.02	9/30/2013	15:43	42° 04.9972	-83° 09.8577	11.86	Vibracore attempts unsuccessful -- ponar collected only. Ponar re-sampled.
CI13-13	9/24/2013	11:28	42° 05.1563	-83° 10.3259	7.13	9/30/2013	15:55	42° 05.1600	-83° 10.3322	42.53	Ponar re-sampled.
CI13-14	9/24/2013	13:53	42° 04.9832	-83° 10.2095	12.59	9/30/2013	16:05	42° 04.9861	-83° 10.2147	16.82	Ponar re-sampled.
CI13-15	9/24/2013	14:25	42° 04.8148	-83° 10.0889	23.52	9/30/2013	16:25	42° 04.8191	-83° 10.0891	13.74	Ponar re-sampled.
CI13-16	9/24/2013	14:56	42° 04.6517	-83° 10.0088	6.72	9/30/2013	16:40	42° 04.6537	-83° 10.0130	29.26	Ponar re-sampled.
CI13-17	9/24/2013	15:43	42° 04.4366	-83° 09.9937	32.80	9/30/2013	16:55	42° 04.4355	-83° 09.9945	25.53	Ponar re-sampled.
CI13-18A	9/24/2013	16:41	42° 04.3228	-83° 10.2212	--	9/30/2013	17:15	42° 04.3198	-83° 10.2049		Replaced CI13-18 due to lack of penetration at proposed location. Ponar re-sampled.
CI13-19	9/24/2013	17:22	42° 04.3879	-83° 10.4510	9.97	9/24/2013	17:22	42° 04.3879	-83° 10.4510	9.97	Made 2 attempts with vibracore and 3 attempts with ponar, all yielded 0 recovery. Location abandoned per EPA guidance.
CI13-20	9/25/2013	8:42	42° 04.6740	-83° 10.6311	428.60	9/30/2013	18:15	42° 04.6758	-83° 10.6276	411.09	Location moved by EPA (R. Ellison) offshore due to large rocks near proposed location. Ponar re-sampled.
CI13-21	9/25/2013	9:59	42° 04.7513	-83° 10.5518	285.66	9/26/2013	9:59	42° 04.7513	-83° 10.5518	285.66	Vibracore attempts unsuccessful -- ponar collected only. Locaton slightly off due to difficulty anchoring in strong current (approved by EPA)
CI13-22	9/25/2013	10:33	42° 04.8959	-83° 10.7214	2.47	10/28/2013	12:33	42° 04.8959	-83° 10.7214	2.47	Vibracore attempts unsuccessful -- ponar collected only. Ponar re-sampled.
CI13-23	9/25/2013	11:00	42° 05.1270	-83° 10.6716	2.21	10/28/2013	12:14	42° 05.1258	-83° 10.6701	9.60	Ponar re-sampled.
CI13-24	9/25/2013	13:56	42° 05.2548	-83° 10.5583	3.95	10/28/2013	11:54	42° 05.2521	-83° 10.5562	16.30	Ponar re-sampled.
CI13-25	9/30/2013	12:05	42° 05.4063	-83° 10.8103	84.06	9/30/2013	12:05	42° 05.4063	-83° 10.8103	84.06	Vibracore attempts unsuccessful -- ponar collected only. Locaton off target due to difficulty anchoring in strong current (approved by EPA)

NOTES:
Shaded cells indicate a sample that was attempted but unsuccessful
A total of 22 ponar samples were collected on a different day from the corresponding core

TABLE 2-1. SEDIMENT CORE AND SURFACE PONAR COORDINATES
CELERON ISLAND SITE CHARACTERIZATION GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	SEDIMENT CORE					SURFACE PONAR					
Location ID	Date Collected	Time Collected	Latitude	Longitude	Distance from Target Coordinate (ft)	Date Collected	Time Collected	Latitude	Longitude	Distance from Target Coordinate (ft)	NOTES
			D D.M					D D.M			
CI13-26	9/30/2013	12:50	42° 05.6069	-83° 10.9426	20.11	9/30/2013	12:50	42° 05.6069	-83° 10.9426	20.11	
CI13-27A	9/30/2013	11:35	42° 05.4440	-83° 11.1203	--	9/30/2013	11:35	42° 05.4440	-83° 11.1203		Replaced CI13-27 due to lack of penetration at proposed location
CI13-28	9/30/2013	10:30	42° 05.2656	-83° 11.0885	30.39	9/30/2013	10:30	42° 05.2656	-83° 11.0885	30.39	Location moved by EPA (R. Ellison) due to large rocks near proposed location
CI13-29A	9/30/2013	9:45	42° 04.5995	-83° 10.8170	--	9/30/2013	9:45	42° 04.5995	-83° 10.8170		Replaced CI13-29 due to lack of penetration at proposed location
CI13-30	9/25/2013	9:21	42° 04.4773	-83° 10.5125	27.90	9/30/2013	17:45	42° 04.4736	-83° 10.5070	53.99	Location moved slightly by EPA (R. Ellison) to area of greater depostion
CI13-31	9/27/2013	12:00	42° 04.3280	-83° 11.0741	145.06	9/27/2013	12:00	42° 04.3280	-83° 11.0741	145.06	Location moved slightly by EPA (R. Ellison) to area of greater depostion
CI13-32	9/27/2013	10:05	42° 04.4480	-83° 11.4165	86.29	9/27/2013	10:05	42° 04.4480	-83° 11.4165	86.29	Location moved slightly by EPA (R. Ellison) due to shallow water at proposed location
CI13-33	9/27/2013	10:35	42° 04.5547	-83° 11.3090	41.89	9/27/2013	10:35	42° 04.5547	-83° 11.3090	41.89	Location moved slightly by EPA (R. Ellison) due to extensive macrophytes at proposed location
CI13-34	9/27/2013	11:20	42° 04.6784	-83° 11.2835	18.84	9/27/2013	11:20	42° 04.6784	-83° 11.2835	18.84	
CI13-35	9/25/2013	14:46	42° 04.7495	-83° 11.1281	98.19	9/25/2013	14:46	42° 04.7495	-83° 11.1281	98.19	Location moved slightly by EPA (R. Ellison) to area of greater depostion
CI13-36	9/25/2013	15:23	42° 04.9741	-83° 11.2249	43.88	9/25/2013	15:23	42° 04.9741	-83° 11.2249	43.88	Location moved slightly by EPA (R. Ellison) to area of greater depostion
CI13-37	9/27/2013	9:35	42° 04.5970	-83° 11.4432	102.55	9/27/2013	9:35	42° 04.5970	-83° 11.4432	102.55	Location moved slightly by EPA (R. Ellison) due to extensive macrophytes at proposed location
CI13-38	9/27/2013	8:55	42° 04.7007	-83° 11.4689	36.01	9/27/2013	8:55	42° 04.7007	-83° 11.4689	36.01	
CI13-39	9/25/2013	17:47	42° 04.7791	-83° 11.4320	24.64	9/25/2013	17:47	42° 04.7791	-83° 11.4320	24.64	
CI13-40	9/25/2013	17:18	42° 04.8218	-83° 11.5496	131.14	9/25/2013	17:18	42° 04.8218	-83° 11.5496	131.14	Location moved slightly by EPA (R. Ellison) due to extensive macrophytes at proposed location
CI13-41	9/25/2013	16:55	42° 04.8447	-83° 11.6558	24.34	9/25/2013	16:55	42° 04.8447	-83° 11.6558	24.34	Location moved slightly by EPA (R. Ellison) due to shallow water at proposed location
CI13-42	9/26/2013	16:55	42° 04.9309	-83° 11.5518	308.37	9/26/2013	16:55	42° 04.9309	-83° 11.5518	308.37	Location moved slightly by EPA (R. Ellison) due to shallow water at proposed location
CI13-43	9/26/2013	10:25	42° 04.9708	-83° 11.7330	23.82	9/26/2013	10:25	42° 04.9708	-83° 11.7330	23.82	
CI13-44	9/26/2013	10:38	42° 04.9869	-83° 11.7854	131.25	9/26/2013	10:38	42° 04.9869	-83° 11.7854	131.25	Location moved slightly by EPA (R. Ellison) due to extensive macrophytes at proposed location
CI13-45	9/26/2013	11:05	42° 00.084	-83° 11.8008	361.40	9/26/2013	11:05	42° 00.084	-83° 11.8008	361.40	Location moved slightly by EPA (R. Ellison) due to extensive macrophytes at proposed location
CI13-46	9/26/2013	14:16	42° 05.0465	-83° 12.0186	646.19	9/26/2013	14:16	42° 05.0465	-83° 12.0186	646.19	
CI13-47	9/26/2013	13:48	42° 05.1468	-83° 11.9006	70.59	9/26/2013	13:48	42° 05.1468	-83° 11.9006	70.59	Location moved slightly by EPA (R. Ellison) due to extensive macrophytes at proposed location
CI13-48	9/26/2013	16:25	42° 05.1454	-83° 11.7157	126.08	9/26/2013	16:25	42° 05.1454	-83° 11.7157	126.08	Location moved slightly by EPA (R. Ellison) to area of greater depostion
CI13-49	9/26/2013	15:50	42° 05.2779	-83° 11.5562	31.23	9/26/2013	15:50	42° 05.2779	-83° 11.5562	31.23	
CI13-50	9/30/2013	8:50	42° 04.2185	-83° 10.7641	67.46	9/30/2013	8:50	42° 04.2185	-83° 10.7641	67.46	Location moved slightly by EPA (R. Ellison) to area of greater depostion

NOTES:
Shaded cells indicate a sample that was attempted but unsuccessful
A total of 22 ponar samples were collected on a different day from the corresponding core

TABLE 2-2 ANALYTICAL PROGRAM

CELERON ISLAND SITE CHARACTERIZATION GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Proposed Analytical Sample Count			Actual Analytical Sample Count		
Sample Location/Sample ID	**PCB-Aroclors, SIM34-PAHs, Michigan 10 metals + iron and nickel, TOC, percent solids**	**AVS/SEM**	**Grain Size**	**PCB-Aroclors, SIM34-PAHs, Michigan 10 metals + iron and nickel, TOC, percent solids**	**AVS/SEM**	**Grain Size**
CI13-01	5	1	1	2	1	1
CI13-02	5	1	1	1	1	1
CI13-03	5	1	1	3	1	1
CI13-04	5	1	1	3	1	1
CI13-05	5	1	1	3	1	1
CI13-06	5	1	1	3	1	1
CI13-07	5	1	1	3	1	1
CI13-08	5	1	1	1	1	1
CI13-09	5	1	1	3	1	1
CI13-10	5	1	1	4	1	1
CI13-11	5	1	1	3	1	1
CI13-12	5	1	1	1	1	1
CI13-13	5	1	1	4	1	1
CI13-14	5	1	1	3	1	1
CI13-15	5	1	1	3	1	1
CI13-16	5	1	1	3	1	1
CI13-17	5	1	1	2	1	1
CI13-18A*	5	1	1	2	1	1
CI13-19	5	1	1	0	0	0
CI13-20	5	1	1	3	1	1
CI13-21	5	1	1	1	1	1
CI13-22	5	1	1	1	1	1
CI13-23	5	1	1	3	1	1
CI13-24	5	1	1	2	1	1
CI13-25	5	1	1	1	1	1
CI13-26	5	1	1	6	1	1
CI13-27A*	5	1	1	5	1	1
CI13-28	5	1	1	7	1	1
CI13-29A*	5	1	1	3	1	1
CI13-30	5	1	1	2	1	1
CI13-31	5	1	1	5	1	1
CI13-32	5	1	1	3	1	1
CI13-33	5	1	1	4	1	1
CI13-34	5	1	1	6	1	1
CI13-35	5	1	1	3	1	1
CI13-36	5	1	1	9	1	1
CI13-37	5	1	1	3	1	1
CI13-38	5	1	1	5	1	1
CI13-39	5	1	1	5	1	1
CI13-40	5	1	1	5	1	1
CI13-41	5	1	1	4	1	1
CI13-42	5	1	1	4	1	1
CI13-43	5	1	1	5	1	1
CI13-44	5	1	1	5	1	1
CI13-45	5	1	1	4	1	1
CI13-46	5	1	1	4	1	1
CI13-47	5	1	1	5	1	1
CI13-48	5	1	1	4	1	1
CI13-49	5	1	1	5	1	1
CI13-50	5	1	1	5	1	1
Total Sediment Samples	**250**	**50**	**50**	**174**	**49**	**49**
Field Quality Control Samples						
Field Duplicates (assume 10% of samples)	**25**	**5**	**0**	**18**	**5**	**0**
Matrix Spike/Matrix Spike Duplicate (assume 5% of samples)	**13**	**3**	**0**	**9**	**3**	**0**
Total Field Quality Control Samples	**38**	**8**	**0**	**27**	**8**	**0**
Total Samples	**288**	**58**	**50**	**201**	**57**	**49**

NOTE:

* Samples were moved during field sampling as designated by EPA and were renamed CI13 - ##A for reporting purposes

CLP = Contract Laboratory Program.

EPA = U.S. Environmental Protection Agency.

PAH = Polynuclear aromatic hydrocarbon.

PCB = Polychlorinated biphenyl.

TOC = Total organic carbon.

TABLE 3-1. CELERON ISLAND SEDIMENT SAMPLE COLLECTION
CELERON ISLAND SITE CHARACTERIZATION GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Location ID	Ponar Sample Collected	Water Depth (ft)	Sediment Surface Elevation* IGLD 1985 (ft)	Sediment Core				Field Duplicate Samples	MS/MSD Samples
				Penetration Depth (ft)	Sediment Core Recovery (ft)	Percent Recovery	Sample Collected to Refusal (Y/N)		
CI13-01	Y	12.0	560	2.5	1.6	64.0	Y		
CI13-02	Y	16.0	556	0.0	0.0	0.0	Y		
CI13-03	Y	6.0	566	2.5	2.9	116.0	Y	CI13-03-SURF-FD	
CI13-04	Y	5.6	566	3.5	3.3	92.9	Y		CI13-04-0103-MS/MSD
CI13-05	Y	5.4	567	3.0	2.9	96.7	Y	CI13-05-SURF-FD; CI13-05-0001-FD; CI13-05-0103-FD	
CI13-06	Y	9.8	562	1.3	1.6	126.7	Y		CI13-06-SURF-MS/MSD
CI13-07	Y	7.6	564	2.0	1.7	83.3	Y	CI13-07-SURF-FD	
CI13-08	Y	3.4	569	0.0	0.0	0.0	Y		
CI13-09	Y	5.4	567	1.8	1.8	97.2	Y		
CI13-10	Y	4.9	567	4.5	4.3	94.4	Y	CI13-10-0001-FD; CI13-10-0103-FD; CI13-10-0305-FD	CI13-10-SURF-MS/MSD
CI13-11	Y	6.6	565	3.8	3.4	90.7	Y		CI13-11-0103-MS/MSD
CS13-12	Y	7.5	565	0.5	0.0	0.0	Y	CI13-12-SURF-FD	
CI13-13	Y	7.2	565	4.0	4.5	112.5	Y		
CI13-14	Y	7.0	565	3.5	3.2	90.3	Y		
CI13-15	Y	6.5	566	2.3	2.3	100.0	Y		
CI13-16	Y	6.1	566	2.5	2.3	90.0	Y		
CI13-17	Y	3.3	569	1.2	1.1	91.7	Y		
CI13-18A	Y	4.5	568	0.9	0.7	77.8	Y		
CI13-19	N	7.6	564	0.0	0.0	0.0	Y		
CI13-20	Y	8.1	564	2.0	1.8	90.0	Y		
CI13-21	Y	3.2	569	0.0	0.0	0.0	Y		
CI13-22	Y	3.6	568	0.0	0.0	0.0	Y		
CI13-23	Y	5.6	566	3.5	3.3	94.3	Y		
CI13-24	Y	5.6	566	1.5	1.3	83.3	Y		
CI13-25	Y	20.2	552	0.5	0.0	0.0	Y		

* Sediment elevation calculated using NOAA buoy Station ID 9044020, located in Gibraltar, MI

TABLE 3-1. CELERON ISLAND SEDIMENT SAMPLE COLLECTION
CELERON ISLAND SITE CHARACTERIZATION GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Location ID	Ponar Sample Collected	Water Depth (ft)	Sediment Surface Elevation* IGLD 1985 (ft)	Sediment Core				Field Duplicate Samples	MS/MSD Samples
				Penetration Depth (ft)	Sediment Core Recovery (ft)	Percent Recovery	Sample Collected to Refusal (Y/N)		
CI13-26	Y	7.5	565	8.0	8.1	101.3	Y		
CI13-27A	Y	3.3	569	6.5	6.8	103.8	Y		
CI13-28	Y	5.8	566	9.0	9.8	108.3	Y		CI13-28-0103-MS/MSD
CI13-29A	Y	10.1	562	3.0	2.8	94.3	Y		
CI13-30	Y	7.9	564	2.0	1.5	75.0	Y		
CI13-31	Y	6.5	566	6.0	6.9	115.2	Y	CI13-31-SURF-FD	
CI13-32	Y	4.5	568	4.5	4.3	94.4	Y		
CI13-33	Y	4.5	568	5.0	5.3	105.0	Y		
CI13-34	Y	4.8	567	8.5	9.1	106.8	Y		CI13-34-SURF-MS/MSD; CI13-34-0507-MS/MSD
CI13-35	Y	4.6	567	2.0	2.6	129.0	Y		
CI13-36	Y	2.6	569	14.5	14.5	100.0	N	CI13-36-0709-FD; CI13-36-0911-FD; CI13-36-1113-FD; CI13-36-1315-FD	
CI13-37	Y	4.6	567	3.0	3.0	100.0	Y		
CI13-38	Y	3.8	568	4.8	5.6	117.5	Y	CI13-38-SURF-FD; CI13-38-0001-FD; CI13-38-0103-FD	CI13-38-0305-MS/MSD
CI13-39	Y	5.1	567	6.0	6.4	106.7	Y		
CI13-40	Y	3.5	569	5.8	5.9	102.6	Y		CI13-40-0305-MS/MSD
CI13-41	Y	3.3	569	4.5	4.9	108.9	Y	CI13-41-SURF-FD	CI13-41-0103-MS/MSD
CI13-42	Y	3.8	568	4.5	5.6	124.0	Y		CI13-42-0103-MS/MSD
CI13-43	Y	3.2	569	6.0	6.7	111.0	Y		
CI13-44	Y	3.8	568	5.0	5.6	112.0	Y		CI13-44-SURF-MS/MSD; CI13-44-0103-MS/MSD
CI13-45	Y	3.16	569	3.5	3.4	97.4	Y	CI13-45-SURF-FD; CI13-45-0001-FD; CI13-45-0103-FD	
CI13-46	Y	3.9	568	5.5	5.5	100.0	Y		
CI13-47	Y	4	568	5.5	5.4	98.2	Y		
CI13-48	Y	3.58	568	5.3	5.6	106.3	Y	CI13-48-0001-FD; CI13-48-0103-FD; CI13-48-0305-FD	
CI13-49	Y	3.5	569	7.5	7.5	100.0	Y		
CI13-50	Y	8.16	564	6.5	6.3	97.4	Y	CI13-50-0001-FD; CI13-50-0103-FD	

* Sediment elevation calculated using NOAA buoy Station ID 9044020, located in Gibraltar, MI

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Sample Location:		CI13-01	CI13-02	CI13-03	CI13-04	CI13-05	CI13-06	CI13-07	CI13-08	CI13-09	CI13-10
Sample Name:		CI13-01-SURF	CI13-02-SURF	CI13-03-SURF	CI13-04-SURF	CI13-05-SURF	CI13-06-SURF	CI13-07-SURF	CI13-08-SURF	CI13-09-SURF	CI13-10-SURF
Sample Depth (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Date Sampled:		9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/30/13	9/30/13
Analyte	**Units**										
Gravel	%	5.9	3.5	0	0	0.4	0.3	0	37	3.5	0.5
Sand	%	81.8	52.8	69.4	84.2	75.9	86.6	74.8	47.8	83.7	88.2
Coarse Sand	%	3.2	1.4	0.1	0.3	0.6	0.2	0.7	12.7	5.3	0.6
Medium Sand	%	10.3	8.4	2.2	0.7	6.6	3.7	2.4	9.4	14.1	5.2
Fine Sand	%	68.3	43	67.1	83.2	68.7	82.7	71.7	25.7	64.3	82.4
Silt	%	9	26.5	21.8	10.3	16.8	8.5	17.9	10.7	8	8.7
Clay	%	3.4	17.2	8.8	5.5	6.9	4.6	7.3	4.5	4.8	2.6
Silt + Clay	%	12.4	43.7	30.6	15.8	23.7	13.1	25.2	15.2	12.8	11.3
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	100	100	100	100	93.9	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	98	97.7	100	100	100	100	100	74.3	100	100
Sieve Size #4 - Percent Finer	% passed	94.1	96.5	100	100	99.6	99.7	100	63	96.5	99.5
Sieve Size #10 - Percent Finer	% passed	90.9	95.1	99.9	99.7	99	99.5	99.3	50.3	91.2	98.9
Sieve Size #20 - Percent Finer	% passed	87.5	91.5	99.4	99.5	97.3	98.8	98.7	46	86	97.5
Sieve Size #40 - Percent Finer	% passed	80.6	86.7	97.7	99	92.4	95.8	96.9	40.9	77.1	93.7
Sieve Size #60 - Percent Finer	% passed	61.2	74.2	95	93.6	79.3	84.6	92.3	32	60.3	83.2
Sieve Size #80 - Percent Finer	% passed	45	63.1	91.8	75	68	71.9	87.4	25	49	68.6
Sieve Size #100 - Percent Finer	% passed	32.3	56.4	83.5	54	58.7	59.9	80.5	21.1	41.8	47.7
Sieve Size #200 - Percent Finer	% passed	12.3	43.7	30.6	15.8	23.7	13.1	25.2	15.2	12.8	11.3
Hydrometer Reading 1 - Percent Finer	% passed	6.5	30.6	18.2	11.3	12.9	10.2	15	8.8	10	4.4
Hydrometer Reading 2 - Percent Finer	% passed	6.5	27.3	16.7	10.8	12.1	8.9	12.9	8	8.9	3.8
Hydrometer Reading 3 - Percent Finer	% passed	5.9	23.9	13.1	9.2	9.9	6.4	10.1	6.2	7.9	3.8
Hydrometer Reading 4 - Percent Finer	% passed	4	19.7	11	7.1	7.7	5.2	8	5.4	6.4	2.6
Hydrometer Reading 5 - Percent Finer	% passed	3.4	17.2	8.8	5.5	6.9	4.6	7.3	4.5	4.8	2.6
Hydrometer Reading 6 - Percent Finer	% passed	2.6	13.6	6.6	4.3	4.6	3.2	5.1	2.7	3.3	1.3
Hydrometer Reading 7 - Percent Finer	% passed	2	9.4	4.4	3.3	3.8	2.6	3.6	1.8	2.7	1.3

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Sample Location:		CI13-11	CI13-12	CI13-13	CI13-14	CI13-15	CI13-16	CI13-17	CI13-18	CI13-20	CI13-21
Sample Name:		CI13-11-SURF	CI13-12-SURF	CI13-13-SURF	CI13-14-SURF	CI13-15-SURF	CI13-16-SURF	CI13-17-SURF	CI13-18A-SURF	CI13-20-SURF	CI13-21-SURF
Sample Depth (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Date Sampled:		9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/26/13
Analyte	**Units**										
Gravel	%	1.9	0	0.7	0.3	0.7	1	0	55.2	0.1	35
Sand	%	79.8	38.2	36.5	56	45	69.6	96.9	39.2	91.6	52.8
Coarse Sand	%	3.9	0.2	0.4	0.3	1.1	1.7	0	9.5	0.1	7.9
Medium Sand	%	13.1	0.7	1.9	1.2	4.1	4.2	0.4	9.9	0.6	11.1
Fine Sand	%	62.8	37.3	34.2	54.5	39.8	63.7	96.5	19.8	90.9	33.8
Silt	%	12.1	36.9	44.4	33.5	42.1	23.5	1.9	3.7	6.5	6.7
Clay	%	6.2	24.9	18.4	10.2	12.2	5.9	1.2	1.9	1.9	5.5
Silt + Clay	%	18.3	61.8	62.8	43.7	54.3	29.4	3.1	5.6	8.4	12.2
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100	100	89.2	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	100	100	100	100	67.6	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	100	100	100	100	100	100	100	58	100	77.2
Sieve Size #4 - Percent Finer	% passed	98.1	100	99.3	99.7	99.3	99	100	44.8	99.9	65
Sieve Size #10 - Percent Finer	% passed	94.2	99.8	98.9	99.4	98.2	97.3	100	35.3	99.8	57.1
Sieve Size #20 - Percent Finer	% passed	90.2	99.6	98.2	99	96.3	96	99.9	30	99.7	52.1
Sieve Size #40 - Percent Finer	% passed	81.1	99.1	97	98.2	94.1	93.1	99.6	25.4	99.2	46
Sieve Size #60 - Percent Finer	% passed	51.3	97.2	93	96	90.2	86.1	92.3	16.5	94.9	33.3
Sieve Size #80 - Percent Finer	% passed	28.7	93.4	86.3	93.3	85.5	80.9	68.6	11.5	78.8	25.6
Sieve Size #100 - Percent Finer	% passed	22.6	86.2	78.5	88.3	80.1	75	45.1	9	55.7	21.2
Sieve Size #200 - Percent Finer	% passed	18.3	61.8	62.8	43.7	54.3	29.4	3.1	5.6	8.3	12.2
Hydrometer Reading 1 - Percent Finer	% passed	13.4	46.7	44.4	22.4	26.5	15.2	1.7	4.7	4.1	10.2
Hydrometer Reading 2 - Percent Finer	% passed	11.7	42	35.3	19.4	22.5	12.3	1.7	4	4.1	9.2
Hydrometer Reading 3 - Percent Finer	% passed	10.1	32.5	28.6	14.8	17.8	9.5	1.7	3.3	3	7.6
Hydrometer Reading 4 - Percent Finer	% passed	7.9	28.7	22.9	12.5	14.6	7.3	1.2	2.3	2.4	6.6
Hydrometer Reading 5 - Percent Finer	% passed	6.2	24.9	18.4	10.2	12.2	5.9	1.2	1.9	1.9	5.5
Hydrometer Reading 6 - Percent Finer	% passed	4.5	18.2	12.8	7.1	7.4	3.8	0.7	0.8	1.9	4.4
Hydrometer Reading 7 - Percent Finer	% passed	2.8	12.5	9.2	6.3	5.7	2.3	0.6	0.4	1.2	2.8

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Sample Location:		CI13-22	CI13-23	CI13-24	CI13-25	CI13-26	CI13-27	CI13-28	CI13-29	CI13-30	CI13-31
Sample Name:		CI13-22-SURF	CI13-23-SURF	CI13-24-SURF	CI13-25-SURF	CI13-26-SURF	CI13-27A-SURF	CI13-28-SURF	CI13-29A-SURF	CI13-30-SURF	CI13-31-SURF
Sample Depth (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Date Sampled:		10/28/13	10/28/13	10/28/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/27/13
Analyte	**Units**										
Gravel	%	0	0.2	1.2	3.8	0	0.6	0.3	0.6	0.8	0
Sand	%	98.1	73.3	60.3	89.9	36.3	55.8	34.4	52.4	62.8	65.8
Coarse Sand	%	0.2	0.5	1.3	4.6	0.4	1.3	0.2	0.7	0.3	0.1
Medium Sand	%	8.6	1.9	2.6	20.6	1.5	1.8	1.2	2.4	1.6	1.2
Fine Sand	%	89.3	70.9	56.4	64.7	34.4	52.7	33	49.3	60.9	64.5
Silt	%	0.8	19.2	27.5	3.6	36.9	34.6	44.6	29.1	28.1	29.8
Clay	%	1	7.3	11	2.6	26.8	9.1	20.7	17.9	8.3	4.4
Silt + Clay	%	1.8	26.5	38.5	6.2	63.7	43.7	65.3	47	36.4	34.2
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	100	100	100	98.7	100	100	100	100	100	100
Sieve Size #4 - Percent Finer	% passed	100	99.8	98.8	96.2	100	99.4	99.7	99.4	99.2	100
Sieve Size #10 - Percent Finer	% passed	99.8	99.3	97.5	91.6	99.6	98.1	99.5	98.7	98.9	99.9
Sieve Size #20 - Percent Finer	% passed	98.7	98.2	96.2	83.8	99	96.8	98.5	98	98.2	99.2
Sieve Size #40 - Percent Finer	% passed	91.2	97.4	94.9	71	98.1	96.3	98.3	96.3	97.3	98.7
Sieve Size #60 - Percent Finer	% passed	44.5	91.9	81.6	37.5	94.1	92.8	97.4	82.9	95.2	97.2
Sieve Size #80 - Percent Finer	% passed	15.4	83.5	65.2	18.2	86.1	84.9	95.5	67	91.3	94.6
Sieve Size #100 - Percent Finer	% passed	8.7	68.9	56.3	12	80	75.9	92.1	59.4	82.2	89.4
Sieve Size #200 - Percent Finer	% passed	1.9	26.5	38.5	6.3	63.7	43.6	65.3	47	36.4	34.2
Hydrometer Reading 1 - Percent Finer	% passed	1.5	15.1	25.5	6.1	53.2	20.2	39.1	32.2	18.7	10.4
Hydrometer Reading 2 - Percent Finer	% passed	1.5	12.5	22.3	5.1	44.4	16.5	34.3	28.8	16.5	8.9
Hydrometer Reading 3 - Percent Finer	% passed	1.5	10.6	16.6	4.6	35.6	13.5	27.5	23.8	12.8	7.4
Hydrometer Reading 4 - Percent Finer	% passed	1.5	8.6	14.2	3.1	30.1	10.5	22.6	19.6	9.8	5.1
Hydrometer Reading 5 - Percent Finer	% passed	1	7.3	11	2.6	26.8	9.1	20.7	17.9	8.4	4.4
Hydrometer Reading 6 - Percent Finer	% passed	0.5	4.6	9.1	2.1	20	5.3	15.7	13.6	5.4	2.8
Hydrometer Reading 7 - Percent Finer	% passed	0	3.3	5.9	1.6	13.4	4.6	9.9	8.5	3.8	2.6

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-32	CI13-33	CI13-34	CI13-35	CI13-36	CI13-37	CI13-38	CI13-39	CI13-40	CI13-41
	Sample Name:	CI13-32-SURF	CI13-33-SURF	CI13-34-SURF	CI13-35-SURF	CI13-36-SURF	CI13-37-SURF	CI13-38-SURF	CI13-39-SURF	CI13-40-SURF	CI13-41-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/27/13	9/27/13	9/27/13	9/26/13	9/25/13	9/27/13	9/27/13	9/26/13	9/26/13	9/26/13
Analyte	**Units**										
Gravel	%	2.3	0	0	25.4	0	1.1	0	0.3	0	0.7
Sand	%	75.6	35.4	23.5	61	14.1	22	16.8	18.7	10.5	13.9
Coarse Sand	%	5.5	0.8	0.6	7.8	0.1	1.2	1.3	0.4	0.1	0.2
Medium Sand	%	15.8	1.1	2.6	9.3	1.4	2.2	1.4	5.8	1.9	2.4
Fine Sand	%	54.3	33.5	20.3	43.9	12.6	18.6	14.1	12.5	8.5	11.3
Silt	%	17.7	58.3	70.5	10.9	81.6	67.2	64.3	65.4	75.9	70.4
Clay	%	4.4	6.3	6	2.7	4.3	9.7	18.9	15.6	13.6	15
Silt + Clay	%	22.1	64.6	76.5	13.6	85.9	76.9	83.2	81	89.5	85.4
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	91.7	100	100	100	100	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	100	100	100	81.1	100	100	100	100	100	100
Sieve Size #4 - Percent Finer	% passed	97.7	100	100	74.6	100	98.9	100	99.7	100	99.3
Sieve Size #10 - Percent Finer	% passed	92.2	99.2	99.4	66.8	99.9	97.7	98.7	99.3	99.9	99.1
Sieve Size #20 - Percent Finer	% passed	86.3	98.7	97.9	63	99.1	96.7	97.9	94.6	98.9	97.9
Sieve Size #40 - Percent Finer	% passed	76.4	98.1	96.8	57.5	98.5	95.5	97.3	93.5	98	96.7
Sieve Size #60 - Percent Finer	% passed	60	95.4	93.4	47.1	97.5	92.5	96.3	92.2	96.9	94.9
Sieve Size #80 - Percent Finer	% passed	48	92.6	90.9	38.7	96.5	90.2	95.2	89.8	96.1	93.8
Sieve Size #100 - Percent Finer	% passed	39.8	89.8	89.1	32.3	95.4	88.4	94.2	87.5	95.2	93
Sieve Size #200 - Percent Finer	% passed	22.1	64.6	76.5	13.6	85.9	76.9	83.2	81	89.5	85.4
Hydrometer Reading 1 - Percent Finer	% passed	10.7	16.6	28	6.4	16.2	29.6	38.6	45.3	32.3	36.6
Hydrometer Reading 2 - Percent Finer	% passed	8.8	13.8	21.7	5.2	11.6	24.1	34.7	33.4	26.5	29.4
Hydrometer Reading 3 - Percent Finer	% passed	6.3	9.1	12.3	4	8	17.4	26.8	24.5	20.6	24.6
Hydrometer Reading 4 - Percent Finer	% passed	5	7.3	9.2	3.4	5.2	13	22.8	18.6	16	19.8
Hydrometer Reading 5 - Percent Finer	% passed	4.4	6.3	6	2.7	4.3	9.7	18.9	15.6	13.6	15
Hydrometer Reading 6 - Percent Finer	% passed	3	3.4	4.2	1.4	3.2	7.3	14.7	12.4	8.8	11.2
Hydrometer Reading 7 - Percent Finer	% passed	2.9	1.4	3.9	1	2.3	6.1	10.8	8.4	6.4	8

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Sample Location:		CI13-42	CI13-43	CI13-44	CI13-45	CI13-46	CI13-47	CI13-48	CI13-49	CI13-50
Sample Name:		CI13-42-SURF	CI13-43-SURF	CI13-44-SURF	CI13-45-SURF	CI13-46-SURF	CI13-47-SURF	CI13-48-SURF	CI13-49-SURF	CI13-50-SURF
Sample Depth (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Date Sampled:		9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/27/13
Analyte	**Units**									
Gravel	%	0.1	0	0.1	0	0.4	0.2	0.7	0	0
Sand	%	18.6	15.1	49	19.9	66	28.5	24.3	21.3	63.7
Coarse Sand	%	0.4	0.2	0.8	1	3.5	1	0.6	0.2	0.2
Medium Sand	%	8.2	3.6	2.6	3.8	14.9	2.7	12.9	13.2	0.4
Fine Sand	%	10	11.3	45.6	15.1	47.6	24.8	10.8	7.9	63.1
Silt	%	70.3	62.2	29.6	59.9	20.2	47.3	63	67.2	20.1
Clay	%	11	22.7	21.3	20.2	13.4	24	12	11.5	16.2
Silt + Clay	%	81.3	84.9	50.9	80.1	33.6	71.3	75	78.7	36.3
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100	100
Sieve Size #4 - Percent Finer	% passed	99.9	100	99.9	100	99.6	99.8	99.3	100	100
Sieve Size #10 - Percent Finer	% passed	99.5	99.8	99.1	99	96.1	98.8	98.7	99.8	99.8
Sieve Size #20 - Percent Finer	% passed	93.7	97.2	97.3	96.6	90.8	97.6	89.4	89.7	99.6
Sieve Size #40 - Percent Finer	% passed	91.3	96.2	96.5	95.2	81.2	96.1	85.8	86.6	99.4
Sieve Size #60 - Percent Finer	% passed	89	94.8	94.9	92.9	62.1	94.3	82.5	84.3	96.5
Sieve Size #80 - Percent Finer	% passed	87.5	93.3	91.6	90.9	49.5	87.2	80.8	83.1	78.5
Sieve Size #100 - Percent Finer	% passed	86.3	91.9	81	89	42.8	83.1	79.7	82.5	59.2
Sieve Size #200 - Percent Finer	% passed	81.3	84.9	50.9	80.1	33.6	71.3	75	78.7	36.3
Hydrometer Reading 1 - Percent Finer	% passed	30.2	47.4	37.4	44.9	26.3	47.4	34.5	34.6	34
Hydrometer Reading 2 - Percent Finer	% passed	21.3	39.2	32.8	36.7	23.1	40.4	23.3	23.9	29.1
Hydrometer Reading 3 - Percent Finer	% passed	15.4	30.9	27.1	29.8	18.2	33.4	18.5	18.6	23.1
Hydrometer Reading 4 - Percent Finer	% passed	11	25.4	22.5	24.3	15	28.7	13.7	15.1	18.2
Hydrometer Reading 5 - Percent Finer	% passed	11	22.7	21.3	20.2	13.4	24	12	11.5	16.2
Hydrometer Reading 6 - Percent Finer	% passed	7.8	17	16.5	13.1	10	17.9	10.2	9.5	12.1
Hydrometer Reading 7 - Percent Finer	% passed	5.4	11.9	11.1	8.9	7	12.5	5.9	4.7	8.1

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-01	CI13-01	CI13-02	CI13-03	CI13-03	CI13-03	CI13-04	CI13-04	CI13-04
			Sample Name:	CI13-01-SURF	CI13-01-0001	CI13-02-SURF	CI13-03-SURF	CI13-03-0001	CI13-03-0103	CI13-04-SURF	CI13-04-0001	CI13-04-0103
			Sample Depth (ft):	0-0.5	0-1	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	1-3
			Date Sampled:	9/27/13	9/23/13	9/27/13	9/27/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**Units**									
Aroclor-1016	NSL	NSL	µg/kg	46 U	41 U	160 U	130 U	45 U	44 U	50 U	45 U	50 U
Aroclor-1221	NSL	NSL	µg/kg	46 U	41 U	160 U	130 U	45 U	44 U	50 U	45 U	50 U
Aroclor-1232	NSL	NSL	µg/kg	46 U	41 U	160 U	130 U	45 U	44 U	50 U	45 U	50 U
Aroclor-1242	NSL	NSL	µg/kg	56	41 U	74 J	85 J	45 U	44 U	21 J	45 U	50 U
Aroclor-1248	NSL	NSL	µg/kg	46 U	41 U	160 U	130 U	17 J	44 U	50 U	1400	800
Aroclor-1254	NSL	NSL	µg/kg	87 J	41 U	160 J	190	12 J	44 U	27 J	900	770
Aroclor-1260	NSL	NSL	µg/kg	110	41 U	210 J	73 J	11 J	44 U	15 J	230	340
Aroclor-1262	NSL	NSL	µg/kg	46 U	41 U	160 U	130 U	45 U	44 U	50 U	45 U	50 U
Aroclor-1268	NSL	NSL	µg/kg	46 U	41 U	160 U	130 U	45 U	44 U	50 U	45 U	50 U
Total PCBs ND=0	60	676	µg/kg	**253**	ND	**444**	**348**	40	ND	**63**	**2,530**	**1,910**

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-05	CI13-05	CI13-05	CI13-05	CI13-05	CI13-05	CI13-06	CI13-06	CI13-06	CI13-07	CI13-07	CI13-07
			Sample Name:	CI13-05-SURF	CI13-05-SURF-FD	CI13-05-0001	CI13-05-0001-FD	CI13-05-0103	CI13-05-0103-FD	CI13-06-SURF	CI13-06-0001	CI13-06-0103	CI13-07-SURF	CI13-07-0001	CI13-07-0103
			Sample Depth (ft):	0-0.5	0-0.5	0-1	0-1	1-3	1-3	0-0.5	0-1	1-3	0-0.5	0-1	1-3
			Date Sampled:	9/27/13	9/27/13	9/24/13	9/24/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**Units**												
Aroclor-1016	NSL	NSL	µg/kg	88 U	73 U	41 U	42 U	40 U	38 U	51 U	47 U	44 U	54 U	41 U	42 U
Aroclor-1221	NSL	NSL	µg/kg	88 U	73 U	41 U	42 U	40 U	38 U	51 U	47 U	44 U	54 U	41 U	42 U
Aroclor-1232	NSL	NSL	µg/kg	88 U	73 U	41 U	42 U	40 U	38 U	51 U	47 U	44 U	54 U	41 U	42 U
Aroclor-1242	NSL	NSL	µg/kg	42 J	41 J	41 U	42 U	40 U	38 U	27 J	47 U	44 U	31 J	41 U	42 U
Aroclor-1248	NSL	NSL	µg/kg	88 U	73 U	41 U	42 U	40 U	38 U	51 U	16 J	44 U	54 U	8.4 J	42 U
Aroclor-1254	NSL	NSL	µg/kg	61 J	61 J	41 U	42 U	40 U	38 U	40 J	13 J	44 U	44 J	6.5 J	42 U
Aroclor-1260	NSL	NSL	µg/kg	35 J	34 J	41 U	42 U	40 U	38 U	25 J	4.7 J	44 U	26 J	3.6 J	42 U
Aroclor-1262	NSL	NSL	µg/kg	88 U	73 U	41 U	42 U	40 U	38 U	51 U	47 U	44 U	54 U	41 U	42 U
Aroclor-1268	NSL	NSL	µg/kg	88 U	73 U	41 U	42 U	40 U	38 U	51 U	47 U	44 U	54 U	41 U	42 U
Total PCBs ND=0	60	676	µg/kg	**138**	**136**	ND	ND	ND	ND	**92**	34	ND	**101**	19	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-08	CI13-09	CI13-09	CI13-09	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10
			Sample Name:	CI13-08-SURF	CI13-09-SURF	CI13-09-0001	CI13-09-0103	CI13-10-SURF	CI13-10-0001	CI13-10-0001-FD	CI13-10-0103	CI13-10-0103-FD	CI13-10-0305	CI13-10-0305-FD
			Sample Depth (ft):	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	0-1	1-3	1-3	3-5	3-5
			Date Sampled:	9/27/13	9/30/13	9/24/13	9/24/13	9/30/13	9/24/13	9/24/13	9/24/13	9/24/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**Units**											
Aroclor-1016	NSL	NSL	µg/kg	54 U	95 U	39 U	40 U	88 U	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1221	NSL	NSL	µg/kg	54 U	95 U	39 U	40 U	88 U	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1232	NSL	NSL	µg/kg	54 U	95 U	39 U	40 U	88 U	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1242	NSL	NSL	µg/kg	12 J	95 U	39 U	40 U	88 U	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1248	NSL	NSL	µg/kg	54 U	35 J	5.7 J	40 U	17 J	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1254	NSL	NSL	µg/kg	23 J	28 J	39 U	40 U	22 J	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1260	NSL	NSL	µg/kg	54 U	9.7 J	39 U	40 U	27 J	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1262	NSL	NSL	µg/kg	54 U	95 U	39 U	40 U	88 U	64 U	71 UJ	54 U	50 U	44 U	45 U
Aroclor-1268	NSL	NSL	µg/kg	54 U	95 U	39 U	40 U	88 U	64 U	71 UJ	54 U	50 U	44 U	45 U
Total PCBs ND=0	60	676	µg/kg	35	**73**	6	ND	**66**	ND	ND	ND	ND	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-11	CI13-11	CI13-11	CI13-12	CI13-13	CI13-13	CI13-13	CI13-13	CI13-14	CI13-14	CI13-14
			Sample Name:	CI13-11-SURF	CI13-11-0001	CI13-11-0103	CI13-12-SURF	CI13-13-SURF	CI13-13-0001	CI13-13-0103	CI13-13-0305	CI13-14-SURF	CI13-14-0001	CI13-14-0103
			Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3
			Date Sampled:	9/30/13	9/24/13	9/24/13	9/30/13	9/30/13	9/24/13	9/24/13	9/24/13	9/30/13	9/25/13	9/25/13
Analyte	**TEC**	**PEC**	**Units**											
Aroclor-1016	NSL	NSL	µg/kg	100 U	51 U	43 U	150 U	180 U	43 U	45 U	44 U	130 U	45 U	43 U
Aroclor-1221	NSL	NSL	µg/kg	100 U	51 U	43 U	150 U	180 U	43 U	45 U	44 U	130 U	45 U	43 U
Aroclor-1232	NSL	NSL	µg/kg	100 U	51 U	43 U	150 U	180 U	43 U	45 U	44 U	130 U	45 U	43 U
Aroclor-1242	NSL	NSL	µg/kg	100 U	51 U	43 U	150 U	180 U	43 U	45 U	44 U	130 U	45 U	43 U
Aroclor-1248	NSL	NSL	µg/kg	45 J	51 U	43 U	62 J	68 J	410 J	45 U	44 U	160	800	43 U
Aroclor-1254	NSL	NSL	µg/kg	36 J	51 U	43 U	39 J	63 J	890 J	45 U	44 U	86 J	420	43 U
Aroclor-1260	NSL	NSL	µg/kg	16 J	51 U	43 U	33 J	85 J	140 J	45 U	44 U	100 J	160	43 U
Aroclor-1262	NSL	NSL	µg/kg	100 U	51 U	43 U	150 U	180 U	43 U	45 U	44 U	130 U	45 U	43 U
Aroclor-1268	NSL	NSL	µg/kg	100 U	51 U	43 U	150 U	180 U	43 U	45 U	44 U	130 U	45 U	43 U
Total PCBs ND=0	60	676	µg/kg	**97**	ND	ND	**134**	**216**	**1,440**	ND	ND	**346**	**1,380**	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-15	CI13-15	CI13-15	CI13-16	CI13-16	CI13-16	CI13-17	CI13-17	CI13-18A	CI13-18A
			Sample Name:	CI13-15-SURF	CI13-15-0001	CI13-15-0103	CI13-16-SURF	CI13-16-0001	CI13-16-0103	CI13-17-SURF	CI13-17-0001	CI13-18A-SURF	CI13-18A-0001
			Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5	0-1
			Date Sampled:	9/30/13	9/25/13	9/25/13	9/30/13	9/25/13	9/25/13	9/30/13	9/25/13	9/30/13	9/25/13
Analyte	**TEC**	**PEC**	**Units**										
Aroclor-1016	NSL	NSL	µg/kg	130 U	45 U	45 U	120 U	44 U	46 U	84 U	120 U	95 U	39 U
Aroclor-1221	NSL	NSL	µg/kg	130 U	45 U	45 U	120 U	44 U	46 U	84 U	120 U	95 U	39 U
Aroclor-1232	NSL	NSL	µg/kg	130 U	45 U	45 U	120 U	44 U	46 U	84 U	120 U	95 U	39 U
Aroclor-1242	NSL	NSL	µg/kg	130 U	45 U	45 U	120 U	44 U	46 U	84 U	120 U	95 U	39 U
Aroclor-1248	NSL	NSL	µg/kg	130 J	45 U	45 U	65 J	120	46 U	27 J	320 J	16 J	39 U
Aroclor-1254	NSL	NSL	µg/kg	78 J	45 U	45 U	55 J	75 J	46 U	15 J	290 J	33 J	39 U
Aroclor-1260	NSL	NSL	µg/kg	180	45 U	45 U	110 J	36 J	46 U	9.9 J	100 J	18 J	39 U
Aroclor-1262	NSL	NSL	µg/kg	130 U	45 U	45 U	120 U	44 U	46 U	84 U	120 U	95 U	39 U
Aroclor-1268	NSL	NSL	µg/kg	130 U	45 U	45 U	120 U	44 U	46 U	84 U	120 U	95 U	39 U
Total PCBs ND=0	60	676	µg/kg	**388**	ND	ND	**230**	**231**	ND	52	**710**	**67**	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-20	CI13-20	CI13-20	CI13-21	CI13-22	CI13-23	CI13-23	CI13-23	CI13-24	CI13-24	CI13-25
			Sample Name:	CI13-20-SURF	CI13-20-0001	CI13-20-0103	CI13-21-SURF	CI13-22-SURF	CI13-23-SURF	CI13-23-0001	CI13-23-0103	CI13-24-SURF	CI13-24-0001	CI13-25-SURF
			Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5
			Date Sampled:	9/30/13	9/25/13	9/25/13	9/26/13	10/28/13	10/28/13	9/25/13	9/25/13	10/28/13	9/26/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**											
Aroclor-1016	NSL	NSL	µg/kg	97 U	44 U	47 U	47 U	45 U	60 U	45 U	44 U	73 U	41 U	410 U
Aroclor-1221	NSL	NSL	µg/kg	97 U	44 U	47 U	47 U	45 U	60 U	45 U	44 U	73 U	41 U	410 U
Aroclor-1232	NSL	NSL	µg/kg	97 U	44 U	47 U	47 U	45 U	60 U	45 U	44 U	73 U	41 U	410 U
Aroclor-1242	NSL	NSL	µg/kg	97 U	44 U	47 U	14 J	19 J	61	45 U	44 U	56 J	9 J	410 U
Aroclor-1248	NSL	NSL	µg/kg	79 J	160	47 U	47 U	45 U	60 U	45 U	37 J	73 U	41 U	420 J
Aroclor-1254	NSL	NSL	µg/kg	110 J	92	47 U	18 J	21 J	64	45 U	28 J	77	41 U	2000
Aroclor-1260	NSL	NSL	µg/kg	40 J	35 J	47 U	12 J	8.2 J	56 J	45 U	31 J	83 J	41 U	290 J
Aroclor-1262	NSL	NSL	µg/kg	97 U	44 U	47 U	47 U	45 U	60 U	45 U	44 U	73 U	41 U	410 U
Aroclor-1268	NSL	NSL	µg/kg	97 U	44 U	47 U	47 U	45 U	60 U	45 U	44 U	73 U	41 U	410 U
Total PCBs ND=0	60	676	µg/kg	**229**	**287**	ND	44	48	**181**	ND	**96**	**216**	9	**2,710**

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-26	CI13-26	CI13-26	CI13-26	CI13-26	CI13-26	CI13-27A	CI13-27A	CI13-27A	CI13-27A	CI13-27A
			Sample Name:	CI13-26-SURF	CI13-26-0001	CI13-26-0103	CI13-26-0305	CI13-26-0507	CI13-26-0709	CI13-27A-SURF	CI13-27A-0001	CI13-27A-0103	CI13-27A-0305	CI13-27A-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	0-0.5	0-1	1-3	3-5	5-7
			Date Sampled:	9/30/13	10/1/13	10/1/13	10/1/13	10/1/13	10/1/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**											
Aroclor-1016	NSL	NSL	µg/kg	150 U	82 U	82 U	85 U	83 U	83 U	120 U	260 U	220 U	170 U	90 U
Aroclor-1221	NSL	NSL	µg/kg	150 U	82 U	82 U	85 U	83 U	83 U	120 U	260 U	220 U	170 U	90 U
Aroclor-1232	NSL	NSL	µg/kg	150 U	82 U	82 U	85 U	83 U	83 U	120 U	260 U	220 U	170 U	90 U
Aroclor-1242	NSL	NSL	µg/kg	120 J	82 U	82 U	85 U	83 U	83 U	91 J	260 U	220 U	170 U	90 U
Aroclor-1248	NSL	NSL	µg/kg	150 U	50 J	82 U	85 U	83 U	83 U	120 U	1100 J	250 J	180 J	65 J
Aroclor-1254	NSL	NSL	µg/kg	450	64 J	82 U	85 U	83 U	83 U	120 J	890	700 J	150 J	39 J
Aroclor-1260	NSL	NSL	µg/kg	310 J	52 J	82 U	85 U	83 U	83 U	140	310 J	300 J	64 J	15 J
Aroclor-1262	NSL	NSL	µg/kg	150 U	82 U	82 U	85 U	83 U	83 U	120 U	260 U	220 U	170 U	90 U
Aroclor-1268	NSL	NSL	µg/kg	150 U	82 U	82 U	85 U	83 U	83 U	120 U	260 U	220 U	170 U	90 U
Total PCBs ND=0	60	676	µg/kg	**880**	**166**	ND	ND	ND	ND	**351**	**2,300**	**1,250**	**394**	**119**

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-29A	CI13-29A	CI13-29A	CI13-30	CI13-30
			Sample Name:	CI13-28-SURF	CI13-28-0001	CI13-28-0103	CI13-28-0305	CI13-28-0507	CI13-28-0709	CI13-28-0911	CI13-29A-SURF	CI13-29A-0001	CI13-29A-0103	CI13-30-SURF	CI13-30-0001
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	9-11	0-0.5	0-1	1-3	0-0.5	0-1
			Date Sampled:	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/25/13
Analyte	**TEC**	**PEC**	**Units**												
Aroclor-1016	NSL	NSL	µg/kg	140 U	97 U	100 U	92 U	95 U	93 U	84 U	150 U	81 U	81 U	3400 U	43 U
Aroclor-1221	NSL	NSL	µg/kg	140 U	97 U	100 U	92 U	95 U	93 U	84 U	150 U	81 U	81 U	3400 U	43 U
Aroclor-1232	NSL	NSL	µg/kg	140 U	97 U	100 U	92 U	95 U	93 U	84 U	150 U	81 U	81 U	3400 U	43 U
Aroclor-1242	NSL	NSL	µg/kg	43 J	97 U	100 U	92 U	95 U	93 U	84 U	60 J	81 U	81 U	3400 U	43 U
Aroclor-1248	NSL	NSL	µg/kg	140 U	97 U	100 U	92 U	95 U	93 U	84 U	150 U	81 U	81 U	3400 U	100
Aroclor-1254	NSL	NSL	µg/kg	120 J	97 U	100 U	92 U	95 U	93 U	84 U	170 J	81 U	81 U	3400 U	89
Aroclor-1260	NSL	NSL	µg/kg	120 J	97 U	100 U	92 U	95 U	93 U	84 U	160	81 U	81 U	2400 J	52
Aroclor-1262	NSL	NSL	µg/kg	140 U	97 U	100 U	92 U	95 U	93 U	84 U	150 U	81 U	81 U	3400 U	43 U
Aroclor-1268	NSL	NSL	µg/kg	140 U	97 U	100 U	92 U	95 U	93 U	84 U	150 U	81 U	81 U	3400 U	43 U
Total PCBs ND=0	60	676	µg/kg	**283**	ND	ND	ND	ND	ND	ND	**390**	ND	ND	**2,400**	**241**

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Sample Location:				CI13-31	CI13-31	CI13-31	CI13-31	CI13-31	CI13-31	CI13-32	CI13-32	CI13-32	CI13-33	CI13-33	CI13-33	CI13-33
Sample Name:				CI13-31-SURF	CI13-31-SURF-FD	CI13-31-0001	CI13-31-0103	CI13-31-0305	CI13-31-0507	CI13-32-SURF	CI13-32-0001	CI13-32-0103	CI13-33-SURF	CI13-33-0001	CI13-33-0103	CI13-33-0305
Sample Depth (ft):				0-0.5	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	1-3	0-0.5	0-1	1-3	3-5
Date Sampled:				9/27/13	9/27/13	9/29/13	9/29/13	9/29/13	9/29/13	9/27/13	9/30/13	9/30/13	9/27/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**													
Aroclor-1016	NSL	NSL	µg/kg	110 U	53 U	82 U	87 U	91 U	88 U	53 U	84 U	83 U	70 U	180 U	130 U	86 U
Aroclor-1221	NSL	NSL	µg/kg	110 U	53 U	82 U	87 U	91 U	88 U	53 U	84 U	83 U	70 U	180 U	130 U	86 U
Aroclor-1232	NSL	NSL	µg/kg	110 U	53 U	82 U	87 U	91 U	88 U	53 U	84 U	83 U	70 U	180 U	130 U	86 U
Aroclor-1242	NSL	NSL	µg/kg	50 J	44 J	7.9 J	87 U	91 U	88 U	37 J	84 U	83 U	78	150 J	130 U	86 U
Aroclor-1248	NSL	NSL	µg/kg	110 U	53 U	82 U	87 U	91 U	88 U	53 U	84 U	83 U	70 U	180 U	130 U	86 U
Aroclor-1254	NSL	NSL	µg/kg	79 J	85 J	11 J	87 U	91 U	88 U	100	84 U	83 U	140 J	330 J	130 U	86 U
Aroclor-1260	NSL	NSL	µg/kg	69 J	65 J	3.9 J	87 U	91 UJ	88 UJ	44 J	84 UJ	83 UJ	110 J	150 J	130 UJ	86 UJ
Aroclor-1262	NSL	NSL	µg/kg	110 U	53 U	82 U	87 U	91 U	88 U	53 U	84 U	83 U	70 U	180 U	130 U	86 U
Aroclor-1268	NSL	NSL	µg/kg	110 U	53 U	82 U	87 U	91 U	88 U	53 U	84 U	83 U	70 U	180 U	130 U	86 U
Total PCBs ND=0	60	676	µg/kg	**198**	**194**	23	ND	ND	ND	**181**	ND	ND	**328**	**630**	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-34	CI13-34	CI13-34	CI13-34	CI13-34	CI13-34	CI13-35	CI13-35	CI13-35
			Sample Name:	CI13-34-SURF	CI13-34-0001	CI13-34-0103	CI13-34-0305	CI13-34-0507	CI13-34-0709	CI13-35-SURF	CI13-35-0001	CI13-35-0103
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	0-0.5	0-1	1-3
			Date Sampled:	9/27/13	9/29/13	9/29/13	9/29/13	9/29/13	9/29/13	9/26/13	9/26/13	9/26/13
Analyte	**TEC**	**PEC**	**Units**									
Aroclor-1016	NSL	NSL	µg/kg	180 U	120 U	92 U	87 U	88 U	82 U	53 U	49 U	40 U
Aroclor-1221	NSL	NSL	µg/kg	180 U	120 U	92 U	87 U	88 U	82 U	53 U	49 U	40 U
Aroclor-1232	NSL	NSL	µg/kg	180 U	120 U	92 U	87 U	88 U	82 U	53 U	49 U	40 U
Aroclor-1242	NSL	NSL	µg/kg	97 J	120 U	92 U	87 U	88 U	82 U	28 J	49 U	40 U
Aroclor-1248	NSL	NSL	µg/kg	180 U	130	92 U	87 U	88 U	82 U	53 U	49 U	40 U
Aroclor-1254	NSL	NSL	µg/kg	230 J	150 J	92 U	87 U	88 U	82 U	35 J	49 U	40 U
Aroclor-1260	NSL	NSL	µg/kg	220 J	130 J	92 U	87 U	88 U	82 U	24 J	49 U	40 U
Aroclor-1262	NSL	NSL	µg/kg	180 U	120 U	92 U	87 U	88 U	82 U	53 U	49 U	40 U
Aroclor-1268	NSL	NSL	µg/kg	180 U	120 U	92 U	87 U	88 U	82 U	53 U	49 U	40 U
Total PCBs ND=0	60	676	µg/kg	**547**	**410**	ND	ND	ND	ND	**87**	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36
			Sample Name:	CI13-36-SURF	CI13-36-0001	CI13-36-0103	CI13-36-0305	CI13-36-0507	CI13-36-0709	CI13-36-0709-FD	CI13-36-0911	CI13-36-0911-FD	CI13-36-1113	CI13-36-1113-FD	CI13-36-1315	CI13-36-1315-FD
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	7-9	9-11	9-11	11-13	11-13	13-15	13-15
			Date Sampled:	9/25/13	9/26/13	9/26/13	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**Units**													
Aroclor-1016	NSL	NSL	µg/kg	74 U	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1221	NSL	NSL	µg/kg	74 U	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1232	NSL	NSL	µg/kg	74 U	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1242	NSL	NSL	µg/kg	83	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1248	NSL	NSL	µg/kg	74 U	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1254	NSL	NSL	µg/kg	170	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1260	NSL	NSL	µg/kg	180	8.5 J	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1262	NSL	NSL	µg/kg	74 U	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Aroclor-1268	NSL	NSL	µg/kg	74 U	64 U	56 U	51 U	50 U	46 U	48 U	46 U	46 U	44 U	45 U	43 U	42 U
Total PCBs ND=0	60	676	µg/kg	**433**	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-37	CI13-37	CI13-37	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38
			Sample Name:	CI13-37-SURF	CI13-37-0001	CI13-37-0103	CI13-38-SURF	CI13-38-SURF-FD	CI13-38-0001	CI13-38-0001-FD	CI13-38-0103	CI13-38-0103-FD	CI13-38-0305	CI13-38-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-1	0-1	1-3	1-3	3-5	5-7
			Date Sampled:	9/27/13	9/30/13	9/30/13	9/27/13	9/27/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**											
Aroclor-1016	NSL	NSL	µg/kg	120 U	130 U	88 U	59 U	63 U	130 U	130 U	110 U	120 U	86 U	83 U
Aroclor-1221	NSL	NSL	µg/kg	120 U	130 U	88 U	59 U	63 U	130 U	130 U	110 U	120 U	86 U	83 U
Aroclor-1232	NSL	NSL	µg/kg	120 U	130 U	88 U	59 U	63 U	130 U	130 U	110 U	120 U	86 U	83 U
Aroclor-1242	NSL	NSL	µg/kg	81 J	89 J	88 U	37 J	51 J	100 J	100 J	20 J	11 J	86 U	83 U
Aroclor-1248	NSL	NSL	µg/kg	120 U	130 U	88 U	59 U	63 U	130 U	130 U	110 U	120 U	86 U	83 U
Aroclor-1254	NSL	NSL	µg/kg	280	130 J	88 U	120	160	240 J	220 J	25 J	18 J	86 U	83 U
Aroclor-1260	NSL	NSL	µg/kg	160 J	75 J	88 UJ	76 J	98 J	220	250	110 U	120 U	86 U	83 U
Aroclor-1262	NSL	NSL	µg/kg	120 U	130 U	88 U	59 U	63 U	130 U	130 U	110 U	120 U	86 U	83 U
Aroclor-1268	NSL	NSL	µg/kg	120 U	130 U	88 U	59 U	63 U	130 U	130 U	110 U	120 U	86 U	83 U
Total PCBs ND=0	60	676	µg/kg	**521**	**294**	ND	**233**	**309**	**560**	**570**	45	29	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-39	CI13-39	CI13-39	CI13-39	CI13-39	CI13-40	CI13-40	CI13-40	CI13-40	CI13-40
			Sample Name:	CI13-39-SURF	CI13-39-0001	CI13-39-0103	CI13-39-0305	CI13-39-0507	CI13-40-SURF	CI13-40-0001	CI13-40-0103	CI13-40-0305	CI13-40-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	1-3	3-5	5-7
			Date Sampled:	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**Units**										
Aroclor-1016	NSL	NSL	µg/kg	60 U	77 U	340 U	200 U	44 U	86 U	69 U	73 U	51 U	47 U
Aroclor-1221	NSL	NSL	µg/kg	60 U	77 U	340 U	200 U	44 U	86 U	69 U	73 U	51 U	47 U
Aroclor-1232	NSL	NSL	µg/kg	60 U	77 U	340 U	200 U	44 U	86 U	69 U	73 U	51 U	47 U
Aroclor-1242	NSL	NSL	µg/kg	81	100	200 J	1300	27 J	48 J	67 J	17 J	51 U	47 U
Aroclor-1248	NSL	NSL	µg/kg	60 U	77 U	340 U	200 U	44 U	86 U	69 U	73 U	51 U	47 U
Aroclor-1254	NSL	NSL	µg/kg	210	240	490	1900	96	140	180 J	110	51 U	47 U
Aroclor-1260	NSL	NSL	µg/kg	210	250	610	770	59 J	95 J	130 J	41 J	51 U	47 U
Aroclor-1262	NSL	NSL	µg/kg	60 U	77 U	340 U	200 U	44 U	86 U	69 U	73 U	51 U	47 U
Aroclor-1268	NSL	NSL	µg/kg	60 U	77 U	340 U	200 U	44 U	86 U	69 U	73 U	51 U	47 U
Total PCBs ND=0	60	676	µg/kg	**501**	**590**	**1,300**	**3,970**	**182**	**283**	**377**	**168**	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-41	CI13-41	CI13-41	CI13-41	CI13-41	CI13-42	CI13-42	CI13-42	CI13-42	CI13-43	CI13-43	CI13-43	CI13-43	CI13-43
			Sample Name:	CI13-41-SURF	CI13-41-SURF-FD	CI13-41-0001	CI13-41-0103	CI13-41-0305	CI13-42-SURF	CI13-42-0001	CI13-42-0103	CI13-42-0305	CI13-43-SURF	CI13-43-0001	CI13-43-0103	CI13-43-0305	CI13-43-0507
			Sample Depth (ft):	0-0.5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	5-7
			Date Sampled:	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/29/13	9/29/13	9/29/13	9/29/13
Analyte	**TEC**	**PEC**	**Units**														
Aroclor-1016	NSL	NSL	µg/kg	85 U	84 U	130 U	75 U	40 U	61 U	370 U	72 U	44 U	57 U	150 U	120 U	130 U	100 U
Aroclor-1221	NSL	NSL	µg/kg	85 U	84 U	130 U	75 U	40 U	61 U	370 U	72 U	44 U	57 U	150 U	120 U	130 U	100 U
Aroclor-1232	NSL	NSL	µg/kg	85 U	84 U	130 U	75 U	40 U	61 U	370 U	72 U	44 U	57 U	150 U	120 U	130 U	100 U
Aroclor-1242	NSL	NSL	µg/kg	47 J	50 J	130 J	75 U	40 U	87	1000	72 U	44 U	42 J	180 J	240	130 U	100 U
Aroclor-1248	NSL	NSL	µg/kg	85 U	84 U	130 U	75 U	40 U	61 U	370 U	72 U	44 U	57 U	150 U	120 U	130 U	100 U
Aroclor-1254	NSL	NSL	µg/kg	130 J	140 J	320 J	19 J	40 U	220	1400	72 U	44 U	100	270	370	55 J	100 U
Aroclor-1260	NSL	NSL	µg/kg	92 J	100 J	140 J	75 U	40 U	200	580 J	27 J	44 U	100	150 J	180	41 J	100 U
Aroclor-1262	NSL	NSL	µg/kg	85 U	84 U	130 U	75 U	40 U	61 U	370 U	72 U	44 U	57 U	150 U	120 U	130 U	100 U
Aroclor-1268	NSL	NSL	µg/kg	85 U	84 U	130 U	75 U	40 U	61 U	370 U	72 U	44 U	57 U	150 U	120 U	130 U	100 U
Total PCBs ND=0	60	676	µg/kg	**269**	**290**	**590**	19	ND	**507**	**2,980**	27	ND	**242**	**600**	**790**	**96**	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-44	CI13-44	CI13-44	CI13-44	CI13-44	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45
			Sample Name:	CI13-44-SURF	CI13-44-0001	CI13-44-0103	CI13-44-0305	CI13-44-0507	CI13-45-SURF	CI13-45-SURF-FD	CI13-45-0001	CI13-45-0001-FD	CI13-45-0103	CI13-45-0103-FD	CI13-45-0305
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-0.5	0-1	0-1	1-3	1-3	3-5
			Date Sampled:	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/26/13	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13
Analyte	**TEC**	**PEC**	**Units**												
Aroclor-1016	NSL	NSL	µg/kg	62 U	130 U	130 U	120 U	110 U	250 U	170 U	68 U	72 U	43 U	42 U	44 U
Aroclor-1221	NSL	NSL	µg/kg	62 U	130 U	130 U	120 U	110 U	250 U	170 U	68 U	72 U	43 U	42 U	44 U
Aroclor-1232	NSL	NSL	µg/kg	62 U	130 U	130 U	120 U	110 U	250 U	170 U	68 U	72 U	43 U	42 U	44 U
Aroclor-1242	NSL	NSL	µg/kg	28 J	130 U	130 U	120 U	110 U	200 J	190	220	230	2.4 J	2.4 J	44 U
Aroclor-1248	NSL	NSL	µg/kg	62 U	21 J	130 U	120 U	110 U	250 U	170 U	68 U	72 U	43 U	42 U	44 U
Aroclor-1254	NSL	NSL	µg/kg	83 J	46 J	130 U	120 U	110 U	390	330 J	350	390	4.6 J	4.4 J	44 U
Aroclor-1260	NSL	NSL	µg/kg	73	67 J	130 U	120 U	110 U	520 J	420 J	200	230	43 U	42 U	44 U
Aroclor-1262	NSL	NSL	µg/kg	62 U	130 U	130 U	120 U	110 U	250 U	170 U	68 U	72 U	43 U	42 U	44 U
Aroclor-1268	NSL	NSL	µg/kg	62 U	130 U	130 U	120 U	110 U	250 U	170 U	68 U	72 U	43 U	42 U	44 U
Total PCBs ND=0	60	676	µg/kg	**184**	**134**	ND	ND	ND	**1,110**	**940**	**770**	**850**	7	7	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-46	CI13-46	CI13-46	CI13-46	CI13-47	CI13-47	CI13-47	CI13-47	CI13-47
			Sample Name:	CI13-46-SURF	CI13-46-0001	CI13-46-0103	CI13-46-0305	CI13-47-SURF	CI13-47-0001	CI13-47-0103	CI13-47-0305	CI13-47-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	5-7
			Date Sampled:	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**Units**									
Aroclor-1016	NSL	NSL	µg/kg	63 U	54 U	45 U	55 U	85 U	62 U	62 U	80 U	75 U
Aroclor-1221	NSL	NSL	µg/kg	63 U	54 U	45 U	55 U	85 U	62 U	62 U	80 U	75 U
Aroclor-1232	NSL	NSL	µg/kg	63 U	54 U	45 U	55 U	85 U	62 U	62 U	80 U	75 U
Aroclor-1242	NSL	NSL	µg/kg	45 J	64	23 J	55 U	43 J	62 U	62 U	80 U	75 U
Aroclor-1248	NSL	NSL	µg/kg	63 U	54 U	45 U	55 U	85 U	62 U	62 U	80 U	75 U
Aroclor-1254	NSL	NSL	µg/kg	54 J	82 J	25 J	55 U	89	62 U	62 U	80 U	75 U
Aroclor-1260	NSL	NSL	µg/kg	33 J	64 J	45 U	55 U	160 J	62 U	62 U	80 U	75 U
Aroclor-1262	NSL	NSL	µg/kg	63 U	54 U	45 U	55 U	85 U	62 U	62 U	80 U	75 U
Aroclor-1268	NSL	NSL	µg/kg	63 U	54 U	45 U	55 U	85 U	62 U	62 U	80 U	75 U
Total PCBs ND=0	60	676	µg/kg	**132**	**210**	48	ND	**292**	ND	ND	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48
			Sample Name:	CI13-48-SURF	CI13-48-0001	CI13-48-0001-FD	CI13-48-0103	CI13-48-0103-FD	CI13-48-0305	CI13-48-0305-FD
			Sample Depth (ft):	0-0.5	0-1	0-1	1-3	1-3	3-5	3-5
			Date Sampled:	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13
Analyte	**TEC**	**PEC**	**Units**							
Aroclor-1016	NSL	NSL	µg/kg	120 UJ	370 U	300 U	210 U	310 U	47 U	98 U
Aroclor-1221	NSL	NSL	µg/kg	120 UJ	370 U	300 U	210 U	310 U	47 U	98 U
Aroclor-1232	NSL	NSL	µg/kg	120 UJ	370 U	300 U	210 U	310 U	47 U	98 U
Aroclor-1242	NSL	NSL	µg/kg	130 J	1200	930	370 J	700	18 J	98 U
Aroclor-1248	NSL	NSL	µg/kg	120 UJ	370 U	300 U	210 U	310 U	47 U	33 J
Aroclor-1254	NSL	NSL	µg/kg	340 J	1700	1400	760	1100	32 J	31 J
Aroclor-1260	NSL	NSL	µg/kg	220 J	1100	980	380	470	15 J	19 J
Aroclor-1262	NSL	NSL	µg/kg	120 UJ	370 U	300 U	210 U	310 U	47 U	98 U
Aroclor-1268	NSL	NSL	µg/kg	120 UJ	370 U	300 U	210 U	310 U	47 U	98 U
Total PCBs ND=0	60	676	µg/kg	**690**	**4,000**	**3,310**	**1,510**	**2,270**	**65**	**83**

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-49	CI13-49	CI13-49	CI13-49	CI13-49	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50
			Sample Name:	CI13-49-SURF	CI13-49-0001	CI13-49-0103	CI13-49-0305	CI13-49-0507	CI13-50-SURF	CI13-50-0001	CI13-50-0001-FD	CI13-50-0103	CI13-50-0103-FD	CI13-50-0305	CI13-50-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	0-1	1-3	1-3	3-5	5-7
			Date Sampled:	9/26/13	9/29/13	9/29/13	9/29/13	9/29/13	9/27/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**												
Aroclor-1016	NSL	NSL	µg/kg	140 UJ	170 U	380 U	140 U	130 U	69 UJ	82 U	82 U	83 U	84 U	82 U	82 U
Aroclor-1221	NSL	NSL	µg/kg	140 UJ	170 U	380 U	140 U	130 U	69 UJ	82 U	82 U	83 U	84 U	82 U	82 U
Aroclor-1232	NSL	NSL	µg/kg	140 UJ	170 U	380 U	140 U	130 U	69 UJ	82 U	82 U	83 U	84 U	82 U	82 U
Aroclor-1242	NSL	NSL	µg/kg	120 J	500 J	1100 J	88 J	12 J	58 J	82 U	82 U	83 U	84 U	82 U	82 U
Aroclor-1248	NSL	NSL	µg/kg	140 UJ	170 U	380 U	140 U	130 U	69 UJ	32 J	41 J	83 U	84 U	82 U	82 U
Aroclor-1254	NSL	NSL	µg/kg	300 J	730 J	1100	280 J	39 J	120 J	58 J	22 J	83 U	84 U	82 U	82 U
Aroclor-1260	NSL	NSL	µg/kg	170 J	710	470 J	460	20 J	75 J	34 J	37 J	83 U	84 U	82 U	82 U
Aroclor-1262	NSL	NSL	µg/kg	140 UJ	170 U	380 U	140 U	130 U	69 UJ	82 U	82 U	83 U	84 U	82 U	82 U
Aroclor-1268	NSL	NSL	µg/kg	140 UJ	170 U	380 U	140 U	130 U	69 UJ	82 U	82 U	83 U	84 U	82 U	82 U
Total PCBs ND=0	60	676	µg/kg	**590**	**1,940**	**2,670**	**828**	**71**	**253**	**124**	**100**	ND	ND	ND	ND

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

NSL = No Screening Level.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-01	CI13-01	CI13-02	CI13-03	CI13-03	CI13-03	CI13-04	CI13-04	CI13-04
			Sample Name:	CI13-01-SURF	CI13-01-0001	CI13-02-SURF	CI13-03-SURF	CI13-03-0001	CI13-03-0103	CI13-04-SURF	CI13-04-0001	CI13-04-0103
			Sample Depth (ft):	0-0.5	0-1	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	1-3
			Date Sampled:	9/27/13	9/23/13	9/27/13	9/27/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**Units**									
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	220 U	4 U	400 U	670 U	87 U	29 U	49 U	440 U	760 U
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	220 U	4 U	400 U	670 U	87 U	29 U	49 U	440 U	760 U
Acenaphthene(a)	NSL	NSL	µg/kg	49 J	1.4 J	77 J	100 J	11 J	29 U	10 J	160 J	270 J
Acenaphthylene (a)	NSL	NSL	µg/kg	38 J	0.61 J	100 J	120 J	19 J	29 U	12 J	96 J	190 J
Anthracene (a)	57	845	µg/kg	**190 J**	1.5 J	**670**	**560 J**	**60 J**	29 U	**66**	**550**	**1,200**
Benzo(a)anthracene (a)	108	1,050	µg/kg	**960**	7	**2,600**	**2,600**	**390**	4.1 J	**300**	**2,200**	**3,700**
Benzo(a)pyrene (a)	150	1,450	µg/kg	**1,000**	4	**2,300**	**2,600**	**380**	3 J	**250**	**1,900**	**3,500**
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	990	4	1,700	2,000	230	4.9 J	240	1,300	2,700
Benzo(e)pyrene	NSL	NSL	µg/kg	650	5	1,400	1,600	220	4.1 J	170	1,100	2,000
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	570	4	1,100	1,100	160	4.5 J	120	870	1,500
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	780	2.8 J	2,000	2,300	280	2.9 J	200	1,600	2,500
C1 Chrysenes	NSL	NSL	µg/kg	600 J	18 J	1700 J	1600 J	280 J	8.9 J	210 J	1300 J	2100 J
C1 Fluorenes	NSL	NSL	µg/kg	27 J	3.3 J	55 J	670 U	10 J	0.33 J	11 J	120 J	190 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	890 J	27 J	2800 J	2500 J	620 J	11 J	360 J	2900 J	5200 J
C1-Naphthalenes	NSL	NSL	µg/kg	58 J	4 U	110 J	100 J	87 U	29 U	14 J	440 U	760 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	530 J	41 J	1300 J	1200 J	240 J	5.2 J	190 J	1500 J	3100 J
C2 Chrysenes	NSL	NSL	µg/kg	370 J	33 J	890 J	900 J	220 J	11 J	130 J	1300 J	1900 J
C2 Fluorenes	NSL	NSL	µg/kg	48 J	8.4 J	91 J	79 J	20 J	0.96 J	17 J	270 J	380 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	430 J	37 J	1200 J	1100 J	290 J	11 J	180 J	1700 J	2500 J
C2-Naphthalenes	NSL	NSL	µg/kg	200 J	4 U	310 J	260 J	87 U	29 U	50 J	440 U	760 U
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	390 J	48 J	840 J	810 J	180 J	7.2 J	170 J	1600 J	2400 J
C3 Chrysenes	NSL	NSL	µg/kg	140 J	21 J	320 J	340 J	68 J	3.9 J	51 J	470 J	620 J
C3 Fluorenes	NSL	NSL	µg/kg	110 J	18 J	160 J	160 J	29 J	29 U	35 J	580 J	790 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	240 J	35 J	540 J	530 J	120 J	8.2 J	92 J	990 J	1200 J
C3-Naphthalenes	NSL	NSL	µg/kg	240 J	4 U	340 J	310 J	87 U	29 U	85 J	440 U	760 U
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	300 J	71 J	550 J	530 J	160 J	16 J	120 J	2200 J	3000 J
C4 Chrysenes	NSL	NSL	µg/kg	42 J	7.8 J	79 J	85 J	87 U	29 U	13 J	170 J	220 J
C4-Naphthalenes	NSL	NSL	µg/kg	150 J	80 J	220 J	180 J	42 J	29 U	63 J	1000 J	1500 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	160 J	42 J	270 J	280 J	78 J	11 J	71 J	1300 J	1800 J
Chrysene (a)	166	1,290	µg/kg	**910**	11	**2,400**	**2,400**	**330**	7.3 J	**290**	**2,000**	**3,400**
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**170 J**	1 J	**350 J**	**320 J**	**52 J**	29 U	**37 J**	**290 J**	**480 J**
Fluoranthene (a)	423	2,230	µg/kg	**1,500**	5	**3,100**	**3,600**	**430**	29 U	370	**3,500**	**5,300**
Fluorene (a)	77	536	µg/kg	63 J	2.4 J	**110 J**	**150 J**	12 J	29 U	19 J	**450**	**780**
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	510	1.5 J	1,000	1,100	150	2 J	110	880	1,500
Naphthalene (a)	176	561	µg/kg	220 U	4 U	400 U	670 U	87 U	29 U	49 U	440 U	760 U
Perylene	NSL	NSL	µg/kg	270	2.7 J	540	670	150	210	65	490	820
Phenanthrene (a)	204	1,170	µg/kg	**530**	8	**1,100**	**1,200**	120	29 U	110	**1,200**	**2,800**
Pyrene (a)	195	1,520	µg/kg	**930**	11	**2,300**	**2,400**	**540**	29 U	**270**	**3,200**	**5,200**
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**9,410**	69	**21,307**	**23,220**	**3,251**	174	**2,453**	**20,636**	**35,780**
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**14,475**	499	**33,082**	**34,824**	**5,699**	536	**4,254**	**37,376**	**62,560**

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-05	CI13-05	CI13-05	CI13-05	CI13-05	CI13-05	CI13-06	CI13-06	CI13-06	CI13-07	CI13-07	CI13-07
			Sample Name:	CI13-05-SURF	CI13-05-SURF-FD	CI13-05-0001	CI13-05-0001-FD	CI13-05-0103	CI13-05-0103-FD	CI13-06-SURF	CI13-06-0001	CI13-06-0103	CI13-07-SURF	CI13-07-0001	CI13-07-0103
			Sample Depth (ft):	0-0.5	0-0.5	0-1	0-1	1-3	1-3	0-0.5	0-1	1-3	0-0.5	0-1	1-3
			Date Sampled:	9/27/13	9/27/13	9/24/13	9/24/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**Units**												
1-Methylnaphthalene $^{(b)}$	NSL	NSL	µg/kg	220 U	100 U	7.2 U	14 U	4 U	4 U	130 U	590 U	140 U	280 U	140 U	4.3 U
2-Methylnaphthalene $^{(a)(b)}$	NSL	NSL	µg/kg	220 U	100 U	7.2 U	14 U	4 U	4 U	130 U	590 U	140 U	280 U	140 U	4.3 U
Acenaphthene$^{(a)}$	NSL	NSL	µg/kg	41 J	31 J	0.47 J	2.5 J	0.17 J	0.15 J	25 J	99 J	38 J	48 J	28 J	0.63 J
Acenaphthylene $^{(a)}$	NSL	NSL	µg/kg	58 J	29 J	2 J	4 J	0.19 J	0.23 J	43 J	120 J	14 J	110 J	21 J	1.2 J
Anthracene $^{(a)}$	57	845	µg/kg	**200 J**	**120**	4.3 J	18	0.33 J	0.31 J	**140**	**470 J**	**110 J**	**380**	**110 J**	3.4 J
Benzo(a)anthracene $^{(a)}$	108	1,050	µg/kg	**1,000**	**610**	31	**110**	2 J	1.3 J	**780**	**3,300**	**480**	**2,100**	**550**	20
Benzo(a)pyrene $^{(a)}$	150	1,450	µg/kg	**990**	**570**	23	95	1.1 J	0.71 J	**750**	**3,000**	**410**	**2,100**	**500**	25
Benzo(b)fluoranthene $^{(a)}$	NSL	NSL	µg/kg	790	550	21	72	2.3 J	1.5 J	670	1,700	200	1,400	290	22
Benzo(e)pyrene	NSL	NSL	µg/kg	630	370	15	53	3 J	2.1 J	480	1,800	230	1,200	290	17
Benzo(g,h,i)perylene $^{(a)}$	NSL	NSL	µg/kg	440	300	10	42	2.9 J	2.1 J	350	1,100	160	940	180	16
Benzo(k)fluoranthene $^{(a)}$	NSL	NSL	µg/kg	880	450	22	89	1.3 J	0.82 J	530	2,000	300	1,700	400	17
C1 Chrysenes	NSL	NSL	µg/kg	590 J	420 J	18 J	56 J	5.7 J	4.1 J	600 J	3500 J	420 J	1600 J	450 J	21 J
C1 Fluorenes	NSL	NSL	µg/kg	220 U	15 J	0.63 J	1.9 J	4 U	4 U	16 J	140 J	37 J	44 J	25 J	0.68 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	980 J	610 J	41 J	120 J	5.2 J	3.5 J	770 J	6200 J	1000 J	2400 J	940 J	25 J
C1-Naphthalenes	NSL	NSL	µg/kg	44 J	37 J	7.2 U	14 U	4 U	4 U	31 J	590 U	140 U	48 J	140 U	4.3 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	480 J	280 J	16 J	38 J	3.3 J	2.4 J	370 J	2300 J	520 J	970 J	360 J	9.3 J
C2 Chrysenes	NSL	NSL	µg/kg	400 J	280 J	16 J	45 J	9.7 J	6.6 J	360 J	2300 J	350 J	880 J	380 J	23 J
C2 Fluorenes	NSL	NSL	µg/kg	36 J	23 J	1.5 J	4 J	4 U	4 U	27 J	320 J	64 J	73 J	46 J	1.3 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	440 J	300 J	20 J	54 J	4.7 J	3.6 J	390 J	3800 J	520 J	1100 J	500 J	16 J
C2-Naphthalenes	NSL	NSL	µg/kg	110 J	110 J	7.2 U	14 U	4 U	4 U	90 J	590 U	140 U	160 J	140 U	4.3 U
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	320 J	220 J	11 J	28 J	5.3 J	3.5 J	290 J	2300 J	400 J	710 J	300 J	7.5 J
C3 Chrysenes	NSL	NSL	µg/kg	180 J	140 J	7.1 J	19 J	5.9 J	4.4 J	140 J	810 J	130 J	320 J	140 J	9.3 J
C3 Fluorenes	NSL	NSL	µg/kg	77 J	52 J	2.4 J	7.1 J	4 U	4 U	63 J	410 J	66 J	120 J	52 J	1.8 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	230 J	180 J	8.4 J	23 J	6 J	3.7 J	210 J	1900 J	230 J	520 J	250 J	11 J
C3-Naphthalenes	NSL	NSL	µg/kg	140 J	110 J	7.2 U	14 U	4 U	4 U	110 J	590 U	140 U	210 J	140 U	4.3 U
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	250 J	210 J	11 J	32 J	11 J	6.8 J	210 J	2100 J	340 J	560 J	310 J	9.6 J
C4 Chrysenes	NSL	NSL	µg/kg	46 J	34 J	7.2 U	3.7 J	1.9 J	1.1 J	35 J	240 J	20 J	86 J	25 J	3.4 J
C4-Naphthalenes	NSL	NSL	µg/kg	100 J	81 J	3.2 J	7 J	4 U	4 U	73 J	500 J	110 J	160 J	78 J	3.8 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	170 J	130 J	6.6 J	21 J	7 J	4.7 J	130 J	1000 J	140 J	230 J	140 J	6 J
Chrysene $^{(a)}$	166	1,290	µg/kg	**860**	**550**	27	92	5	3.3 J	**740**	**2,900**	**420**	**1,800**	**480**	24
Dibenzo(a,h)anthracene $^{(a)}$	33	NSL	µg/kg	**120 J**	**86 J**	4.1 J	16	0.34 J	0.27 J	**110 J**	**330 J**	**44 J**	**270 J**	**60 J**	5
Fluoranthene $^{(a)}$	423	2,230	µg/kg	**1,700**	**850**	46	120	4 U	4 U	**1,000**	**3,100**	**570**	**2,400**	**640**	13
Fluorene $^{(a)}$	77	536	µg/kg	67 J	40 J	1.1 J	4.2 J	0.23 J	0.23 J	34 J	**210 J**	38 J	**81 J**	36 J	0.96 J
Indeno(1,2,3-cd)pyrene $^{(a)}$	NSL	NSL	µg/kg	400	270	11	47	0.67 J	0.47 J	310	870	130 J	840	170	14
Naphthalene $^{(a)}$	176	561	µg/kg	220 U	100 U	7.2 U	23	4 U	4 U	130 U	590 U	140 U	280 U	140 U	4.3 U
Perylene	NSL	NSL	µg/kg	280	160	6.2 J	25	1.7 J	1.1 J	180	560 J	87 J	490	110 J	7
Phenanthrene $^{(a)}$	204	1,170	µg/kg	**620**	**280**	12	27	4 U	4 U	**330**	**690**	180	**820**	180	7
Pyrene $^{(a)}$	195	1,520	µg/kg	**1,200**	**570**	41	100	5	4 U	**690**	**4,100**	**850**	**2,000**	**820**	16
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**9,586**	**5,406**	263	869	29	21	**6,632**	**24,579**	**4,084**	**17,269**	**4,605**	189
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**14,419**	**8,638**	430	1,343	101	74	**10,542**	**49,649**	**8,138**	**8,391**	339	**27,390**

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-08	CI13-09	CI13-09	CI13-09	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10
			Sample Name:	CI13-08-SURF	CI13-09-SURF	CI13-09-0001	CI13-09-0103	CI13-10-SURF	CI13-10-0001	CI13-10-0001-FD	CI13-10-0103	CI13-10-0103-FD	CI13-10-0305	CI13-10-0305-FD
			Sample Depth (ft):	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	0-1	1-3	1-3	3-5	3-5
			Date Sampled:	9/27/13	9/30/13	9/24/13	9/24/13	9/30/13	9/24/13	9/24/13	9/24/13	9/24/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**Units**											
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	27 U	5.7 J	4 U	2.4 U	150 U	62 U	120 UJ	5.3 U	5 U	4.5 U	0.17 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	27 U	8.8 J	4 U	2.4 U	150 U	62 U	120 UJ	5.3 U	5 U	4.5 U	4.5 U
Acenaphthene(a)	NSL	NSL	µg/kg	3.9 J	9.1 J	0.75 J	0.08 J	18 J	11 J	12 J	0.19 J	0.15 J	0.19 J	0.22 J
Acenaphthylene (a)	NSL	NSL	µg/kg	11 J	15 J	0.5 J	2.4 U	85 J	18 J	47 J	0.25 J	5 U	4.5 U	0.14 J
Anthracene (a)	57	845	µg/kg	18 J	53 J	2.3 J	0.19 J	**180**	47 J	**110 J**	0.17 J	0.15 J	0.13 J	0.16 J
Benzo(a)anthracene (a)	108	1,050	µg/kg	**160**	**340**	15	0.69 J	**920**	**380**	**780 J**	1.4 J	0.86 J	0.87 J	4.5 U
Benzo(a)pyrene (a)	150	1,450	µg/kg	**180**	**340**	13	0.44 J	**1,000**	**380**	**890 J**	1.4 J	0.54 J	0.34 J	0.34 J
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	140	260	13	0.85 J	810	230	550 J	2.1 J	1.7 J	3.5 J	4.5 U
Benzo(e)pyrene	NSL	NSL	µg/kg	120	220	9	0.68 J	610	210	490 J	1.8 J	1.3 J	3.5 J	4.5 U
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	89	170	6	0.47 J	500	170	390 J	1.4 J	0.69 J	3.3 J	4.5 U
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	130	310	13	0.46 J	670	290	610 J	1.2 J	0.75 J	0.5 J	0.72 J
C1 Chrysenes	NSL	NSL	µg/kg	150 J	240 J	8.2 J	0.85 J	660 J	300 J	520 J	3.4 J	2.2 J	5.3 J	4.3 J
C1 Fluorenes	NSL	NSL	µg/kg	4.3 J	7 J	0.47 J	2.4 U	19 J	7.5 J	17 J	5.3 U	5 U	4.5 U	4.5 U
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	210 J	360 J	15 J	0.92 J	1000 J	540 J	1200 J	4.8 J	3.1 J	4.3 J	3.2 J
C1-Naphthalenes	NSL	NSL	µg/kg	6.8 J	9.8 J	4 U	2.4 U	150 U	62 U	120 UJ	5.3 U	5 U	4.5 U	4.5 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	77 J	140 J	6.5 J	0.65 J	390 J	180 J	330 J	2.4 J	1.5 J	3.3 J	2.8 J
C2 Chrysenes	NSL	NSL	µg/kg	97 J	150 J	9.3 J	1 J	430 J	220 J	410 J	3.4 J	2.9 J	9 J	6.6 J
C2 Fluorenes	NSL	NSL	µg/kg	9.6 J	11 J	0.97 J	2.4 U	28 J	16 J	30 J	0.69 J	0.52 J	0.84 J	4.5 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	130 J	180 J	7.1 J	0.93 J	490 J	290 J	510 J	4.2 J	3.7 J	5.2 J	3.9 J
C2-Naphthalenes	NSL	NSL	µg/kg	24 J	35 J	4 U	2.4 U	52 J	62 U	120 UJ	5.3 U	5 U	4.5 U	1.3 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	94 J	120 J	5.7 J	0.75 J	310 J	150 J	260 J	2.5 J	1.7 J	5.1 J	4.5 J
C3 Chrysenes	NSL	NSL	µg/kg	49 J	67 J	3.4 J	2.4 U	160 J	72 J	120 J	5.3 U	5 U	4.8 J	4.2 J
C3 Fluorenes	NSL	NSL	µg/kg	29 J	27 J	1.6 J	2.4 U	56 J	24 J	45 J	5.3 U	0.79 J	4.5 U	4.5 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	71 J	95 J	4.1 J	0.68 J	210 J	120 J	230 J	3.2 J	2.3 J	7.3 J	4.1 J
C3-Naphthalenes	NSL	NSL	µg/kg	36 J	50 J	4 U	2.4 U	57 J	62 U	120 UJ	5.3 U	5 U	4.5 U	2.8 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	100 J	120 J	6.4 J	0.79 J	200 J	130 J	260 J	1.9 J	1.4 J	9.4 J	8 J
C4 Chrysenes	NSL	NSL	µg/kg	13 J	20 J	4 U	2.4 U	50 J	11 J	25 J	5.3 U	5 U	4.5 U	1.3 J
C4-Naphthalenes	NSL	NSL	µg/kg	40 J	41 J	3.5 J	0.56 J	56 J	19 J	42 J	1.4 J	5 U	4.1 J	3.4 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	55 J	66 J	4.2 J	0.6 J	110 J	64 J	160 J	2.3 J	2 J	6.2 J	4.9 J
Chrysene (a)	166	1,290	µg/kg	**180**	**340**	14	0.87 J	**870**	**330**	**700 J**	2.3 J	1.5 J	5	4.2 J
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	23 J	**47 J**	2 J	0.11 J	**150**	**57 J**	**110 J**	0.3 J	0.14 J	0.25 J	4.5 U
Fluoranthene (a)	423	2,230	µg/kg	170	380	21	2.4 U	**1,200**	**430**	**700 J**	5.3 U	5 U	4.5 U	1.8 J
Fluorene (a)	77	536	µg/kg	7.9 J	17 J	1.3 J	0.16 J	32 J	17 J	38 J	0.26 J	0.19 J	0.23 J	0.19 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	75	160	6	0.26 J	450	160	370 J	0.98 J	0.45 J	0.45 J	4.5 U
Naphthalene (a)	176	561	µg/kg	27 U	16 J	4 U	2.4 U	150 U	62 U	120 UJ	5.3 U	5 U	4.5 U	4.5 U
Perylene	NSL	NSL	µg/kg	40	91	4 J	0.22 J	210	81	180 J	8	6	2.1 J	1.7 J
Phenanthrene (a)	204	1,170	µg/kg	51	110	6	2.4 U	**430**	170	**220 J**	5.3 U	5 U	4.5 U	4.5 U
Pyrene (a)	195	1,520	µg/kg	150	**320**	18	2.4 U	**840**	**440**	**890 J**	5.3 U	5 U	4.5 U	2.6 J
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	1,416	**2,896**	136	12	**8,305**	**3,192**	**6,537**	25	22	28	28
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**2,557**	**4,662**	221	27	**12,703**	**5,279**	**10,746**	73	61	97	86

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment

Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment

Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-11	CI13-11	CI13-11	CI13-12	CI13-13	CI13-13	CI13-13	CI13-13	CI13-14	CI13-14	CI13-14
			Sample Name:	CI13-11-SURF	CI13-11-0001	CI13-11-0103	CI13-12-SURF	CI13-13-SURF	CI13-13-0001	CI13-13-0103	CI13-13-0305	CI13-14-SURF	CI13-14-0001	CI13-14-0103
			Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3
			Date Sampled:	9/30/13	9/24/13	9/24/13	9/30/13	9/30/13	9/24/13	9/24/13	9/24/13	9/30/13	9/25/13	9/25/13
Analyte	**TEC**	**PEC**	**Units**											
1-Methylnaphthalene [(b)]	NSL	NSL	µg/kg	17 U	0.45 J	0.16 J	200 U	59 J	11 J	4.5 J	1.8 J	46 J	66 J	1.5 J
2-Methylnaphthalene [(a)] [(b)]	NSL	NSL	µg/kg	17 U	8.7 U	4.4 U	200 U	98 J	100 U	6	4.6 U	83 J	760 U	17 U
Acenaphthene[(a)]	NSL	NSL	µg/kg	1.9 J	1.8 J	4.4 U	38 J	67 J	31 J	3.3 J	0.57 J	73 J	130 J	7.1 J
Acenaphthylene [(a)]	NSL	NSL	µg/kg	4 J	0.57 J	4.4 U	74 J	89 J	28 J	4 J	0.23 J	170 J	200 J	2.6 J
Anthracene [(a)]	57	845	µg/kg	10 J	5.9 J	0.12 J	**180 J**	**400**	**360**	6	0.46 J	**710**	**800**	25
Benzo(a)anthracene [(a)]	108	1,050	µg/kg	57	25	4.4 U	**870**	**1,400**	**600**	10	4.6 U	**3,300**	**3,700**	54
Benzo(a)pyrene [(a)]	150	1,450	µg/kg	61	19	0.27 J	**910**	**1,500**	**550**	7	1.1 J	**3,300**	**3,400**	38
Benzo(b)fluoranthene [(a)]	NSL	NSL	µg/kg	73	19	4.4 U	800	1,500	500	8	4.6 U	2,900	2,600	26
Benzo(e)pyrene	NSL	NSL	µg/kg	49	15	4.4 U	580	930	320	7	4.6 U	1,900	2,000	23
Benzo(g,h,i)perylene [(a)]	NSL	NSL	µg/kg	42	9	4.4 U	500	530	230	4.6 U	4.6 U	1,100	1,400	17 U
Benzo(k)fluoranthene [(a)]	NSL	NSL	µg/kg	48	20	0.37 J	660	1,400	450	8	1.3 J	3,000	2,500	30
C1 Chrysenes	NSL	NSL	µg/kg	61 J	16 J	1.8 J	600 J	690 J	310 J	12 J	8.3 J	1800 J	3000 J	44 J
C1 Fluorenes	NSL	NSL	µg/kg	3.6 J	8.7 U	4.4 U	31 J	34 J	16 J	2.1 J	1.4 J	660 U	120 J	6.2 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	76 J	30 J	1.5 J	910 J	1200 J	590 J	19 J	9.7 J	3200 J	4900 J	110 J
C1-Naphthalenes	NSL	NSL	µg/kg	3.7 J	8.7 U	4.4 U	37 J	110 J	22 J	7.2 J	2.3 J	91 J	120 J	2.2 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	45 J	13 J	0.82 J	480 J	600 J	290 J	24 J	15 J	1300 J	2800 J	92 J
C2 Chrysenes	NSL	NSL	µg/kg	53 J	13 J	2.1 J	330 J	570 J	180 J	15 J	17 J	1200 J	1900 J	29 J
C2 Fluorenes	NSL	NSL	µg/kg	7.3 J	1.4 J	4.4 U	35 J	43 J	25 J	3.8 J	3.1 J	91 J	250 J	10 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	57 J	18 J	1.6 J	450 J	450 J	230 J	14 J	11 J	1200 J	2800 J	53 J
C2-Naphthalenes	NSL	NSL	µg/kg	15 J	2.5 J	0.97 J	120 J	250 J	67 J	16 J	9.2 J	280 J	450 J	16 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	46 J	9.1 J	1.2 J	370 J	380 J	240 J	46 J	25 J	870 J	2200 J	71 J
C3 Chrysenes	NSL	NSL	µg/kg	32 J	4.9 J	1.2 J	140 J	230 J	67 J	7.8 J	8.3 J	410 J	590 J	13 J
C3 Fluorenes	NSL	NSL	µg/kg	21 J	2.7 J	4.4 U	89 J	94 J	34 J	6.1 J	5.4 J	160 J	390 J	12 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	35 J	9.3 J	1.4 J	200 J	260 J	100 J	12 J	13 J	540 J	1300 J	27 J
C3-Naphthalenes	NSL	NSL	µg/kg	26 J	4 J	1.3 J	160 J	300 J	100 J	29 J	25 J	340 J	910 J	34 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	47 J	11 J	1.8 J	240 J	280 J	160 J	30 J	28 J	610 J	1800 J	49 J
C4 Chrysenes	NSL	NSL	µg/kg	11 J	2 J	0.77 J	43 J	290 U	100 U	2.3 J	3.3 J	660 U	160 J	3.5 J
C4-Naphthalenes	NSL	NSL	µg/kg	24 J	3.1 J	4.4 U	110 J	180 J	84 J	25 J	26 J	220 J	430 J	26 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	38 J	7.7 J	1.6 J	120 J	170 J	66 J	14 J	15 J	260 J	890 J	22 J
Chrysene [(a)]	166	1,290	µg/kg	69	23	1.3 J	**870**	**1,300**	**640**	12	6	**3,200**	**3,400**	51
Dibenzo(a,h)anthracene [(a)]	33	NSL	µg/kg	11 J	8.7 U	4.4 U	**160 J**	**150 J**	100 U	4.6 U	4.6 U	**310 J**	760 U	17 U
Fluoranthene [(a)]	423	2,230	µg/kg	120	53	1.1 J	**1,300**	**2200 J**	**730**	18	4.2 J	**3700 J**	**4,100**	85
Fluorene [(a)]	77	536	µg/kg	4.7 J	2.2 J	0.14 J	65 J	**120 J**	71 J	9	1.5 J	**140 J**	**270 J**	6.3 J
Indeno(1,2,3-cd)pyrene [(a)]	NSL	NSL	µg/kg	40	8.7 U	4.4 U	460	520	230	4.6 U	4.6 U	1,100	1,200	17 U
Naphthalene [(a)]	176	561	µg/kg	17 U	8.7 U	4.4 U	200 U	**220 J**	100 U	27	4.6 U	**230 J**	760 U	17 U
Perylene	NSL	NSL	µg/kg	18	7.6 J	0.4 J	210	400	150	19	28	870	750 J	16 J
Phenanthrene [(a)]	204	1,170	µg/kg	27	20	4.4 U	**460**	**690**	**240**	18	4.6 U	**1,100**	**1,500**	34
Pyrene [(a)]	195	1,520	µg/kg	83	44	1.2 J	**940**	**1,500**	**580**	14	4.2 J	**2,800**	**3,600**	90
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	669	260	27	**8,487**	**13,684**	**5,390**	157	38	**27,216**	**29,940**	492
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	1,237	407	53	**12,992**	**20,192**	**8,111**	435	268	**41,395**	**53,220**	1,062

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

[(a)] Included in calculation of total 17PAH

[(b)] Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-15	CI13-15	CI13-15	CI13-16	CI13-16	CI13-16	CI13-17	CI13-17	CI13-18A	CI13-18A
			Sample Name:	CI13-15-SURF	CI13-15-0001	CI13-15-0103	CI13-16-SURF	CI13-16-0001	CI13-16-0103	CI13-17-SURF	CI13-17-0001	CI13-18A-SURF	CI13-18A-0001
			Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5	0-1
			Date Sampled:	9/30/13	9/25/13	9/25/13	9/30/13	9/25/13	9/25/13	9/30/13	9/25/13	9/30/13	9/25/13
Analyte	**TEC**	**PEC**	**Units**										
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	88 J	34 J	0.9 J	220 J	29 J	1.3 J	42 U	28 J	48 U	0.57 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	140 J	450 U	4.3 U	210 J	450 U	38 U	42 U	430 U	48 U	3.9 U
Acenaphthene(a)	NSL	NSL	µg/kg	200 J	50 J	1.2 J	1300 J	89 J	5.4 J	2.4 J	54 J	10 J	1.2 J
Acenaphthylene (a)	NSL	NSL	µg/kg	260 J	86 J	1.1 J	1200 J	170 J	14 J	12 J	87 J	8.4 J	0.79 J
Anthracene (a)	57	845	µg/kg	**1,100**	**530**	6	**13,000**	**510**	27 J	**61**	**640**	34 J	3.4 J
Benzo(a)anthracene (a)	108	1,050	µg/kg	**4,600**	**2,000**	16	**34,000**	**3,400**	**250**	**180**	**1,800**	**160**	13
Benzo(a)pyrene (a)	150	1,450	µg/kg	**4,400**	**1,800**	13	**26,000**	**3,400**	**270**	150	**1,400**	150	12
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	3,400	1,300	13	19,000	2,300	160	140	1,200	140	11
Benzo(e)pyrene	NSL	NSL	µg/kg	2,500	980	8	15,000	1,900	150	95	880	100	8
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	1,600	700	5	9,400	1,200	89	79	680	94	5
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	3,600	1,300	11	25000 J	2,300	170	120	1,500	120	11
C1 Chrysenes	NSL	NSL	µg/kg	840 U	1200 J	11 J	19000 J	3000 J	210 J	92 J	690 J	110 J	7.3 J
C1 Fluorenes	NSL	NSL	µg/kg	120 J	450 U	0.78 J	1200 J	80 J	5 J	42 U	430 U	6.5 J	3.9 U
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	840 U	2300 J	20 J	40000 J	4700 J	340 J	150 J	1500 J	150 J	14 J
C1-Naphthalenes	NSL	NSL	µg/kg	160 J	71 J	1.3 J	7800 U	60 J	38 U	42 U	53 J	19 J	1 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	2600 J	1000 J	13 J	29000 J	1600 J	110 J	71 J	710 J	140 J	8.3 J
C2 Chrysenes	NSL	NSL	µg/kg	840 U	620 J	9.5 J	11000 J	2000 J	140 J	52 J	370 J	67 J	4.6 J
C2 Fluorenes	NSL	NSL	µg/kg	160 J	67 J	1.3 J	1200 J	170 J	11 J	42 U	430 U	48 U	0.72 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	840 U	900 J	9.8 J	13000 J	2700 J	190 J	59 J	460 J	100 J	5.6 J
C2-Naphthalenes	NSL	NSL	µg/kg	520 J	160 J	4.3 J	2800 J	230 J	11 J	11 J	150 J	46 J	2.7 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	1600 J	570 J	11 J	12000 J	1500 J	110 J	41 J	300 J	74 J	5 J
C3 Chrysenes	NSL	NSL	µg/kg	840 U	200 J	3.9 J	3400 J	750 J	39 J	24 J	140 J	33 J	3.9 U
C3 Fluorenes	NSL	NSL	µg/kg	260 J	98 J	2.5 J	1300 J	260 J	17 J	11 J	46 J	48 U	3.9 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	840 U	350 J	7 J	4800 J	1400 J	84 J	27 J	190 J	46 J	2.8 J
C3-Naphthalenes	NSL	NSL	µg/kg	640 J	200 J	7.3 J	4400 J	430 J	23 J	12 J	170 J	37 J	4.1 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	1700 J	400 J	11 J	5100 J	1300 J	87 J	27 J	210 J	38 J	3.1 J
C4 Chrysenes	NSL	NSL	µg/kg	840 U	450 U	1.4 J	7800 U	230 J	11 J	7.7 J	430 U	10 J	3.9 U
C4-Naphthalenes	NSL	NSL	µg/kg	330 J	110 J	7.3 J	1900 J	270 J	15 J	8.3 J	54 J	20 J	1.5 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	3300 J	200 J	6.5 J	1500 J	670 J	40 J	15 J	97 J	22 J	1.6 J
Chrysene (a)	166	1,290	µg/kg	**3,900**	**1,700**	15	**28,000**	**3,200**	**230**	**170**	**1,600**	160	12
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**510 J**	450 U	4.3 U	**3000 J**	450 U	38 U	24 J	430 U	28 J	3.9 U
Fluoranthene (a)	423	2,230	µg/kg	**6600 J**	**2,900**	29	**54,000**	**3,200**	190	290	**3,400**	320	19
Fluorene (a)	77	536	µg/kg	**310 J**	**120 J**	2 J	**2500 J**	**150 J**	7 J	12 J	**160 J**	17 J	1.5 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	1,500	650	5	9,100	1,100	78	78	660	86	5
Naphthalene (a)	176	561	µg/kg	**340 J**	450 U	4.3 U	**580 J**	450 U	38 U	42 U	430 U	48 U	3.9 U
Perylene	NSL	NSL	µg/kg	1,000	400 J	25	6900 J	670	48	39 J	410 J	39 J	3.8 J
Phenanthrene (a)	204	1,170	µg/kg	**2,300**	**900**	13	**25,000**	**680**	38 U	110	**1,500**	190	9
Pyrene (a)	195	1,520	µg/kg	**5,000**	**2,200**	20	**42,000**	**3,200**	190	170	**2,300**	**210**	14
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**39,760**	**16,911**	157	**293,290**	**25,574**	**1,756**	**1,640**	**17,626**	**1,775**	124
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**56,610**	**25,712**	300	**456,580**	**45,169**	**3,123**	**2,338**	**23,836**	**2,711**	195

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-20	CI13-20	CI13-20	CI13-21	CI13-22	CI13-23	CI13-23	CI13-23	CI13-24	CI13-24	CI13-25
			Sample Name:	CI13-20-SURF	CI13-20-0001	CI13-20-0103	CI13-21-SURF	CI13-22-SURF	CI13-23-SURF	CI13-23-0001	CI13-23-0103	CI13-24-SURF	CI13-24-0001	CI13-25-SURF
			Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5
			Date Sampled:	9/30/13	9/25/13	9/25/13	9/26/13	10/28/13	10/28/13	9/25/13	9/25/13	10/28/13	9/26/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**											
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	99 U	14 J	1 J	8.3 J	0.92 J	36 J	7.3 J	0.56 J	77 J	1.7 J	27 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	99 U	110 U	4.7 U	31 U	1.4 J	59 J	54 U	4.4 U	110 J	20 U	23 J
Acenaphthene(a)	NSL	NSL	µg/kg	29 J	44 J	1.8 J	15 J	0.92 J	65 J	16 J	0.36 J	220 J	9.6 J	57 J
Acenaphthylene (a)	NSL	NSL	µg/kg	33 J	21 J	0.86 J	7.4 J	2.2 J	52 J	13 J	0.15 J	32 J	3 J	130 J
Anthracene (a)	57	845	µg/kg	**130**	**150**	3.9 J	41	7.6 J	**360**	55	0.48 J	**480 J**	24	**660**
Benzo(a)anthracene (a)	108	1,050	µg/kg	**470**	**440**	12	**150**	58	**1,400**	**270**	4.4 U	**1,500**	62	**1,600**
Benzo(a)pyrene (a)	150	1,450	µg/kg	**490**	**370**	10	130	48	**1,300**	**240**	1 J	**1,300**	51	**1,200**
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	410	310	8	130	54	1,100	190	4.4 U	1,200	53	1,200
Benzo(e)pyrene	NSL	NSL	µg/kg	310	230	7	91	36	790	150	4.4 U	810	36	740
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	260	150	4.7 U	49	14	490	81	4.4 U	470 J	24	630
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	360	360	7	110	44	1,000	200	1.2 J	1,400	47	940
C1 Chrysenes	NSL	NSL	µg/kg	290 J	290 J	13 J	88 J	41 J	810 J	230 J	3.2 J	770 J	40 J	630 J
C1 Fluorenes	NSL	NSL	µg/kg	18 J	24 J	1.5 J	3.5 J	1.7 J	38 J	13 J	0.58 J	490 U	4.3 J	62 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	500 J	530 J	22 J	140 J	73 J	1700 J	360 J	5.4 J	1500 J	78 J	1800 J
C1-Naphthalenes	NSL	NSL	µg/kg	19 J	23 J	1.3 J	17 J	1.7 J	67 J	13 J	0.75 J	130 J	2.8 J	450 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	300 J	340 J	21 J	83 J	35 J	840 J	190 J	6.1 J	870 J	57 J	970 J
C2 Chrysenes	NSL	NSL	µg/kg	170 J	190 J	12 J	71 J	34 J	560 J	160 J	8.4 J	620 J	32 J	380 J
C2 Fluorenes	NSL	NSL	µg/kg	23 J	39 J	2.7 J	7 J	3 J	53 J	26 J	1.1 J	52 J	5.3 J	69 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	230 J	300 J	14 J	73 J	39 J	680 J	200 J	4.1 J	740 J	37 J	590 J
C2-Naphthalenes	NSL	NSL	µg/kg	65 J	85 J	6.6 J	31 J	5.9 J	200 J	42 J	2.7 J	280 J	14 J	230 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	210 J	260 J	18 J	58 J	31 J	530 J	170 J	9.5 J	440 J	37 J	550 J
C3 Chrysenes	NSL	NSL	µg/kg	56 J	66 J	5 J	30 J	17 J	190 J	51 J	2 J	230 J	14 J	450 U
C3 Fluorenes	NSL	NSL	µg/kg	53 J	90 J	4.7 J	15 J	11 J	95 J	37 J	2.1 J	61 J	8.8 J	120 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	100 J	160 J	9.7 J	44 J	22 J	300 J	100 J	3.6 J	340 J	20 J	190 J
C3-Naphthalenes	NSL	NSL	µg/kg	84 J	180 J	20 J	30 J	9.8 J	220 J	80 J	6.8 J	260 J	27 J	260 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	140 J	280 J	20 J	61 J	36 J	430 J	160 J	7.4 J	370 J	33 J	360 J
C4 Chrysenes	NSL	NSL	µg/kg	22 J	20 J	1.9 J	12 J	3.6 J	34 J	10 J	0.69 J	490 U	3.8 J	450 U
C4-Naphthalenes	NSL	NSL	µg/kg	61 J	120 J	15 J	27 J	13 J	160 J	63 J	7.4 J	170 J	18 J	230 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	83 J	160 J	10 J	29 J	20 J	200 J	85 J	4.5 J	210 J	19 J	150 J
Chrysene (a)	166	1,290	µg/kg	**460**	**430**	13	150	57	**1,200**	**250**	2.6 J	**1,400**	59	**1,400**
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**84 J**	110 U	4.7 U	17 J	5 J	**160 J**	54 U	4.4 U	**140 J**	6.5 J	**190 J**
Fluoranthene (a)	423	2,230	µg/kg	**690**	**810**	17	230	68	**1,900**	330	3.6 J	**2,700**	120	**3,800**
Fluorene (a)	77	536	µg/kg	39 J	70 J	2.2 J	18 J	2.3 J	**110 J**	23 J	0.62 J	**250 J**	11 J	**170 J**
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	240	150	4.7 U	48	15	460	76	4.4 U	480 J	20	600
Naphthalene (a)	176	561	µg/kg	99 U	110 U	4.7 U	32	9.1 U	240 U	54 U	4.4 U	490 U	20 U	450 U
Perylene	NSL	NSL	µg/kg	110	110	14	32	12	320	73	13	400 J	14 J	290 J
Phenanthrene (a)	204	1,170	µg/kg	**300**	**390**	8	110	20	**660**	92	4.4 U	**1,800**	55	**1,500**
Pyrene (a)	195	1,520	µg/kg	**510**	**600**	17	160	72	**1,700**	**280**	4.1 J	**2,300**	89	**2,600**
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**4,604**	**4,460**	112	1,413	474	**12,136**	**2,197**	32	**16,027**	654	**16,925**
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**7,069**	**7,442**	305	**2,223**	857	**19,314**	**4,083**	113	**23,580**	1,088	**24,418**

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-26	CI13-26	CI13-26	CI13-26	CI13-26	CI13-26	CI13-27A	CI13-27A	CI13-27A	CI13-27A	CI13-27A
			Sample Name:	CI13-26-SURF	CI13-26-0001	CI13-26-0103	CI13-26-0305	CI13-26-0507	CI13-26-0709	CI13-27A-SURF	CI13-27A-0001	CI13-27A-0103	CI13-27A-0305	CI13-27A-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	0-0.5	0-1	1-3	3-5	5-7
			Date Sampled:	9/30/13	10/1/13	10/1/13	10/1/13	10/1/13	10/1/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**											
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	76 J	16 J	1.2 J	1.1 J	0.74 J	0.51 J	31 J	740 U	720 U	1900 U	450 U
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	91 J	20 J	1.3 J	1 J	0.47 J	0.25 J	49 J	740 U	720 U	1900 U	450 U
Acenaphthene(a)	NSL	NSL	µg/kg	210 J	23 J	0.65 J	0.42 J	4.1 U	4 U	38 J	190 J	250 J	1800 J	280 J
Acenaphthylene (a)	NSL	NSL	µg/kg	390 J	35 J	0.82 J	0.56 J	0.13 J	0.17 J	43 J	200 J	290 J	650 J	150 J
Anthracene (a)	57	845	µg/kg	**1,100**	**100**	3 J	1.5 J	0.23 J	0.12 J	150 U	**860**	**910**	**4,600**	**760**
Benzo(a)anthracene (a)	108	1,050	µg/kg	**5,400**	**620**	12	7	1.1 J	0.85 J	**660**	**3,500**	**4,000**	**8,900**	**2,000**
Benzo(a)pyrene (a)	150	1,450	µg/kg	**4,900**	**600**	12	6	0.69 J	0.59 J	**770**	**3,100**	**3,700**	**7,400**	**1,800**
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	4,000	500	16	10	2.8 J	2.2 J	770	2,800	2,900	5,100	1,200
Benzo(e)pyrene	NSL	NSL	µg/kg	3,000	370	10	7	2.8 J	2.4 J	570	2,700	2,700	4,500	1,200
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	2,600	190	5	3.8 J	1.4 J	1.4 J	560	1,900	2,100	3,700	990
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	3,200	600 J	13 J	6.8 J	1.2 J	0.79 J	610	2,500	2,900	4,700	1,100
C1 Chrysenes	NSL	NSL	µg/kg	3700 J	480 J	15 J	10 J	8.2 J	7.1 J	630 J	4700 J	4700 J	9300 J	2200 J
C1 Fluorenes	NSL	NSL	µg/kg	170 J	14 J	0.95 J	0.72 J	0.56 J	0.44 J	24 J	280 J	290 J	1200 J	210 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	7700 J	700 J	19 J	13 J	8.1 J	8.2 J	740 J	5600 J	6500 J	18000 J	3700 J
C1-Naphthalenes	NSL	NSL	µg/kg	140 J	24 J	1.7 J	1.4 J	0.99 J	0.68 J	57 J	220 J	320 J	1200 J	170 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	4300 J	270 J	17 J	12 J	10 J	9 J	420 J	4500 J	5000 J	18000 J	3500 J
C2 Chrysenes	NSL	NSL	µg/kg	2000 J	410 J	28 J	24 J	27 J	27 J	480 J	4400 J	4200 J	6500 J	1600 J
C2 Fluorenes	NSL	NSL	µg/kg	250 J	26 J	2.5 J	2 J	2.2 J	1.7 J	50 J	790 J	850 J	1500 J	290 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	3100 J	360 J	15 J	12 J	11 J	11 J	500 J	4500 J	5300 J	9600 J	2200 J
C2-Naphthalenes	NSL	NSL	µg/kg	510 J	83 J	6.7 J	5.7 J	5 J	3.5 J	180 J	1500 J	1900 J	9000 J	1400 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	2400 J	320 J	89 J	32 J	110 J	78 J	390 J	6500 J	7300 J	12000 J	2600 J
C3 Chrysenes	NSL	NSL	µg/kg	630 J	110 J	12 J	11 J	12 J	12 J	230 J	1800 J	1900 J	3000 J	590 J
C3 Fluorenes	NSL	NSL	µg/kg	360 J	52 J	7.7 J	6.7 J	6.8 J	5.6 J	120 J	2300 J	2400 J	2700 J	570 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1100 J	190 J	15 J	14 J	15 J	13 J	310 J	3300 J	4000 J	4800 J	1200 J
C3-Naphthalenes	NSL	NSL	µg/kg	720 J	94 J	15 J	13 J	13 J	10 J	210 J	3600 J	3400 J	7800 J	1400 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	1400 J	230 J	38 J	30 J	42 J	37 J	370 J	7500 J	9200 J	9600 J	2100 J
C4 Chrysenes	NSL	NSL	µg/kg	970 U	22 J	4.9 J	4.3 J	5 J	4.7 J	84 J	720 J	830 J	1200 J	280 J
C4-Naphthalenes	NSL	NSL	µg/kg	600 J	83 J	25 J	22 J	23 J	20 J	160 J	3500 J	3400 J	3800 J	750 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	560 J	96 J	17 J	16 J	17 J	16 J	240 J	4700 J	6200 J	6500 J	1400 J
Chrysene (a)	166	1,290	µg/kg	**4,800**	**560**	16	10	6	5	**800**	**4,400**	**4,800**	**8,800**	**2,100**
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**680 J**	**66 J**	1.3 J	0.71 J	0.13 J	0.14 J	**170**	**510 J**	**570 J**	**880 J**	**220 J**
Fluoranthene (a)	423	2,230	µg/kg	**7,300**	**620**	21	14	2.9 J	2.1 J	**1,100**	**5,000**	**5,400**	**12,000**	**2,400**
Fluorene (a)	77	536	µg/kg	**210 J**	41 J	1.5 J	1 J	0.37 J	0.19 J	53 J	**350 J**	**440 J**	**2,100**	**380 J**
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	2,200	180	3.8 J	2.4 J	0.33 J	0.26 J	480	1,500	1,700	2,900	750
Naphthalene (a)	176	561	µg/kg	970 U	64 J	1.8 J	1 J	0.57 J	0.51 J	150 U	740 U	720 U	1900 U	450 U
Perylene	NSL	NSL	µg/kg	990	180	25	34	26	19	180	710 J	800	1300 J	380 J
Phenanthrene (a)	204	1,170	µg/kg	**3,000**	**240**	8	6	1.6 J	1.3 J	**440**	**2,300**	**2,600**	**12,000**	**2,200**
Pyrene (a)	195	1,520	µg/kg	**7,400**	**500**	14	11	2.8 J	2.8 J	**780**	**4,300**	**4,900**	**13,000**	**2,700**
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**47,966**	**4,959**	131	83	25	21	**7,473**	**34,150**	**38,180**	**90,430**	**19,480**
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**77,790**	**8,503**	464	327	344	283	**12,634**	**89,800**	**99,710**	**206,580**	**43,595**

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-29A	CI13-29A	CI13-29A	CI13-30	CI13-30
			Sample Name:	CI13-28-SURF	CI13-28-0001	CI13-28-0103	CI13-28-0305	CI13-28-0507	CI13-28-0709	CI13-28-0911	CI13-29A-SURF	CI13-29A-0001	CI13-29A-0103	CI13-30-SURF	CI13-30-0001
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	9-11	0-0.5	0-1	1-3	0-0.5	0-1
			Date Sampled:	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/25/13
Analyte	**TEC**	**PEC**	**Units**												
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	39 J	2.1 J	2.9 J	2.1 J	2.6 J	2.1 J	1.6 J	48 J	7 U	4.1 U	170 U	22 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	66 J	2.1 J	3.2 J	2 J	2.3 J	1.9 J	1.7 J	62 J	7 U	4.1 U	170 U	210 U
Acenaphthene(a)	NSL	NSL	µg/kg	49 J	0.67 J	0.97 J	0.57 J	0.56 J	0.34 J	0.59 J	84 J	1.8 J	0.57 J	41 J	65 J
Acenaphthylene (a)	NSL	NSL	µg/kg	58 J	0.44 J	0.39 J	4.5 U	0.19 J	0.2 J	0.32 J	220 J	1.6 J	0.76 J	47 J	55 J
Anthracene (a)	57	845	µg/kg	230 U	1.8 J	1.5 J	1 J	0.41 J	0.58 J	0.81 J	**860**	9	1.3 J	**220**	**350**
Benzo(a)anthracene (a)	108	1,050	µg/kg	**870**	8	5 J	3.9 J	1.3 J	0.9 J	1.2 J	**2,600**	23	7	**730**	**1,100**
Benzo(a)pyrene (a)	150	1,450	µg/kg	**1,000**	7	4.9 J	3.9 J	0.88 J	0.57 J	0.93 J	**2,600**	20	6	**730**	**1,100**
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	1,100	12	10	8	4.2 J	3.2 J	3.3 J	2,300	24	6	650	830
Benzo(e)pyrene	NSL	NSL	µg/kg	740	9	6	5	3.6 J	2.7 J	2.9 J	1,600	15	6	460	620
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	780	4.7 J	3.1 J	3 J	2.1 J	1.7 J	1.4 J	1,500	15	7	420	350
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	820	10	5.5 J	3.8 J	1.6 J	1.1 J	1.3 J	1,900	15	3.5 J	560	940
C1 Chrysenes	NSL	NSL	µg/kg	670 J	13 J	11 J	11 J	9.9 J	8.2 J	8.2 J	1400 J	20 J	13 J	500 J	700 J
C1 Fluorenes	NSL	NSL	µg/kg	27 J	1.8 J	1.8 J	2 J	2.2 J	1.5 J	1.9 J	720 U	2.1 J	1 J	27 J	37 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	920 J	15 J	11 J	11 J	10 J	7.1 J	8.8 J	2600 J	28 J	16 J	770 J	1300 J
C1-Naphthalenes	NSL	NSL	µg/kg	78 J	2.8 J	4 J	2.8 J	3.5 J	2.7 J	2.3 J	98 J	2.1 J	1.1 J	45 J	32 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	470 J	24 J	22 J	23 J	24 J	18 J	27 J	1200 J	33 J	22 J	400 J	640 J
C2 Chrysenes	NSL	NSL	µg/kg	470 J	23 J	25 J	22 J	31 J	21 J	23 J	830 J	25 J	18 J	320 J	480 J
C2 Fluorenes	NSL	NSL	µg/kg	39 J	3 J	2.7 J	3.1 J	3 J	1.7 J	3 J	720 U	4.2 J	2.7 J	31 J	64 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	520 J	13 J	12 J	12 J	13 J	8.8 J	11 J	1100 J	23 J	16 J	410 J	610 J
C2-Naphthalenes	NSL	NSL	µg/kg	220 J	12 J	15 J	12 J	14 J	12 J	14 J	310 J	10 J	10 J	130 J	120 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	350 J	24 J	23 J	26 J	28 J	19 J	29 J	740 J	130 J	170 J	330 J	510 J
C3 Chrysenes	NSL	NSL	µg/kg	220 J	9.8 J	11 J	10 J	12 J	8.5 J	11 J	270 J	15 J	13 J	130 J	140 J
C3 Fluorenes	NSL	NSL	µg/kg	64 J	8 J	7.9 J	7.5 J	8.7 J	5.3 J	8.2 J	120 J	11 J	9.2 J	88 J	110 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	290 J	13 J	12 J	13 J	14 J	11 J	14 J	460 J	19 J	17 J	200 J	300 J
C3-Naphthalenes	NSL	NSL	µg/kg	200 J	31 J	35 J	35 J	38 J	31 J	46 J	310 J	22 J	27 J	140 J	240 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	350 J	24 J	25 J	29 J	31 J	22 J	34 J	490 J	52 J	57 J	230 J	460 J
C4 Chrysenes	NSL	NSL	µg/kg	63 J	4.6 J	5.8 J	4.6 J	6.1 J	3.1 J	3.9 J	720 U	4 J	3.9 J	170 U	36 J
C4-Naphthalenes	NSL	NSL	µg/kg	190 J	32 J	34 J	37 J	43 J	28 J	48 J	170 J	38 J	36 J	110 J	140 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	200 J	14 J	15 J	17 J	18 J	13 J	20 J	220 J	28 J	24 J	130 J	260 J
Chrysene (a)	166	1,290	µg/kg	**1,000**	14	10	9	8	5	7	**2,700**	28	12	**770**	**1,100**
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**230 J**	1.1 J	0.61 J	0.53 J	0.23 J	0.2 J	0.19 J	**440 J**	3.8 J	1 J	**140 J**	210 U
Fluoranthene (a)	423	2,230	µg/kg	**1,400**	17 J	11	8.7 J	6	4.6 J	4.8 J	**3,700**	48	11	**1,100**	**1,600**
Fluorene (a)	77	536	µg/kg	70 J	2.4 J	2.7 J	2.5 J	2.7 J	2.1 J	2.1 J	**230 J**	3.3 J	0.49 J	74 J	**120 J**
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	680	3.5 J	2 J	1.6 J	0.59 J	0.46 J	0.46 J	1,300	12	3.5 J	410	340
Naphthalene (a)	176	561	µg/kg	230 U	1.8 J	3.1 J	1.8 J	1.7 J	1.4 J	1 J	720 U	7 U	4.1 U	**180**	210 U
Perylene	NSL	NSL	µg/kg	250	32	36	30	33	25	16	570 J	27	15	170	270
Phenanthrene (a)	204	1,170	µg/kg	**560**	9	10	7	8	7	7	**1,600**	18	6	**410**	**460**
Pyrene (a)	195	1,520	µg/kg	**1,100**	10	7	6	3.5 J	2.5 J	3.3 J	**2,900**	29	10	**710**	**1,200**
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**10,013**	106	81	65	44	34	37	**25,356**	258	80	**7,277**	**9,925**
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**15,583**	387	369	351	360	262	343	**37,302**	721	523	**11,288**	**15,979**

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-31	CI13-31	CI13-31	CI13-31	CI13-31	CI13-31	CI13-32	CI13-32	CI13-32	CI13-33	CI13-33	CI13-33	CI13-33
			Sample Name:	CI13-31-SURF	CI13-31-SURF-FI	CI13-31-0001	CI13-31-0103	CI13-31-0305	CI13-31-0507	CI13-32-SURF	CI13-32-0001	CI13-32-0103	CI13-33-SURF	CI13-33-0001	CI13-33-0103	CI13-33-0305
			Sample Depth (ft):	0-0.5	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	1-3	0-0.5	0-1	1-3	3-5
			Date Sampled:	9/27/13	9/27/13	9/29/13	9/29/13	9/29/13	9/29/13	9/27/13	9/30/13	9/30/13	9/27/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**													
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	29 J	26 J	2.8 J	1.3 J	1.3 J	1.3 J	20 J	1.2 J	0.16 J	70 J	46 J	4.4 J	1.1 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	270 U	180 U	4.4 J	1 J	1 J	0.86 J	170 U	1.8 J	0.26 J	710 U	79 J	4.2 J	0.96 J
Acenaphthene(a)	NSL	NSL	µg/kg	44 J	44 J	2.8 J	0.63 J	0.38 J	0.3 J	32 J	2 J	4 U	140 J	96 J	2.7 J	0.24 J
Acenaphthylene (a)	NSL	NSL	µg/kg	74 J	79 J	2.5 J	0.31 J	0.24 J	0.19 J	61 J	3.5 J	0.14 J	140 J	100 J	0.86 J	0.45 J
Anthracene (a)	57	845	µg/kg	**300**	**170 J**	9	0.85 J	4.6 U	4.3 U	**110 J**	43 U	4 U	**360 J**	**310**	12 U	4.4 U
Benzo(a)anthracene (a)	108	1,050	µg/kg	**990**	**1,000**	53	4	1.4 J	1.1 J	**700**	**130**	2.1 J	**2,300**	**1,700**	15	2.3 J
Benzo(a)pyrene (a)	150	1,450	µg/kg	**1,200**	**1,200**	61	3.9 J	0.78 J	0.67 J	**870**	74	1.2 J	**2,700**	**2,200**	14	2.9 J
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	1,100	1,200	60	8	3.5 J	2.8 J	880	98 J	2.5 J	2,800	2200 J	21 J	3.7 J
Benzo(e)pyrene	NSL	NSL	µg/kg	790	870	44	5	3.3 J	3 J	670	100	3 J	1,900	1,400	16	3.4 J
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	690	810	33	3 J	4.2 J	3.6 J	500	40 J	2.1 J	1,600	1,300	13	3.7 J
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	830	870	49	4.3 J	1.2 J	0.94 J	640	54	1.1 J	2,000	1,500	12 J	2.1 J
C1 Chrysenes	NSL	NSL	µg/kg	780 J	880 J	47 J	9.6 J	9.6 J	8.9 J	700 J	250 J	5.6 J	1500 J	1300 J	29 J	7.1 J
C1 Fluorenes	NSL	NSL	µg/kg	270 U	28 J	3.2 J	1.4 J	1.3 J	1.2 J	21 J	37 J	0.44 J	710 U	40 J	2.2 J	0.46 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1000 J	1100 J	64 J	10 J	9 J	8.6 J	880 J	410 J	6.8 J	2000 J	1800 J	29 J	6 J
C1-Naphthalenes	NSL	NSL	µg/kg	56 J	56 J	4.8 J	1.7 J	1.6 J	1.5 J	35 J	43 U	4 U	130 J	85 J	5.7 J	1.4 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	490 J	500 J	48 J	16 J	13 J	11 J	330 J	450 J	4.9 J	830 J	710 J	33 J	6.8 J
C2 Chrysenes	NSL	NSL	µg/kg	510 J	570 J	40 J	18 J	18 J	17 J	540 J	180 J	5.8 J	1300 J	1000 J	40 J	10 J
C2 Fluorenes	NSL	NSL	µg/kg	44 J	62 J	6.3 J	2.6 J	2.6 J	2.6 J	45 J	72 J	0.8 J	77 J	85 J	4.5 J	1.3 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	610 J	710 J	43 J	10 J	12 J	11 J	610 J	300 J	5.5 J	1200 J	1100 J	29 J	7.5 J
C2-Naphthalenes	NSL	NSL	µg/kg	170 J	150 J	18 J	7.8 J	6.7 J	7.2 J	110 J	17 J	0.9 J	330 J	250 J	20 J	5 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	390 J	450 J	52 J	20 J	20 J	29 J	310 J	300 J	5.1 J	600 J	630 J	37 J	11 J
C3 Chrysenes	NSL	NSL	µg/kg	260 J	270 J	17 J	9.5 J	10 J	8.7 J	250 J	49 J	2.8 J	580 J	320 J	22 J	5.8 J
C3 Fluorenes	NSL	NSL	µg/kg	100 J	80 J	13 J	5.7 J	6.7 J	7.8 J	110 J	100 J	1.9 J	170 J	220 J	12 J	3.9 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	320 J	390 J	31 J	12 J	12 J	12 J	340 J	150 J	3.9 J	570 J	580 J	26 J	7.5 J
C3-Naphthalenes	NSL	NSL	µg/kg	180 J	160 J	34 J	19 J	13 J	12 J	120 J	82 J	1.6 J	330 J	290 J	30 J	8.5 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	370 J	450 J	51 J	22 J	26 J	30 J	360 J	180 J	3.8 J	600 J	740 J	45 J	13 J
C4 Chrysenes	NSL	NSL	µg/kg	66 J	71 J	6 J	3.9 J	4.7 J	3.5 J	76 J	25 J	0.85 J	250 J	100 J	12 U	1.7 J
C4-Naphthalenes	NSL	NSL	µg/kg	110 J	130 J	42 J	23 J	22 J	21 J	75 J	76 J	4 U	190 J	270 J	26 J	10 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	220 J	250 J	29 J	14 J	17 J	15 J	200 J	94 J	2.9 J	410 J	460 J	30 J	9.8 J
Chrysene (a)	166	1,290	µg/kg	**1,100**	**1,100**	58	8	7	6	**850**	**210**	5	**2,600**	**1,900**	24	5
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**210 J**	**240**	11	0.64 J	0.45 J	0.42 J	**150 J**	13 J	0.37 J	**500 J**	**420**	2.9 J	0.67 J
Fluoranthene (a)	423	2,230	µg/kg	**1,400**	**1,300**	74	8	4.6 U	4.3 U	**850**	150	4 U	**2,700**	**2,100**	26	4.4 U
Fluorene (a)	77	536	µg/kg	**91 J**	57 J	5.6 J	1.5 J	0.89 J	0.76 J	36 J	6.2 J	0.11 J	**130 J**	**100 J**	3.6 J	0.33 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	600	700	30	1.8 J	1.1 J	0.83 J	430	32 J	0.84 J	1,400	1,200	8.2 J	1.8 J
Naphthalene (a)	176	561	µg/kg	270 U	180 U	8.3 J	0.91 J	4.6 U	4.3 U	170 U	43 U	4 U	710 U	290 U	12 U	4.4 U
Perylene	NSL	NSL	µg/kg	280	280	35	37	42	25	200	45	6	630 J	500	60	17
Phenanthrene (a)	204	1,170	µg/kg	**510**	**440**	30	6	4.6 U	4.3 U	**270**	160	4 U	**930**	**760**	18	4.4 U
Pyrene (a)	195	1,520	µg/kg	**1,000**	**1,000**	55	6	3.1 J	2.6 J	**750**	**250**	4	**2,100**	**1,800**	21	2.2 J
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**10,409**	**10,390**	546	58	34	29	**7,299**	1,268	30	**23,110**	**17,910**	198	35
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**16,225**	**16,657**	1,096	283	260	244	**12,246**	**3,754**	87	**34,937**	**28,031**	642	157

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-34	CI13-34	CI13-34	CI13-34	CI13-34	CI13-34	CI13-35	CI13-35	CI13-35
			Sample Name:	CI13-34-SURF	CI13-34-0001	CI13-34-0103	CI13-34-0305	CI13-34-0507	CI13-34-0709	CI13-35-SURF	CI13-35-0001	CI13-35-0103
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	0-0.5	0-1	1-3
			Date Sampled:	9/27/13	9/29/13	9/29/13	9/29/13	9/29/13	9/29/13	9/26/13	9/26/13	9/26/13
Analyte	**TEC**	**PEC**	**Units**									
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	61 J	57 J	2.9 J	1.4 J	1.7 J	1.6 J	5.6 J	24 U	4 U
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	440 U	94 J	2.9 J	1.3 J	1.5 J	1.5 J	35 U	24 U	4 U
Acenaphthene(a)	NSL	NSL	µg/kg	100 J	110 J	1.3 J	0.55 J	0.66 J	1.1 J	8.8 J	24 U	4 U
Acenaphthylene (a)	NSL	NSL	µg/kg	170 J	100 J	1.1 J	0.3 J	0.37 J	0.36 J	9.3 J	24 U	4 U
Anthracene (a)	57	845	µg/kg	**360 J**	**330 J**	3.9 J	1.1 J	1.4 J	1.1 J	28 J	24 U	4 U
Benzo(a)anthracene (a)	108	1,050	µg/kg	**2,200**	**2,100**	16	5	5	7	**170**	0.75 J	0.21 J
Benzo(a)pyrene (a)	150	1,450	µg/kg	**2,800**	**2,500**	20	5	3.5 J	7	**180**	24 U	4 U
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	2,800	2,400	24	7	7	8	180	0.9 J	0.47 J
Benzo(e)pyrene	NSL	NSL	µg/kg	1,900	1,600	16	6	5	7	140	24 U	0.52 J
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	1,500	1,400	8.7 J	3.7 J	2.5 J	3.8 J	87	24 U	0.42 J
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	2,000	1,800	17	5	3.8 J	6	160	24 U	0.16 J
C1 Chrysenes	NSL	NSL	µg/kg	1700 J	1700 J	21 J	10 J	12 J	13 J	160 J	24 U	0.47 J
C1 Fluorenes	NSL	NSL	µg/kg	44 J	45 J	2.1 J	1.4 J	1.6 J	1.1 J	5.9 J	24 U	4 U
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	2100 J	2000 J	25 J	11 J	13 J	14 J	210 J	2.8 J	0.63 J
C1-Naphthalenes	NSL	NSL	µg/kg	110 J	98 J	3.9 J	1.8 J	2.1 J	2.1 J	10 J	24 U	4 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	860 J	950 J	27 J	16 J	21 J	22 J	110 J	24 U	0.5 J
C2 Chrysenes	NSL	NSL	µg/kg	1300 J	1300 J	27 J	17 J	21 J	31 J	130 J	24 U	4 U
C2 Fluorenes	NSL	NSL	µg/kg	80 J	84 J	3.6 J	2.8 J	3 J	4.4 J	17 J	24 U	4 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1200 J	1300 J	20 J	10 J	13 J	20 J	130 J	24 U	4 U
C2-Naphthalenes	NSL	NSL	µg/kg	300 J	280 J	14 J	7.8 J	8.3 J	14 J	36 J	24 U	0.42 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	670 J	750 J	27 J	21 J	24 J	55 J	94 J	24 U	4 U
C3 Chrysenes	NSL	NSL	µg/kg	620 J	460 J	15 J	8.6 J	11 J	15 J	59 J	24 U	4 U
C3 Fluorenes	NSL	NSL	µg/kg	180 J	210 J	8.6 J	5.8 J	6.7 J	12 J	29 J	24 U	4 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	620 J	900 J	19 J	12 J	14 J	21 J	71 J	24 U	4 U
C3-Naphthalenes	NSL	NSL	µg/kg	310 J	320 J	32 J	19 J	19 J	37 J	60 J	24 U	0.51 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	620 J	610 J	33 J	24 J	28 J	46 J	98 J	24 U	4 U
C4 Chrysenes	NSL	NSL	µg/kg	150 J	170 J	5.8 J	4 J	4.4 J	6.8 J	22 J	24 U	4 U
C4-Naphthalenes	NSL	NSL	µg/kg	170 J	220 J	35 J	29 J	26 J	52 J	36 J	24 U	4 U
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	380 J	390 J	20 J	15 J	18 J	28 J	61 J	24 U	4 U
Chrysene (a)	166	1,290	µg/kg	**2,400**	**2,100**	23	9	10	12	**190**	1.4 J	0.63 J
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**470**	**430**	2.4 J	0.73 J	0.48 J	0.83 J	29 J	24 U	4 U
Fluoranthene (a)	423	2,230	µg/kg	**2,800**	**2,800**	19	7	8	8	240	2.2 J	0.44 J
Fluorene (a)	77	536	µg/kg	**110 J**	**110 J**	2 J	0.72 J	0.87 J	0.98 J	13 J	24 U	4 U
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	1,400	1,300	7.3 J	2 J	1.2 J	2.1 J	84	24 U	0.11 J
Naphthalene (a)	176	561	µg/kg	440 U	**210 J**	3.2 J	0.89 J	0.95 J	1.2 J	35 U	24 U	4 U
Perylene	NSL	NSL	µg/kg	630	630	33	20	30	14	46	160	7
Phenanthrene (a)	204	1,170	µg/kg	**950**	**930**	11	4.4 U	7	7	87	24 U	4 U
Pyrene (a)	195	1,520	µg/kg	**2,100**	**1,800**	15	6	7	8	**200**	2.5 J	0.66 J
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**22,600**	**20,514**	178	57	61	75	**1,701**	152	21
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**34,504**	**32,237**	524	275	314	448	**3,008**	495	53

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36
			Sample Name:	CI13-36-SURF	CI13-36-0001	CI13-36-0103	CI13-36-0305	CI13-36-0507	CI13-36-0709	CI13-36-0709-FD	CI13-36-0911	CI13-36-0911-FD	CI13-36-1113	CI13-36-1113-FD	CI13-36-1315	CI13-36-1315-FD
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	7-9	9-11	9-11	11-13	11-13	13-15	13-15
			Date Sampled:	9/25/13	9/26/13	9/26/13	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**Units**													
1-Methylnaphthalene (b)	NSL	NSL	μg/kg	36 J	5.1 J	3.3 J	2.3 J	2.2 J	1.9 J	3.7 J	2.5 J	2.4 J	2.3 J	2.5 J	1.3 J	1.3 J
2-Methylnaphthalene (a) (b)	NSL	NSL	μg/kg	250 U	33 U	8 U	11 U	6 U	4 U	6 U	5 U	7 U	7 U	5 U	4 U	4 U
Acenaphthene(a)	NSL	NSL	μg/kg	49 J	12 J	1.7 J	0.65 J	0.51 J	0.37 J	0.58 J	0.54 J	0.37 J	0.77 J	0.78 J	0.37 J	0.54 J
Acenaphthylene (a)	NSL	NSL	μg/kg	57 J	7.7 J	2.1 J	0.43 J	0.34 J	0.2 J	6 U	5 U	0.2 J	0.19 J	0.26 J	4 U	0.12 J
Anthracene (a)	57	845	μg/kg	**150 J**	18 J	3.1 J	0.64 J	0.39 J	0.23 J	1 J	1.3 J	0.42 J	0.34 J	0.62 J	0.22 J	0.45 J
Benzo(a)anthracene (a)	108	1,050	μg/kg	**1,200**	**140**	27	4.1 J	2.7 J	1 J	1.8 J	2.7 J	1.4 J	1.4 J	1.5 J	0.85 J	0.75 J
Benzo(a)pyrene (a)	150	1,450	μg/kg	**1,400**	140	26	3.7 J	2.2 J	0.71 J	1.3 J	1.8 J	0.96 J	0.7 J	1.1 J	0.58 J	0.55 J
Benzo(b)fluoranthene (a)	NSL	NSL	μg/kg	1,400	130	28	6.8 J	5.4 J	3.2 J	5.5 J	5.4 J	3.8 J	3.1 J	4.2 J	2.1 J	2.2 J
Benzo(e)pyrene	NSL	NSL	μg/kg	1,000	110	22	5.5 J	4.1 J	2.8 J	4.9 J	4.6 J	4 J	3.3 J	3.8 J	2 J	2.3 J
Benzo(g,h,i)perylene (a)	NSL	NSL	μg/kg	700	75	15	4.2 J	2.7 J	2.2 J	4.1 J	3.8 J	3.6 J	3.2 J	3.1 J	1.9 J	1.9 J
Benzo(k)fluoranthene (a)	NSL	NSL	μg/kg	1,300	120	25	4.5 J	2.3 J	1.1 J	1.8 J	2.1 J	1.7 J	1.4 J	1.4 J	0.75 J	0.95 J
C1 Chrysenes	NSL	NSL	μg/kg	1200 J	170 J	38 J	16 J	10 J	8.6 J	15 J	12 J	12 J	12 J	12 J	7.2 J	7.4 J
C1 Fluorenes	NSL	NSL	μg/kg	250 U	8.4 J	2 J	1.4 J	1.3 J	1.5 J	2.8 J	2 J	2.1 J	1.9 J	2 J	0.83 J	0.87 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	μg/kg	1300 J	250 J	44 J	18 J	12 J	8.4 J	16 J	12 J	15 J	13 J	12 J	6.8 J	7 J
C1-Naphthalenes	NSL	NSL	μg/kg	66 J	8.1 J	4.5 J	2.9 J	2.7 J	2.4 J	4.7 J	3.1 J	3 J	2.9 J	3.1 J	1.6 J	1.6 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	μg/kg	530 J	140 J	27 J	18 J	15 J	18 J	30 J	23 J	23 J	22 J	23 J	11 J	12 J
C2 Chrysenes	NSL	NSL	μg/kg	1300 J	140 J	36 J	22 J	19 J	18 J	29 J	21 J	23 J	20 J	21 J	13 J	14 J
C2 Fluorenes	NSL	NSL	μg/kg	55 J	15 J	3.7 J	3.5 J	2.6 J	3 J	4.8 J	3.8 J	3.7 J	3.6 J	3.8 J	1.8 J	2.2 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	μg/kg	920 J	160 J	30 J	14 J	12 J	9.8 J	18 J	14 J	16 J	15 J	14 J	8.4 J	8.5 J
C2-Naphthalenes	NSL	NSL	μg/kg	190 J	35 J	15 J	10 J	9.3 J	9.3 J	18 J	13 J	12 J	12 J	13 J	6.2 J	7.1 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	μg/kg	540 J	120 J	27 J	21 J	18 J	19 J	31 J	26 J	24 J	23 J	25 J	16 J	18 J
C3 Chrysenes	NSL	NSL	μg/kg	490 J	64 J	19 J	10 J	9.4 J	8.4 J	15 J	11 J	11 J	8.6 J	13 J	7.6 J	8.3 J
C3 Fluorenes	NSL	NSL	μg/kg	160 J	31 J	8.6 J	11 U	5.8 J	6.2 J	11 J	7.7 J	8.4 J	7.3 J	7.3 J	4.2 J	5.4 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	μg/kg	620 J	110 J	21 J	20 J	15 J	11 J	22 J	16 J	16 J	16 J	17 J	9.9 J	10 J
C3-Naphthalenes	NSL	NSL	μg/kg	230 J	65 J	29 J	22 J	21 J	24 J	41 J	34 J	30 J	29 J	30 J	12 J	15 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	μg/kg	640 J	120 J	33 J	24 J	17 J	20 J	40 J	30 J	39 J	34 J	31 J	22 J	21 J
C4 Chrysenes	NSL	NSL	μg/kg	92 J	25 J	5.9 J	4.1 J	3.4 J	4.3 J	6.7 J	5 J	5.1 J	3.6 J	5.3 J	2.9 J	3.2 J
C4-Naphthalenes	NSL	NSL	μg/kg	170 J	49 J	23 J	21 J	19 J	26 J	48 J	39 J	36 J	34 J	35 J	18 J	21 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	μg/kg	440 J	78 J	27 J	21 J	18 J	13 J	25 J	21 J	24 J	21 J	19 J	12 J	14 J
Chrysene (a)	166	1,290	μg/kg	**1,300**	160	32	9.6 J	8	6	10	9	8	6.8 J	8	4	5
Dibenzo(a,h)anthracene (a)	33	NSL	μg/kg	**210 J**	22 J	4.5 J	0.8 J	0.45 J	0.25 J	0.44 J	1.1 J	0.38 J	0.34 J	0.37 J	0.2 J	0.22 J
Fluoranthene (a)	423	2,230	μg/kg	**1,600**	220	32	9.1 J	6.1 J	4 U	6 U	5 U	7 U	7 U	5 U	4 U	4 U
Fluorene (a)	77	536	μg/kg	70 J	9.4 J	2.7 J	1.3 J	1.3 J	1.5 J	2.4 J	2.3 J	1.8 J	1.2 J	1.5 J	0.69 J	0.76 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	μg/kg	600	64	13	2.3 J	1.2 J	0.58 J	1.1 J	1.5 J	0.95 J	0.8 J	0.88 J	0.48 J	0.51 J
Naphthalene (a)	176	561	μg/kg	250 U	33 U	8 U	11 U	6 U	4 U	6 U	5 U	7 U	7 U	5 U	4 U	4 U
Perylene	NSL	NSL	μg/kg	350	92	44	57	37	35	63	59	59	55	56	26	30
Phenanthrene (a)	204	1,170	μg/kg	**510**	64	13	11 U	6 U	4 U	8	7	7 U	7 U	7	4 U	4 U
Pyrene (a)	195	1,520	μg/kg	**1,200**	190	25	7 J	4.8 J	2.6 J	5 J	4.7 J	4.5 J	4.3 J	4.1 J	2.4 J	2.5 J
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**11,996**	1,405	258	72	47	28	55	53	42	39	42	25	24
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**20,749**	**2,909**	663	349	269	255	458	379	374	342	355	195	213

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

μg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment

Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment

Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Sample Location:				CI13-37	CI13-37	CI13-37	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38
Sample Name:				CI13-37-SURF	CI13-37-0001	CI13-37-0103	CI13-38-SURF	CI13-38-SURF-FD	CI13-38-0001	CI13-38-0001-FD	CI13-38-0103	CI13-38-0103-FD	CI13-38-0305	CI13-38-0507
Sample Depth (ft):				0-0.5	0-1	1-3	0-0.5	0-0.5	0-1	0-1	1-3	1-3	3-5	5-7
Date Sampled:				9/27/13	9/30/13	9/30/13	9/27/13	9/27/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**											
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	52 J	17 J	0.18 J	23 J	27 J	42 J	39 J	2.8 J	4 J	0.28 J	0.2 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	630 U	29 J	0.28 J	200 U	220 U	68 J	64 J	3.8 J	5.4 J	0.36 J	0.22 J
Acenaphthene(a)	NSL	NSL	µg/kg	89 J	24 J	4.5 U	31 J	45 J	60 J	67 J	2.3 J	3.9 J	0.29 J	4.1 U
Acenaphthylene (a)	NSL	NSL	µg/kg	190 J	78 J	1.2 J	47 J	70 J	100 J	100 J	8.6 J	6.2 J	0.24 J	4.1 U
Anthracene (a)	57	845	µg/kg	**320 J**	210 U	4.5 U	**100 J**	**130 J**	330 U	330 U	22 U	25 U	4.3 U	4.1 U
Benzo(a)anthracene (a)	108	1,050	µg/kg	**2,400**	**860**	10	**670**	**930**	**1,300**	**1,200**	100	79	6	0.9 J
Benzo(a)pyrene (a)	150	1,450	µg/kg	**3,000**	**970**	13	**880**	**1,200**	**1,700**	**1,600**	120	84	5	0.39 J
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	2,800	960	14	940	1,200	1800 J	1700 J	94	85	6	2.8 J
Benzo(e)pyrene	NSL	NSL	µg/kg	2,000	800	9	700	910	1,300	1,300	86	73	5	3.8 J
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	1,800	630	10	570	810	1,100	980	81	62	4	3.4 J
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	2,100	630	9	710	920	1,300	1,300	82	72	5	0.43 J
C1 Chrysenes	NSL	NSL	µg/kg	2000 J	1100 J	6.9 J	640 J	780 J	1500 J	1500 J	120 J	110 J	5.7 J	6.3 J
C1 Fluorenes	NSL	NSL	µg/kg	630 U	32 J	4.5 U	200 U	220 U	42 J	45 J	2.9 J	3.9 J	4.3 U	4.1 U
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	2500 J	1400 J	7.4 J	770 J	970 J	1700 J	1600 J	150 J	120 J	6.5 J	3.9 J
C1-Naphthalenes	NSL	NSL	µg/kg	110 J	32 J	4.5 U	44 J	51 J	81 J	73 J	4.6 J	6.9 J	0.46 J	4.1 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	960 J	470 J	2.2 J	330 J	400 J	620 J	740 J	52 J	54 J	3.7 J	5.1 J
C2 Chrysenes	NSL	NSL	µg/kg	1500 J	860 J	5.1 J	540 J	650 J	1300 J	1400 J	89 J	95 J	5.6 J	11 J
C2 Fluorenes	NSL	NSL	µg/kg	97 J	80 J	0.53 J	31 J	40 J	89 J	120 J	8.9 J	11 J	0.52 J	4.1 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1600 J	1000 J	4.4 J	490 J	630 J	1200 J	1300 J	110 J	100 J	5.2 J	5 J
C2-Naphthalenes	NSL	NSL	µg/kg	310 J	120 J	1.1 J	110 J	140 J	280 J	260 J	18 J	25 J	1.5 J	2.3 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	800 J	570 J	2.4 J	250 J	320 J	650 J	810 J	82 J	74 J	5 J	9.1 J
C3 Chrysenes	NSL	NSL	µg/kg	620 J	350 J	2.1 J	310 J	330 J	630 J	690 J	36 J	40 J	1.9 J	7.5 J
C3 Fluorenes	NSL	NSL	µg/kg	210 J	200 J	4.5 U	81 J	99 J	250 J	370 J	34 J	32 J	1.7 J	4.1 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	750 J	570 J	2.7 J	270 J	330 J	760 J	880 J	62 J	72 J	3.5 J	6 J
C3-Naphthalenes	NSL	NSL	µg/kg	270 J	190 J	1.4 J	110 J	140 J	300 J	340 J	26 J	27 J	1.6 J	3.4 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	700 J	670 J	3.1 J	280 J	310 J	870 J	1100 J	100 J	93 J	4.7 J	15 J
C4 Chrysenes	NSL	NSL	µg/kg	180 J	100 J	4.5 U	110 J	84 J	160 J	250 J	17 J	17 J	4.3 U	2.1 J
C4-Naphthalenes	NSL	NSL	µg/kg	180 J	180 J	1 J	76 J	82 J	200 J	320 J	31 J	37 J	4.3 U	4.1 U
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	420 J	420 J	1.5 J	160 J	220 J	650 J	830 J	64 J	58 J	2.8 J	8.6 J
Chrysene (a)	166	1,290	µg/kg	**2,700**	**1,100**	12	**880**	**1,100**	**1,700**	**1,600**	120	97	7	7
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**550 J**	**200 J**	2.5 J	**170 J**	**250**	**330 J**	**280 J**	22 J	16 J	1.1 J	0.29 J
Fluoranthene (a)	423	2,230	µg/kg	**2,700**	**910**	6	**1,000**	**1,300**	**1,800**	**1,900**	91	110	12	4.1 U
Fluorene (a)	77	536	µg/kg	**93 J**	37 J	0.2 J	42 J	53 J	74 J	67 J	3.1 J	4.8 J	0.34 J	4.1 U
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	1,500	510	9	490	700	950	900	66	52	3.6 J	0.41 J
Naphthalene (a)	176	561	µg/kg	630 U	210 U	4.5 U	200 U	220 U	330 U	330 U	22 U	25 U	4.3 U	4.1 U
Perylene	NSL	NSL	µg/kg	650	230	5	210	280	420	370	88	120	23	16
Phenanthrene (a)	204	1,170	µg/kg	**780**	**240**	4.5 U	**330**	**410**	**540**	**590**	23	30	5	4.1 U
Pyrene (a)	195	1,520	µg/kg	**2,200**	**890**	5	**820**	**970**	**1,600**	**1,500**	85	98	8.7 J	2.3 J
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**23,852**	**8,278**	100	**7,880**	**10,308**	**14,752**	**14,178**	924	830	69	33
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**37,359**	**16,053**	157	**12,632**	**16,114**	**25,726**	**26,232**	**1,929**	**1,822**	145	137

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment

Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment

Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-39	CI13-39	CI13-39	CI13-39	CI13-39	CI13-40	CI13-40	CI13-40	CI13-40	CI13-40	CI13-41
			Sample Name:	CI13-39-SURF	CI13-39-0001	CI13-39-0103	CI13-39-0305	CI13-39-0507	CI13-40-SURF	CI13-40-0001	CI13-40-0103	CI13-40-0305	CI13-40-0507	CI13-41-SURF
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	1-3	3-5	5-7	0-0.5
			Date Sampled:	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13	9/26/13
Analyte	**TEC**	**PEC**	**Units**											
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	23 J	37 J	48 J	72 J	11 J	24 J	24 J	8.8 J	0.2 J	0.31 J	15 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	120 U	150 U	230 U	680 U	110 U	290 U	170 U	120 U	5 U	4 U	210 U
Acenaphthene(a)	NSL	NSL	µg/kg	28 J	48 J	53 J	95 J	15 J	29 J	40 J	6 J	0.4 J	0.2 J	25 J
Acenaphthylene (a)	NSL	NSL	µg/kg	23 J	37 J	58 J	80 J	17 J	20 J	22 J	12 J	0.15 J	0.14 J	19 J
Anthracene (a)	57	845	µg/kg	**66 J**	**100 J**	**130 J**	**200 J**	38 J	**79 J**	**87 J**	23 J	0.46 J	0.3 J	**59 J**
Benzo(a)anthracene (a)	108	1,050	µg/kg	**510**	**660**	**860**	**3600 J**	**520**	**690**	**710**	**480**	4.2 J	2.4 J	**630**
Benzo(a)pyrene (a)	150	1,450	µg/kg	**580**	**760**	**1,000**	**2,100**	**370**	**780**	**780**	**280**	2.9 J	1.7 J	**740**
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	630	910	1,100	2,500	400	1,100	1,100	380	4.9 J	3.5 J	1,100
Benzo(e)pyrene	NSL	NSL	µg/kg	510	670	830	3,100	450	790	720	400	4.9 J	2.9 J	830
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	250	300	380	1,200	160	550 J	460	140	2 J	1.1 J	540 J
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	560	720	780	1,300	220	850	730	220	3.5 J	2 J	920
C1 Chrysenes	NSL	NSL	µg/kg	740 J	970 J	1100 J	9700 J	1200 J	960 J	960 J	1100 J	11 J	7.1 J	940 J
C1 Fluorenes	NSL	NSL	µg/kg	20 J	32 J	43 J	350 J	44 J	290 U	27 J	44 J	5 U	4 U	210 U
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	700 J	940 J	1200 J	8200 J	1200 J	950 J	1000 J	1200 J	10 J	5.6 J	950 J
C1-Naphthalenes	NSL	NSL	µg/kg	41 J	68 J	87 J	140 J	20 J	42 J	45 J	15 J	5 U	4 U	27 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	390 J	520 J	670 J	2200 J	210 J	450 J	480 J	210 J	3.5 J	3.1 J	340 J
C2 Chrysenes	NSL	NSL	µg/kg	690 J	1100 J	1300 J	9700 J	1300 J	880 J	890 J	930 J	11 J	8.5 J	940 J
C2 Fluorenes	NSL	NSL	µg/kg	52 J	70 J	120 J	1300 J	140 J	54 J	65 J	130 J	1 J	0.8 J	41 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	640 J	800 J	1100 J	8500 J	1200 J	720 J	760 J	1200 J	10 J	5.4 J	730 J
C2-Naphthalenes	NSL	NSL	µg/kg	130 J	220 J	320 J	710 J	90 J	140 J	170 J	61 J	1.5 J	1.9 J	100 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	410 J	510 J	860 J	5700 J	430 J	410 J	460 J	300 J	4.7 J	4 J	340 J
C3 Chrysenes	NSL	NSL	µg/kg	390 J	510 J	560 J	3700 J	530 J	510 J	500 J	400 J	5.5 J	6.9 J	510 J
C3 Fluorenes	NSL	NSL	µg/kg	140 J	180 J	380 J	3400 J	410 J	160 J	180 J	360 J	2.8 J	1.6 J	140 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	470 J	570 J	910 J	6100 J	960 J	490 J	540 J	900 J	7 J	5.8 J	470 J
C3-Naphthalenes	NSL	NSL	µg/kg	160 J	290 J	460 J	2000 J	280 J	150 J	200 J	120 J	2.7 J	2.8 J	120 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	450 J	650 J	1200 J	8300 J	1000 J	420 J	530 J	690 J	7.9 J	6.8 J	350 J
C4 Chrysenes	NSL	NSL	µg/kg	160 J	260 J	250 J	1100 J	200 J	200 J	200 J	150 J	1.7 J	2.5 J	190 J
C4-Naphthalenes	NSL	NSL	µg/kg	130 J	190 J	470 J	4300 J	440 J	130 J	160 J	230 J	3 J	3.2 J	100 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	340 J	500 J	920 J	6300 J	1000 J	300 J	390 J	670 J	7.4 J	6.5 J	250 J
Chrysene (a)	166	1,290	µg/kg	**660**	**870**	**1,100**	**5400 J**	**580**	**1,000**	**970**	**580**	7	4.2 J	**980**
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**89 J**	**110 J**	**140 J**	**440 J**	**62 J**	**160 J**	**150 J**	**57 J**	0.6 J	0.26 J	**160 J**
Fluoranthene (a)	423	2,230	µg/kg	**800**	**1,100**	**1,300**	**2,600**	230	**1,500**	**1,300**	**440**	6	4 U	**1,500**
Fluorene (a)	77	536	µg/kg	36 J	61 J	**83 J**	**150 J**	38 J	46 J	51 J	12 J	0.23 J	0.27 J	35 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	240	290	360	660 J	110	500	430	120 J	1.5 J	0.69 J	480
Naphthalene (a)	176	561	µg/kg	120 U	150 U	230 U	680 U	110 U	290 U	170 U	120 U	5 U	4 U	210 U
Perylene	NSL	NSL	µg/kg	140	200	250	380 J	74 J	210 J	210	76 J	13	33	200 J
Phenanthrene (a)	204	1,170	µg/kg	**260**	**380**	**480**	680 U	110 U	**390**	**370**	120 U	5 U	4 U	**310**
Pyrene (a)	195	1,520	µg/kg	**590**	**820**	**980**	**3700 J**	**600**	**980 J**	**990**	**640**	8	3.8 J	**960 J**
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**5,442**	**7,316**	**9,034**	**25,045**	**3,525**	**8,964**	**8,360**	**3,570**	49	29	**8,668**
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**10,975**	**15,121**	**19,939**	**95,285**	**12,488**	**15,720**	**15,462**	**10,596**	143	130	**15,036**

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-41	CI13-41	CI13-41	CI13-41	CI13-42	CI13-42	CI13-42	CI13-42	CI13-43	CI13-43	CI13-43	CI13-43	CI13-43
			Sample Name:	CI13-41-SURF-FD	CI13-41-0001	CI13-41-0103	CI13-41-0305	CI13-42-SURF	CI13-42-0001	CI13-42-0103	CI13-42-0305	CI13-43-SURF	CI13-43-0001	CI13-43-0103	CI13-43-0305	CI13-43-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	5-7
			Date Sampled:	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/29/13	9/29/13	9/29/13	9/29/13
Analyte	**TEC**	**PEC**	**Units**													
1-Methylnaphthalene [b]	NSL	NSL	µg/kg	17 J	29 J	1.4 J	0.11 J	25 J	610 J	36000 U	63 J	17 J	25 J	650 J	20000 J	2500 J
2-Methylnaphthalene [a] [b]	NSL	NSL	µg/kg	280 U	170 U	30 U	4 U	120 U	760 U	36000 U	440 U	190 U	35 J	140 J	37000 J	3900 J
Acenaphthene[a]	NSL	NSL	µg/kg	28 J	21 J	1 J	0.19 J	26 J	200 J	1400 J	15 J	28 J	55 J	280 J	3400 J	410 J
Acenaphthylene [a]	NSL	NSL	µg/kg	28 J	30 J	2.9 J	4 U	21 J	81 J	36000 U	440 U	21 J	22 J	4800 U	78000 U	10000 U
Anthracene [a]	57	845	µg/kg	**220 J**	57 J	3.8 J	0.19 J	**66 J**	**450 J**	**15000 J**	**200 J**	**83 J**	**120 J**	**2300 J**	**28000 J**	**2600 J**
Benzo(a)anthracene [a]	108	1,050	µg/kg	**930**	**770**	83	2.1 J	**450**	**3,500**	36000 U	**360 J**	**730**	**1,200**	**9,400**	78000 U	10000 U
Benzo(a)pyrene [a]	150	1,450	µg/kg	**990**	**740**	66	1.9 J	**490**	**2,100**	36000 U	100 J	**850**	**1,200**	**3300 J**	**19000 J**	**1900 J**
Benzo(b)fluoranthene [a]	NSL	NSL	µg/kg	1,200	890	91	3.4 J	580	2,100	36000 U	100 J	1,200	1,700	4100 J	21000 J	1900 J
Benzo(e)pyrene	NSL	NSL	µg/kg	950	920	110	4	430	2,700	36000 U	190 J	860	1,400	7,000	78000 U	10000 U
Benzo(g,h,i)perylene [a]	NSL	NSL	µg/kg	600 J	370 J	55	2.7 J	310	1,200	2600 J	41 J	420	860	2100 J	7000 J	820 J
Benzo(k)fluoranthene [a]	NSL	NSL	µg/kg	980	550	43	1.7 J	370	1,300	36000 U	36 J	950	1,300	1800 J	8300 J	890 J
C1 Chrysenes	NSL	NSL	µg/kg	1100 J	1700 J	240 J	6.1 J	560 J	7900 J	68,000	770 J	860 J	2200 J	24000 J	160000 J	16000 J
C1 Fluorenes	NSL	NSL	µg/kg	280 U	43 J	6.3 J	4 U	16 J	760 J	19000 J	220 J	24 J	110 J	3700 J	43000 J	4500 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1200 J	1600 J	210 J	4.8 J	530 J	11000 J	110000 J	1500 J	1100 J	2300 J	34000 J	270000 J	28000 J
C1-Naphthalenes	NSL	NSL	µg/kg	31 J	48 J	30 U	4 U	45 J	520 J	9200 J	440 U	31 J	41 J	540 J	37000 J	4200 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	430 J	570 J	79 J	1.9 J	300 J	12000 J	380000 J	4100 J	560 J	1800 J	75000 J	840000 J	86000 J
C2 Chrysenes	NSL	NSL	µg/kg	890 J	1500 J	240 J	8 J	500 J	7200 J	39000 J	490 J	800 J	2000 J	16000 J	110000 J	9700 J
C2 Fluorenes	NSL	NSL	µg/kg	43 J	140 J	19 J	0.48 J	35 J	1800 J	27000 J	320 J	58 J	240 J	6600 J	63000 J	6500 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	830 J	1400 J	230 J	4.7 J	430 J	9800 J	74000 J	990 J	890 J	1900 J	26000 J	180000 J	19000 J
C2-Naphthalenes	NSL	NSL	µg/kg	100 J	220 J	14 J	1.4 J	140 J	2300 J	53000 J	470 J	110 J	340 J	5900 J	200000 J	24000 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	390 J	820 J	130 J	3 J	300 J	11000 J	130000 J	1400 J	460 J	1600 J	37000 J	310000 J	32000 J
C3 Chrysenes	NSL	NSL	µg/kg	560 J	720 J	120 J	4.1 J	320 J	2900 J	13000 J	150 J	430 J	810 J	5800 J	27000 J	2700 J
C3 Fluorenes	NSL	NSL	µg/kg	140 J	370 J	61 J	1.3 J	100 J	4400 J	33000 J	410 J	170 J	580 J	9700 J	75000 J	8800 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	560 J	1000 J	160 J	4.5 J	300 J	6400 J	41000 J	460 J	530 J	1300 J	17000 J	99000 J	10000 J
C3-Naphthalenes	NSL	NSL	µg/kg	120 J	410 J	37 J	1.9 J	160 J	4200 J	66000 J	780 J	160 J	720 J	13000 J	150000 J	20000 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	380 J	1200 J	160 J	5 J	320 J	12000 J	46000 J	620 J	460 J	1500 J	17000 J	120000 J	11000 J
C4 Chrysenes	NSL	NSL	µg/kg	240 J	210 J	37 J	1.4 J	110 J	1100 J	4000 J	440 U	170 J	240 J	2000 J	11000 J	10000 U
C4-Naphthalenes	NSL	NSL	µg/kg	110 J	430 J	51 J	2.2 J	110 J	4200 J	34000 J	380 J	130 J	690 J	8600 J	81000 J	9700 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	310 J	800 J	140 J	3.2 J	240 J	6800 J	18000 J	310 J	300 J	900 J	8500 J	45000 J	4900 J
Chrysene [a]	166	1,290	µg/kg	**1,300**	**1,200**	150	4	**540**	**4,700**	**54,000**	**780**	**1,100**	**1,900**	**14,000**	**130,000**	**12,000**
Dibenzo(a,h)anthracene [a]	33	NSL	µg/kg	**180 J**	**140 J**	20 J	0.62 J	**95 J**	**460 J**	**1500 J**	22 J	**140 J**	**240 J**	**840 J**	**3500 J**	**400 J**
Fluoranthene [a]	423	2,230	µg/kg	**1,800**	**940**	87	3 J	**660**	**2,800**	36000 U	250 J	**1,700**	**2,300**	**7,900**	78000 U	10000 U
Fluorene [a]	77	536	µg/kg	50 J	33 J	2.8 J	0.19 J	33 J	**730 J**	**14000 J**	**160 J**	49 J	**110 J**	**2200 J**	**32000 J**	**3300 J**
Indeno(1,2,3-cd)pyrene [a]	NSL	NSL	µg/kg	550	280	35	1.3 J	270	890	1400 J	26 J	420	700	1200 J	3400 J	480 J
Naphthalene [a]	176	561	µg/kg	280 U	170 U	30 U	4 U	120 U	760 U	36000 U	440 U	190 U	39 J	4800 U	78000 U	10000 U
Perylene	NSL	NSL	µg/kg	260 J	170	70	6	130	360 J	36000 U	32 J	210	330 J	450 J	78000 U	2600 J
Phenanthrene [a]	204	1,170	µg/kg	**430**	**250**	30 U	4 U	**260**	**6,200**	**260,000**	**2,900**	**460**	**940**	**39,000**	**580,000**	**60,000**
Pyrene [a]	195	1,520	µg/kg	**1100 J**	**1,100**	110	4 J	**500**	**4,700**	**65,000**	**910**	**1,200**	**1,800**	**17,000**	**160,000**	**16,000**
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**10,666**	**7,541**	796	34	**4,791**	**32,171**	**558,900**	**6,560**	**9,541**	**14,521**	**110,360**	**1,188,600**	**124,600**
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**19,327**	**2,520**	91	**17,920**	**9,077**	**124,931**	**1,626,100**	**18,922**	**16,339**	**32,287**	**385,010**	**3,771,600**	**401,300**

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

[a] Included in calculation of total 17PAH

[b] Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-44	CI13-44	CI13-44	CI13-44	CI13-44	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45
			Sample Name:	CI13-44-SURF	CI13-44-0001	CI13-44-0103	CI13-44-0305	CI13-44-0507	CI13-45-SURF	CI13-45-SURF-FD	CI13-45-0001	CI13-45-0001-FD	CI13-45-0103	CI13-45-0103-FD	CI13-45-0305
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-0.5	0-1	0-1	1-3	1-3	3-5
			Date Sampled:	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/26/13	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13
Analyte	**TEC**	**PEC**	**Units**												
1-Methylnaphthalene [(b)]	NSL	NSL	µg/kg	22 J	930 U	920 J	8900 J	140 J	39 J	43 J	170 U	180 U	4.2 U	4.2 U	4.4 U
2-Methylnaphthalene [(a)] [(b)]	NSL	NSL	µg/kg	310 U	32 J	8500 U	21000 J	320 J	280 U	280 U	170 U	180 U	4.2 U	4.2 U	4.4 U
Acenaphthene[(a)]	NSL	NSL	µg/kg	33 J	60 J	400 J	1800 J	35 J	38 J	43 J	25 J	35 J	0.26 J	0.31 J	4.4 U
Acenaphthylene [(a)]	NSL	NSL	µg/kg	11 J	930 U	8500 U	31000 U	540 U	43 J	49 J	18 J	33 J	0.28 J	0.31 J	4.4 U
Anthracene [(a)]	57	845	µg/kg	**180 J**	**490 J**	**4700 J**	**14000 J**	**290 J**	**96 J**	**130 J**	38 J	**66 J**	0.44 J	0.54 J	1.2 J
Benzo(a)anthracene [(a)]	108	1,050	µg/kg	**1100 J**	**3500 J**	**15000 J**	**37,000**	**900 J**	**830**	**930**	**580**	**780**	7	8	4.4 U
Benzo(a)pyrene [(a)]	150	1,450	µg/kg	**550**	**1,300**	**4200 J**	**9300 J**	**340 J**	**860**	**950**	**470**	**670**	5	6	4.4 U
Benzo(b)fluoranthene [(a)]	NSL	NSL	µg/kg	810	1,500	4500 J	8400 J	330 J	1,100	1,200	610	800	6	8	4.4 U
Benzo(e)pyrene	NSL	NSL	µg/kg	930	2,800	8,700	31000 U	540 U	850	910	610	830	8	11	4.4 U
Benzo(g,h,i)perylene [(a)]	NSL	NSL	µg/kg	340	650 J	1500 J	4000 J	120 J	440 J	530 J	290	360	3.1 J	3.7 J	0.64 J
Benzo(k)fluoranthene [(a)]	NSL	NSL	µg/kg	490	760 J	1300 J	3300 J	230 J	860	1,000	330	510	4	6	4.4 U
C1 Chrysenes	NSL	NSL	µg/kg	2500 J	8600 J	34000 J	77000 J	1600 J	1300 J	1300 J	1300 J	1700 J	19 J	22 J	8.7 J
C1 Fluorenes	NSL	NSL	µg/kg	250 J	900 J	7200 J	21000 J	390 J	62 J	66 J	43 J	60 J	0.86 J	0.81 J	1.4 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	3100 J	15000 J	68000 J	130000 J	3200 J	1400 J	1600 J	1300 J	1700 J	20 J	25 J	13 J
C1-Naphthalenes	NSL	NSL	µg/kg	33 J	930 U	8500 U	20000 J	300 J	71 J	80 J	34 J	44 J	0.46 J	0.54 J	4.4 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	4500 J	20000 J	130000 J	440000 J	7000 J	850 J	960 J	710 J	1000 J	15 J	16 J	35 J
C2 Chrysenes	NSL	NSL	µg/kg	1900 J	6900 J	23000 J	38000 J	1100 J	1400 J	1500 J	1200 J	1800 J	17 J	22 J	6 J
C2 Fluorenes	NSL	NSL	µg/kg	480 J	2000 J	12000 J	31000 J	600 J	200 J	200 J	150 J	220 J	2.5 J	2.6 J	2.6 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	2600 J	12000 J	49000 J	82000 J	2100 J	1200 J	1400 J	1200 J	1700 J	18 J	22 J	9.4 J
C2-Naphthalenes	NSL	NSL	µg/kg	480 J	930 J	12000 J	100000 J	1700 J	300 J	340 J	240 J	330 J	3.5 J	3.8 J	0.9 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	2600 J	10000 J	50000 J	150000 J	2600 J	1400 J	1500 J	1200 J	1800 J	18 J	19 J	15 J
C3 Chrysenes	NSL	NSL	µg/kg	610 J	2400 J	6300 J	12000 J	280 J	750 J	770 J	410 J	590 J	7 J	8.7 J	1.6 J
C3 Fluorenes	NSL	NSL	µg/kg	790 J	3500 J	15000 J	37000 J	760 J	710 J	780 J	470 J	720 J	6.8 J	6.9 J	3.8 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1700 J	6800 J	26000 J	43000 J	1100 J	900 J	1100 J	970 J	1300 J	13 J	16 J	5.7 J
C3-Naphthalenes	NSL	NSL	µg/kg	910 J	3000 J	21000 J	85000 J	1500 J	570 J	640 J	600 J	890 J	8.2 J	8.6 J	2.9 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	1500 J	7700 J	32000 J	52000 J	1500 J	1700 J	1900 J	1400 J	2000 J	16 J	19 J	6.3 J
C4 Chrysenes	NSL	NSL	µg/kg	260 J	850 J	1900 J	4300 J	120 J	240 J	240 J	170 J	260 J	2 J	2.8 J	0.7 J
C4-Naphthalenes	NSL	NSL	µg/kg	650 J	2700 J	14000 J	42000 J	1100 J	820 J	850 J	660 J	940 J	8 J	8 J	2.9 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	970 J	4100 J	14000 J	20000 J	710 J	1300 J	1400 J	930 J	1500 J	11 J	13 J	3.5 J
Chrysene [(a)]	166	1,290	µg/kg	**1800 J**	**6,200**	**26,000**	**63,000**	**1,400**	**1,100**	**1,300**	**910**	**1,200**	13	15	7
Dibenzo(a,h)anthracene [(a)]	33	NSL	µg/kg	**120 J**	**300 J**	**900 J**	**2000 J**	**45 J**	**150 J**	**170 J**	**94 J**	**130 J**	1.1 J	1.4 J	0.28 J
Fluoranthene [(a)]	423	2,230	µg/kg	**1,200**	**2,200**	**8,600**	31000 U	**830**	**1,900**	**2,200**	**870**	**1,200**	12	14	4.4 U
Fluorene [(a)]	77	536	µg/kg	**160 J**	**380 J**	**3900 J**	**17000 J**	**250 J**	**88 J**	**110 J**	27 J	33 J	0.45 J	0.5 J	0.71 J
Indeno(1,2,3-cd)pyrene [(a)]	NSL	NSL	µg/kg	260 J	380 J	920 J	2300 J	88 J	390	460	220	280	2.3 J	2.9 J	0.42 J
Naphthalene [(a)]	176	561	µg/kg	310 U	30 J	8500 U	31000 U	14 J	280 U	280 U	170 U	180 U	4.2 U	4.2 U	4.4 U
Perylene	NSL	NSL	µg/kg	120 J	170 J	370 J	31000 U	190 J	230 J	260 J	160 J	200	12	25	2.5 J
Phenanthrene [(a)]	204	1,170	µg/kg	**2,300**	**8,200**	**84,000**	**310,000**	**5,000**	**400**	**480**	**280**	**360**	5	5	21
Pyrene [(a)]	195	1,520	µg/kg	**1600 J**	**6,800**	**37,000**	**78,000**	**2,000**	**1200 J**	**1400 J**	**820**	**1,100**	12	14	8
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**11,264**	**33,247**	**205,670**	**617,600**	**12,462**	**9,775**	**11,232**	**5,752**	**7,737**	77	91	59
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**33,692**	**125,230**	**655,140**	**1,886,900**	**37,062**	**23,788**	**26,388**	**17,254**	**24,231**	250	303	168

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

[(a)] Included in calculation of total 17PAH

[(b)] Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-46	CI13-46	CI13-46	CI13-46	CI13-47	CI13-47	CI13-47	CI13-47	CI13-47
			Sample Name:	CI13-46-SURF	CI13-46-0001	CI13-46-0103	CI13-46-0305	CI13-47-SURF	CI13-47-0001	CI13-47-0103	CI13-47-0305	CI13-47-0507
			Sample Depth (ft):	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	5-7
			Date Sampled:	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**Units**									
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	33 J	2700 U	11 J	1 J	11 J	8.5 J	2.6 J	0.76 J	0.65 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	150 U	2700 U	220 U	23 U	280 U	160 U	26 U	19 U	14 U
Acenaphthene(a)	NSL	NSL	µg/kg	95 J	90 J	56 J	1.3 J	24 J	9 J	2.9 J	19 U	14 U
Acenaphthylene (a)	NSL	NSL	µg/kg	5.9 J	2700 U	220 U	23 U	10 J	9.6 J	4.7 J	0.56 J	0.41 J
Anthracene (a)	57	845	µg/kg	**86 J**	**1200 J**	**210 J**	3.9 J	**61 J**	54 J	9.1 J	1.7 J	0.9 J
Benzo(a)anthracene (a)	108	1,050	µg/kg	**350**	**4,700**	**610**	12 J	**670**	**560**	78	7.2 J	3.5 J
Benzo(a)pyrene (a)	150	1,450	µg/kg	**390**	**1500 J**	**350**	6.3 J	**910**	**340**	79	6.3 J	3.8 J
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	630	1400 J	400	9.4 J	1,600	540	83	9.7 J	7.4 J
Benzo(e)pyrene	NSL	NSL	µg/kg	450	2,900	370	9.6 J	990	630	63	7.2 J	4.7 J
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	250	670 J	170 J	8.7 J	560	290	60	7.4 J	4.9 J
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	500	580 J	250	4.6 J	1,300	250	68	7.1 J	5.4 J
C1 Chrysenes	NSL	NSL	µg/kg	370 J	11000 J	780 J	29 J	560 J	1500 J	98 J	15 J	9.4 J
C1 Fluorenes	NSL	NSL	µg/kg	32 J	1800 J	170 J	5.3 J	280 U	60 J	13 J	2.3 J	1.4 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	590 J	17000 J	1600 J	49 J	880 J	2400 J	170 J	26 J	16 J
C1-Naphthalenes	NSL	NSL	µg/kg	48 J	2700 U	220 U	23 U	280 U	160 U	3.8 J	19 U	14 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	340 J	40000 J	1600 J	69 J	250 J	950 J	120 J	20 J	16 J
C2 Chrysenes	NSL	NSL	µg/kg	300 J	7000 J	600 J	30 J	540 J	950 J	84 J	22 J	16 J
C2 Fluorenes	NSL	NSL	µg/kg	52 J	3700 J	280 J	9 J	37 J	220 J	11 J	3.5 J	2.4 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	390 J	12000 J	1100 J	37 J	580 J	2000 J	100 J	15 J	10 J
C2-Naphthalenes	NSL	NSL	µg/kg	150 J	1400 J	190 J	15 J	64 J	190 J	34 J	15 J	6.2 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	240 J	18000 J	1000 J	51 J	240 J	1300 J	83 J	18 J	13 J
C3 Chrysenes	NSL	NSL	µg/kg	130 J	2500 J	210 J	15 J	280 J	340 J	34 J	19 U	14 U
C3 Fluorenes	NSL	NSL	µg/kg	110 J	5400 J	380 J	16 J	75 J	490 J	29 J	19 U	6 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	210 J	6300 J	460 J	26 J	310 J	1000 J	56 J	13 J	10 J
C3-Naphthalenes	NSL	NSL	µg/kg	210 J	5300 J	450 J	41 J	110 J	510 J	64 J	28 J	8.5 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	240 J	7800 J	650 J	53 J	250 J	1100 J	85 J	21 J	12 J
C4 Chrysenes	NSL	NSL	µg/kg	40 J	790 J	84 J	4.7 J	93 J	110 J	11 J	19 U	14 U
C4-Naphthalenes	NSL	NSL	µg/kg	150 J	3700 J	390 J	35 J	84 J	430 J	39 J	17 J	7.3 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	140 J	3500 J	340 J	31 J	190 J	590 J	48 J	13 J	9.4 J
Chrysene (a)	166	1,290	µg/kg	**610**	**8,300**	**860**	23	**1,200**	**1,300**	97	13 J	8.1 J
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**64 J**	**380 J**	**53 J**	1.8 J	**140 J**	**97 J**	16 J	1.6 J	1.5 J
Fluoranthene (a)	423	2,230	µg/kg	**1,100**	**3,100**	**1,000**	23	**2,300**	**810**	170	24	16
Fluorene (a)	77	536	µg/kg	**140 J**	**720 J**	**110 J**	4.3 J	38 J	29 J	5.5 J	2.3 J	1.8 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	240	340 J	130 J	4.5 J	550	220	52	5.7 J	4.1 J
Naphthalene (a)	176	561	µg/kg	150 U	2700 U	220 U	23 U	280 U	160 U	26 U	19 U	14 U
Perylene	NSL	NSL	µg/kg	110 J	2700 U	170 J	130	240 J	120 J	130	97	71
Phenanthrene (a)	204	1,170	µg/kg	**350**	**18,000**	**1,200**	29	**370**	**300**	110	19 U	14 U
Pyrene (a)	195	1,520	µg/kg	**750**	**8,700**	**1,400**	35	**1,300**	**1,300**	160	21	12 J
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**5,711**	**53,730**	**7,129**	201	**11,313**	**6,269**	1,021	146	98
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**9,338**	**186,870**	**16,393**	794	**16,336**	**18,159**	**2,128**	479	311

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

			Sample Location:	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48
			Sample Name:	CI13-48-SURF	CI13-48-0001	CI13-48-0001-FD	CI13-48-0103	CI13-48-0103-FD	CI13-48-0305	CI13-48-0305-FD
			Sample Depth (ft):	0-0.5	0-1	0-1	1-3	1-3	3-5	3-5
			Date Sampled:	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13
Analyte	**TEC**	**PEC**	**Units**							
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	31 J	250 U	300 U	340 U	320 U	240 U	7 J
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	370 UJ	250 U	300 U	340 U	320 U	240 U	9.9 J
Acenaphthene(a)	NSL	NSL	µg/kg	54 J	130 J	150 J	110 J	93 J	12 J	14 J
Acenaphthylene (a)	NSL	NSL	µg/kg	42 J	98 J	110 J	81 J	66 J	7.8 J	6.6 J
Anthracene (a)	57	845	µg/kg	**170 J**	**220 J**	**250 J**	**290 J**	**220 J**	**95 J**	**89 J**
Benzo(a)anthracene (a)	108	1,050	µg/kg	**980 J**	**1,400**	**1,600**	**2,000**	**1,600**	**640**	**660**
Benzo(a)pyrene (a)	150	1,450	µg/kg	**1100 J**	**1,400**	**1,600**	**1,300**	**1,100**	240 U	**220**
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	1100 J	1,500	1,500	1,400	1,200	260	280
Benzo(e)pyrene	NSL	NSL	µg/kg	870 J	1,400	1,500	1,600	1,300	400	430
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	640 J	620 J	640 J	510 J	490 J	77 J	89 J
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	960 J	1,000	1,300	970	780	240 U	120 J
C1 Chrysenes	NSL	NSL	µg/kg	1100 J	2600 J	2700 J	4400 J	3600 J	1600 J	1600 J
C1 Fluorenes	NSL	NSL	µg/kg	370 UJ	270 J	260 J	300 J	230 J	120 J	130 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1100 J	2800 J	2900 J	5300 J	3700 J	2200 J	2400 J
C1-Naphthalenes	NSL	NSL	µg/kg	54 J	170 J	170 J	140 J	120 J	240 U	170 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	520 J	3400 J	3400 J	5700 J	3700 J	3500 J	3400 J
C2 Chrysenes	NSL	NSL	µg/kg	1000 J	3300 J	3400 J	4700 J	3500 J	1100 J	1200 J
C2 Fluorenes	NSL	NSL	µg/kg	63 J	970 J	850 J	830 J	630 J	350 J	370 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	770 J	2800 J	2800 J	4700 J	3600 J	1700 J	1900 J
C2-Naphthalenes	NSL	NSL	µg/kg	190 J	1000 J	1000 J	920 J	810 J	220 J	230 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	510 J	5300 J	5000 J	6200 J	4400 J	2200 J	2200 J
C3 Chrysenes	NSL	NSL	µg/kg	590 J	1600 J	1500 J	1800 J	1600 J	350 J	420 J
C3 Fluorenes	NSL	NSL	µg/kg	180 J	2800 J	2600 J	2300 J	1800 J	620 J	600 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	550 J	2500 J	2500 J	3700 J	3000 J	1000 J	1200 J
C3-Naphthalenes	NSL	NSL	µg/kg	230 J	3200 J	3000 J	2600 J	2200 J	700 J	580 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	600 J	5400 J	5400 J	6500 J	5200 J	1100 J	1300 J
C4 Chrysenes	NSL	NSL	µg/kg	210 J	900 J	740 J	720 J	630 J	140 J	160 J
C4-Naphthalenes	NSL	NSL	µg/kg	210 J	4800 J	4100 J	2800 J	2500 J	550 J	650 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	490 J	3400 J	3300 J	4300 J	3500 J	550 J	720 J
Chrysene (a)	166	1,290	µg/kg	**1100 J**	**1,800**	**2,100**	**2,900**	**2,200**	**1,200**	**1,200**
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**190 J**	**200 J**	**230 J**	**200 J**	**190 J**	**41 J**	**46 J**
Fluoranthene (a)	423	2,230	µg/kg	**1900 J**	**2,100**	**2,200**	**2,300**	**1,800**	**510**	**480**
Fluorene (a)	77	536	µg/kg	**93 J**	**190 J**	**160 J**	**220 J**	**180 J**	61 J	59 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	560 J	510	560	400	390	54 J	56 J
Naphthalene (a)	176	561	µg/kg	370 UJ	250 U	300 U	340 U	320 U	240 U	9.2 J
Perylene	NSL	NSL	µg/kg	290 J	310	330	240 J	240 J	25 J	28 J
Phenanthrene (a)	204	1,170	µg/kg	**710 J**	**890**	**1,000**	**1,900**	**1,400**	**1,200**	**1,300**
Pyrene (a)	195	1,520	µg/kg	**1200 J**	**1,700**	**1,700**	**2,700**	**1,900**	**1,000**	**1,100**
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**11,169**	**14,008**	**15,400**	**17,621**	**13,929**	**5,638**	**5,739**
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	19,376	**57,503**	**57,400**	**68,801**	**53,429**	**21,363**	22,232

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-4 SEDIMENT RESULTS FOR PAHs
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Sample Location:				CI13-49	CI13-49	CI13-49	CI13-49	CI13-49	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50
Sample Name:				CI13-49-SURF	CI13-49-0001	CI13-49-0103	CI13-49-0305	CI13-49-0507	CI13-50-SURF	CI13-50-0001	CI13-50-0001-FD	CI13-50-0103	CI13-50-0103-FD	CI13-50-0305	CI13-50-0507
Sample Depth (ft):				0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	0-1	1-3	1-3	3-5	5-7
Date Sampled:				9/26/13	9/29/13	9/29/13	9/29/13	9/29/13	9/27/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**Units**												
1-Methylnaphthalene (b)	NSL	NSL	µg/kg	35 J	63 J	100 J	150 J	16 J	25 J	28 U	26 U	4.2 U	4.1 U	6.9 U	4.1 U
2-Methylnaphthalene (a) (b)	NSL	NSL	µg/kg	280 UJ	110 J	160 J	130 J	19 J	140 UJ	28 U	26 U	4.2 U	4.1 U	6.9 U	4.1 U
Acenaphthene(a)	NSL	NSL	µg/kg	45 J	120 J	190 J	240 J	43 J	25 J	11 J	13 J	0.52 J	0.86 J	0.28 J	0.58 J
Acenaphthylene (a)	NSL	NSL	µg/kg	48 J	79 J	140 J	90 J	18 J	32 J	11 J	9.9 J	0.72 J	0.74 J	6.9 U	4.1 U
Anthracene (a)	57	845	µg/kg	**130 J**	**180 J**	**350 J**	**450 J**	**120 J**	**98 J**	50	38	1.6 J	2.6 J	0.36 J	4.1 U
Benzo(a)anthracene (a)	108	1,050	µg/kg	**870 J**	**1700 J**	**3200 J**	**2,700**	**1200 J**	**410 J**	100	90	8	7	1.4 J	0.86 J
Benzo(a)pyrene (a)	150	1,450	µg/kg	**950 J**	**1,500**	**3,000**	**1,900**	**520**	**470 J**	99	92	8	6	1.1 J	0.64 J
Benzo(b)fluoranthene (a)	NSL	NSL	µg/kg	1000 J	1,900	3,000	2,100	610	500 J	91	83	6	7	2.9 J	2.2 J
Benzo(e)pyrene	NSL	NSL	µg/kg	790 J	1,400	2,900	1,800	860	350 J	65	61	6	6	3.1 J	2.6 J
Benzo(g,h,i)perylene (a)	NSL	NSL	µg/kg	570 J	840	1,500	1,100	240 J	340 J	67	60	7	6	3.3 J	3.4 J
Benzo(k)fluoranthene (a)	NSL	NSL	µg/kg	810 J	1,200	2,300	1,500	380	370 J	76	63	5	5	1.4 J	0.56 J
C1 Chrysenes	NSL	NSL	µg/kg	1000 J	2200 J	5300 J	4500 J	2600 J	310 J	69 J	68 J	12 J	11 J	9.6 J	8.2 J
C1 Fluorenes	NSL	NSL	µg/kg	280 UJ	140 J	380 J	250 J	130 J	17 J	14 J	8.7 J	1.8 J	1.9 J	1.8 J	1.3 J
C1-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	1000 J	3000 J	7000 J	5400 J	4000 J	460 J	130 J	120 J	17 J	15 J	9.5 J	8.8 J
C1-Naphthalenes	NSL	NSL	µg/kg	63 J	120 J	180 J	190 J	330 U	44 J	8.4 J	9.7 J	1.3 J	1.7 J	1.4 J	2 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	520 J	2000 J	5200 J	4600 J	2800 J	260 J	110 J	110 J	21 J	22 J	18 J	16 J
C2 Chrysenes	NSL	NSL	µg/kg	930 J	2500 J	5700 J	4700 J	2000 J	240 J	48 J	47 J	15 J	16 J	17 J	15 J
C2 Fluorenes	NSL	NSL	µg/kg	56 J	450 J	1200 J	900 J	390 J	30 J	17 J	15 J	3.3 J	3.4 J	3.5 J	3.4 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	770 J	2900 J	6600 J	5300 J	3300 J	280 J	65 J	70 J	13 J	15 J	12 J	12 J
C2-Naphthalenes	NSL	NSL	µg/kg	210 J	580 J	1500 J	1500 J	390 J	130 J	47 J	53 J	6.8 J	8.9 J	7.4 J	6.6 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	540 J	2700 J	7600 J	7900 J	2500 J	210 J	110 J	120 J	44 J	53 J	33 J	66 J
C3 Chrysenes	NSL	NSL	µg/kg	580 J	850 J	2100 J	2200 J	790 J	130 J	19 J	24 J	8.9 J	9.3 J	11 J	8.8 J
C3 Fluorenes	NSL	NSL	µg/kg	180 J	1400 J	3500 J	3000 J	790 J	41 J	32 J	39 J	7.9 J	9.5 J	9.2 J	7.8 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	µg/kg	550 J	2100 J	4900 J	4900 J	2000 J	170 J	40 J	45 J	13 J	13 J	14 J	12 J
C3-Naphthalenes	NSL	NSL	µg/kg	240 J	1400 J	4400 J	4100 J	890 J	150 J	92 J	89 J	24 J	26 J	26 J	21 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	600 J	4300 J	12000 J	10000 J	2800 J	230 J	91 J	110 J	35 J	39 J	36 J	37 J
C4 Chrysenes	NSL	NSL	µg/kg	240 J	400 J	900 J	1300 J	320 J	48 J	6.6 J	5.9 J	2.9 J	3.2 J	3.3 J	2.8 J
C4-Naphthalenes	NSL	NSL	µg/kg	220 J	2200 J	6100 J	4800 J	830 J	96 J	76 J	83 J	35 J	36 J	38 J	33 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	µg/kg	470 J	3200 J	7400 J	7400 J	1700 J	270 J	52 J	60 J	17 J	20 J	20 J	20 J
Chrysene (a)	166	1,290	µg/kg	**1100 J**	**2,000**	**4,000**	**3,400**	**1,900**	**460 J**	110	96	11	10	6.6 J	6
Dibenzo(a,h)anthracene (a)	33	NSL	µg/kg	**170 J**	**260 J**	**410 J**	**350 J**	**96 J**	**91 J**	20 J	16 J	1.2 J	1 J	0.38 J	0.34 J
Fluoranthene (a)	423	2,230	µg/kg	**1500 J**	**2,200**	**3,600**	**3,800**	**820**	**660 J**	200	180	12	14	6.9 U	4.1 U
Fluorene (a)	77	536	µg/kg	64 J	**110 J**	**190 J**	**330 J**	76 J	45 J	15 J	16 J	1.4 J	1.8 J	0.7 J	0.89 J
Indeno(1,2,3-cd)pyrene (a)	NSL	NSL	µg/kg	510 J	730	1,100	900	160 J	280 J	57	51	3.7 J	3.4 J	1 J	0.75 J
Naphthalene (a)	176	561	µg/kg	280 UJ	150 J	**210 J**	**200 J**	21 J	140 UJ	28 U	26 U	4.2 U	4.1 U	6.9 U	4.1 U
Perylene	NSL	NSL	µg/kg	260 J	400	700 J	470 J	84 J	100 J	46	37	24	22	36	18
Phenanthrene (a)	204	1,170	µg/kg	**480 J**	**780**	**1,400**	**1,500**	**750**	**280 J**	99	100	5	8	6.9 U	4.1 U
Pyrene (a)	195	1,520	µg/kg	**990 J**	**2,400**	**4,700**	**3,100**	**1,900**	**490 J**	130	130	11	11	3.4 J	2.9 J
Total 17PAHs ND=1/2RL	1,610	22,800	ug/kg	**9,517**	**16,259**	**29,450**	**23,790**	**8,873**	**4,691**	1,164	1,064	86	89	40	31
Total 34PAHs ND=1/2RL	1,610	22,800	ug/kg	**17,416**	**45,389**	**103,350**	**88,670**	**32,893**	**7,737**	**2,183**	**2,111**	368	391	320	308

NOTES:

Presented results are not normalized for organic carbon in this SSTM.

(a) Included in calculation of total 17PAH

(b) Excluded from calculation of total 34PAH

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

µg/kg = Micrograms per kilogram.

TEC = Threshold effect concentration.

Development and Evaluation of Consensus-Based Sediment
Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration.

Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-01	CI13-01	CI13-02	CI13-03	CI13-03	CI13-03	CI13-04	CI13-04	CI13-04
				Sample Name:	CI13-01-SURF	CI13-01-0001	CI13-02-SURF	CI13-03-SURF	CI13-03-0001	CI13-03-0103	CI13-04-SURF	CI13-04-0001	CI13-04-0103
				Sample Depth (ft):	0-0.5	0-1	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	1-3
				Date Sampled:	9/27/13	9/23/13	9/27/13	9/27/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**									
Arsenic	9.79	33	11	mg/kg	4.1	4.7	6.7	4.5	9.4	**12.8**	2.1	2.6	6.3
Barium	NSL	NSL	NSL	mg/kg	21.9	56.7	35.7	36.9	97.3	121	15.8 J	35.2	93.1
Cadmium	0.99	4.98	0.96	mg/kg	0.64	0.37 J	0.72 J	**1.1**	0.5 J	0.38 J	0.44 J	**1.5**	**4.4**
Chromium	43.4	111	51	mg/kg	22.7	6.9	25.9	27.2	18.6	15.1	11.9	**44.1**	**121**
Copper	31.6	149	42	mg/kg	14.8	9 J	21.6	23.9	15.3 J	14.6 J	10	24.1 J	**70.6 J**
Iron	20000*	40000*	NSL	mg/kg	16300 J	7930	**21000 J**	13400 J	19600	17400	9810 J	9790	**22100**
Lead	35.8	128	47	mg/kg	20.6 J	6.2	27.9 J	25.5 J	15.8	11.3	8.5 J	**37.6**	**105**
Mercury	0.18	1.06	0.12	mg/kg	**0.48**	0.0097 J	**0.44 J**	**0.27 J**	0.059 J	0.019 J	0.073 J	**0.27 J**	**0.92 J**
Nickel	22.7	48.6	36	mg/kg	19	13.1	**26.3**	**25.3**	**27.2**	22.6	11.6	**22.8**	**54.7**
Selenium	NSL	NSL	NSL	mg/kg	1.2 J	4.2 U	2.2 J	1.7 J	4.5 U	0.77 J	0.88 J	4.4 U	1.2 J
Silver	NSL	NSL	NSL	mg/kg	0.92 U	1.2 UJ	1.7 U	1.4 U	0.16 J	1.3 UJ	1 U	0.41 J	1.1 J
Zinc	121	459	190	mg/kg	**131**	45.2	**152**	116	68.5	58.2	53	**143**	**325**
Total Organic Carbon	NSL	NSL	NSL	%	3.08	5.13	6.03	5.67	1.85	1.4	1.45	1.78	3.99

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-05	CI13-05	CI13-05	CI13-05	CI13-05	CI13-05	CI13-06	CI13-06	CI13-06	CI13-07	CI13-07	CI13-07
				Sample Name:	CI13-05-SURF	CI13-05-SURF-FD	CI13-05-0001	CI13-05-0001-FD	CI13-05-0103	CI13-05-0103-FD	CI13-06-SURF	CI13-06-0001	CI13-06-0103	CI13-07-SURF	CI13-07-0001	CI13-07-0103
				Sample Depth (ft):	0-0.5	0-0.5	0-1	0-1	1-3	1-3	0-0.5	0-1	1-3	0-0.5	0-1	1-3
				Date Sampled:	9/27/13	9/27/13	9/24/13	9/24/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13	9/27/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**												
Arsenic	9.79	33	11	mg/kg	3.8	3.3	7	5.1	5	4.6	2.1	3.2	4.5	3.4	5.6	8.4
Barium	NSL	NSL	NSL	mg/kg	28.5 J	26.3 J	80.4	75.9	39.4	42.3	14.3 J	20.4 J	49.7	24.3	36.2	66.5
Cadmium	0.99	4.98	0.96	mg/kg	0.95	0.74 J	0.34 J	0.32 J	0.38 J	0.37 J	0.52	0.58 J	0.27 J	0.74	0.43 J	0.42 J
Chromium	43.4	111	51	mg/kg	21.7	18.5	12.2	12.9	8	8.5	12.1	10.2	14.1	20.8	11.1	15.1
Copper	31.6	149	42	mg/kg	18.3	15.8	14.5 J	14.5 J	12 J	13.4 J	14.1	23.9 J	15 J	20.4	15.7 J	19.4 J
Iron	20000*	40000*	NSL	mg/kg	15700 J	16100 J	12600	12500	9330	9940	10300 J	7020	14900	11600 J	**21000**	17300
Lead	35.8	128	47	mg/kg	15.2 J	12.6 J	10.3	11	7.7	8.3	9.8 J	29.1	17.3	15.8 J	12.9	11.1
Mercury	0.18	1.06	0.12	mg/kg	**0.19 J**	0.16 J	0.028 J	0.034 J	0.015 J	0.015 J	0.11 J	**0.35 J**	0.13 J	0.18 J	0.17 J	0.02 J
Nickel	22.7	48.6	36	mg/kg	20.7	17.3	16.7	16.2	13.3	13.6	11.6	10.2	19.1	17.9	16.3	**24.4**
Selenium	NSL	NSL	NSL	mg/kg	1.8 J	1.7 J	4.4 U	0.52 J	0.6 J	0.52 J	0.99 J	4.5 U	0.54 J	1.1 J	4.4 U	0.86 J
Silver	NSL	NSL	NSL	mg/kg	1.9 U	1.5 U	1.3 UJ	1.2 UJ	1.1 UJ	1.2 UJ	1 U	1.3 UJ	1.2 UJ	1.1 U	1.2 UJ	1.2 UJ
Zinc	121	459	190	mg/kg	95.4	75.1	59.7	54.7	38.6	40.9	58.3	73.4	55.9	81.6	47.7	51.6
Total Organic Carbon	NSL	NSL	NSL	%	2.58	2.63	2.95	1.35	3.66	3.62	1.35	3.01	0.542	2.6	2.36	2.98

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-08	CI13-09	CI13-09	CI13-09	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10	CI13-10
				Sample Name:	CI13-08-SURF	CI13-09-SURF	CI13-09-0001	CI13-09-0103	CI13-10-SURF	CI13-10-0001	CI13-10-0001-FD	CI13-10-0103	CI13-10-0103-FD	CI13-10-0305	CI13-10-0305-FD
				Sample Depth (ft):	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	0-1	1-3	1-3	3-5	3-5
				Date Sampled:	9/27/13	9/30/13	9/24/13	9/24/13	9/30/13	9/24/13	9/24/13	9/24/13	9/24/13	9/24/13	9/24/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**											
Arsenic	9.79	33	11	mg/kg	4.8	2.6	5.4	6.4	1.2	4.3	3.9	3.9	4.5	**10.1**	9.2
Barium	NSL	NSL	NSL	mg/kg	20 J	14.5 J	71.1	70.5	9.6 J	89.3	43.7	88.5	73.8	54.4	50.2 J
Cadmium	0.99	4.98	0.96	mg/kg	0.35 J	0.4 J	0.4 J	0.4 J	0.27 J	0.59 J	0.43 J	0.44 J	0.4 J	0.67	0.58 J
Chromium	43.4	111	51	mg/kg	10.8	11.3 J	14.8	16.4	6.1	15.4	10.2	20.2	15.9	16.2	17.5 J
Copper	31.6	149	42	mg/kg	17.5	11.4	16.1 J	16.3 J	5.9	24.4 J	16.8 J	14.2 J	13.7 J	17.7 J	16.4 J
Iron	20000*	40000*	NSL	mg/kg	9190 J	9990 J	18000	18400	4080 J	14300	8390	14000	12100	**24500**	**25000 J**
Lead	35.8	128	47	mg/kg	10.2 J	8.8	10.4	10.2	7.5	9.7	7	16.3	13.2	12.3	11.6
Mercury	0.18	1.06	0.12	mg/kg	0.042 J	0.28 UJ	0.019 J	0.016 J	0.25 U	0.048 J	0.051 J	0.042 J	0.032 J	0.021 J	0.024 J
Nickel	22.7	48.6	36	mg/kg	12.8	11.2 J	21.3	**24.4**	6.5 J	20	12.9	22.1	17.7	**25.1**	**27.8 J**
Selenium	NSL	NSL	NSL	mg/kg	1.3 J	3.4 U	4.2 U	4.3 U	3.1 U	10.3 U	1.1 J	0.71 J	5.3 U	0.83 J	0.64 J
Silver	NSL	NSL	NSL	mg/kg	1.2 U	0.96 U	1.2 UJ	1.2 UJ	0.9 U	2.9 UJ	0.97 UJ	1.5 UJ	1.5 UJ	0.17 J	0.16 J
Zinc	121	459	190	mg/kg	45.1	43.5 J	46.7	46.2	25.1	53.7	31.7	78.4	61.8	101	76.9 J
Total Organic Carbon	NSL	NSL	NSL	%	1.75	1.11	2.93	2.49	2.28	13.9	13.3	4.12	2.53	1.76	1.7

NOTES:

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mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-11	CI13-11	CI13-11	CI13-12	CI13-13	CI13-13	CI13-13	CI13-13	CI13-14	CI13-14	CI13-14
				Sample Name:	CI13-11-SURF	CI13-11-0001	CI13-11-0103	CI13-12-SURF	CI13-13-SURF	CI13-13-0001	CI13-13-0103	CI13-13-0305	CI13-14-SURF	CI13-14-0001	CI13-14-0103
				Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3
				Date Sampled:	9/30/13	9/24/13	9/24/13	9/30/13	9/30/13	9/24/13	9/24/13	9/24/13	9/30/13	9/25/13	9/25/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**											
Arsenic	9.79	33	11	mg/kg	1.6	3.4	7.3	4.6	4.9	2	2	2.6	5.3	3.3	1.9
Barium	NSL	NSL	NSL	mg/kg	16.8 J	80.1 J	56.1 J	43 J	48.2 J	14.8 J	22.7 J	20.5 J	46.9 J	25.6 J	14.7 J
Cadmium	0.99	4.98	0.96	mg/kg	0.37 J	0.24 J	0.25 J	0.84	0.95	0.39 J	0.24 J	0.25 J	**1.8**	0.91	0.24 J
Chromium	43.4	111	51	mg/kg	8.7	16.4 J	17.3 J	26.1	28.9 J	9.7 J	10.4 J	9.5 J	37.6 J	17.9 J	8.2 J
Copper	31.6	149	42	mg/kg	8.6	17.4 J	11 J	27.6	**35.5**	6.6 J	6.9 J	6.7 J	**40.3**	30.4 J	7.5 J
Iron	20000*	40000*	NSL	mg/kg	5490 J	10200 J	**22700 J**	**20400 J**	**21200 J**	7130 J	8890 J	8620 J	**33100 J**	9980 J	7930 J
Lead	35.8	128	47	mg/kg	7	13.1	14.9	24.6	28.2	8.1	6.2	5.8	32.3	35.2	6.6
Mercury	0.18	1.06	0.12	mg/kg	0.27 U	0.037 J	0.025 J	0.4 U	0.48 UJ	0.044 J	0.015 J	0.017 J	0.34 UJ	**0.49**	0.047 J
Nickel	22.7	48.6	36	mg/kg	10.3 J	16 J	19.8 J	**24.8 J**	**29 J**	10.5 J	11.9 J	11.2 J	**29.8 J**	13.2 J	9.4 J
Selenium	NSL	NSL	NSL	mg/kg	3.8 U	5.3 U	0.92 J	2.2 J	2.4 J	4.4 U	4.4 U	4.6 U	2.5 J	4.7 U	4.4 U
Silver	NSL	NSL	NSL	mg/kg	1.1 U	1.5 UJ	1.3 UJ	1.6 U	1.9 U	1.3 UJ	1.3 UJ	1.3 UJ	0.59 J	0.22 J	1.3 UJ
Zinc	121	459	190	mg/kg	33.4	50.5 J	68.6 J	**122**	**141 J**	43.9 J	29.1 J	26.5 J	**206 J**	115 J	29.7 J
Total Organic Carbon	NSL	NSL	NSL	%	2.12	2.6	1.13	5.52	4.43	1.6	2.3	2.94	3.47	2.86	1.13

NOTES:

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mg/kg = Milligrams per kilogram.

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-15	CI13-15	CI13-15	CI13-16	CI13-16	CI13-16	CI13-17	CI13-17	CI13-18A	CI13-18A
				Sample Name:	CI13-15-SURF	CI13-15-0001	CI13-15-0103	CI13-16-SURF	CI13-16-0001	CI13-16-0103	CI13-17-SURF	CI13-17-0001	CI13-18A-SURF	CI13-18A-0001
				Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5	0-1
				Date Sampled:	9/30/13	9/25/13	9/25/13	9/30/13	9/25/13	9/25/13	9/30/13	9/25/13	9/30/13	9/25/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**										
Arsenic	9.79	33	11	mg/kg	4.9	2.2	2.8	3.9	5.5	7.7	1.2	1.3	2.5	5.1
Barium	NSL	NSL	NSL	mg/kg	37.7 J	16.6 J	68.2 J	34.8 J	80.6 J	130 J	6.5 J	9.1 J	12.2 J	52.4 J
Cadmium	0.99	4.98	0.96	mg/kg	**1.2**	0.52 J	0.21 J	**1**	0.53 J	0.35 J	0.19 J	0.37 J	0.29 J	0.3 J
Chromium	43.4	111	51	mg/kg	30.9 J	11.6 J	13.9 J	28.3 J	16.5 J	22.4 J	8.9	12.2 J	8.7	10.3 J
Copper	31.6	149	42	mg/kg	**33.1**	8.9 J	14.7 J	27.2	18.7 J	17.3 J	2.9	5.3 J	9.6	10.8 J
Iron	20000*	40000*	NSL	mg/kg	**22000 J**	9120 J	8560 J	**24700 J**	13700 J	**27300 J**	4290 J	3860 J	8020 J	10300 J
Lead	35.8	128	47	mg/kg	29.8	10.2	11	22.7	23.9	14.6	5.2	9.4	7.4	7.7
Mercury	0.18	1.06	0.12	mg/kg	0.37 UJ	0.084 J	0.019 J	0.32 UJ	**0.24**	0.036 J	0.24 U	0.11 J	0.25 U	0.03 J
Nickel	22.7	48.6	36	mg/kg	**26.7 J**	10.8 J	13.5 J	21.4 J	18.1 J	**36.4 J**	5.5 J	8.4 J	9 J	14.7 J
Selenium	NSL	NSL	NSL	mg/kg	2 J	4.4 U	0.66 J	2.2 J	4.7 U	0.68 J	3 U	4.1 U	3.4 U	0.61 J
Silver	NSL	NSL	NSL	mg/kg	1.4	1.3 UJ	1.3 UJ	1.1 J	1.3 UJ	0.19 J	0.86 U	1.2 UJ	0.97 U	1.1 UJ
Zinc	121	459	190	mg/kg	**167 J**	55 J	43.1 J	**131 J**	91.6 J	114 J	26.6	42.2 J	34.7	36.5 J
Total Organic Carbon	NSL	NSL	NSL	%	3.69	1.68	1.93	3.76	2.71	0.677	0.789	3.11	3.55	3.84

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-20	CI13-20	CI13-20	CI13-21	CI13-22	CI13-23	CI13-23	CI13-23	CI13-24	CI13-24	CI13-25
				Sample Name:	CI13-20-SURF	CI13-20-0001	CI13-20-0103	CI13-21-SURF	CI13-22-SURF	CI13-23-SURF	CI13-23-0001	CI13-23-0103	CI13-24-SURF	CI13-24-0001	CI13-25-SURF
				Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5
				Date Sampled:	9/30/13	9/25/13	9/25/13	9/26/13	10/28/13	10/28/13	9/25/13	9/25/13	10/28/13	9/26/13	9/30/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**											
Arsenic	9.79	33	11	mg/kg	2	3.8	3.4	4.1	1.9	4.4	2.1	3.2	4.9	6.8	5.6
Barium	NSL	NSL	NSL	mg/kg	20 J	27.5 J	29 J	17.3 J	10.8 J	33.3	19.8 J	43.3 J	37.2	45.1 J	18.8 J
Cadmium	0.99	4.98	0.96	mg/kg	0.39 J	**1.7**	0.31 J	0.25 J	0.14 J	0.97	0.43 J	0.29 J	0.8	0.37 J	0.39 J
Chromium	43.4	111	51	mg/kg	12.8	35.6 J	12.2 J	8.1 J	7	29	11.9 J	14 J	26.3	12.3 J	20.1 J
Copper	31.6	149	42	mg/kg	12.7	26.7 J	8.8 J	7.6 J	3.4	26.1	9.9 J	**56.7 J**	25.5	14.8 J	10.9
Iron	20000*	40000*	NSL	mg/kg	9800 J	15000 J	10700 J	9210 J	5530	**24000**	8690 J	10600 J	**21700**	15000 J	**21000 J**
Lead	35.8	128	47	mg/kg	12.4	33.2	8.1	7	5.4	25.6	9.6	8.4	25.3	10.7	17.3
Mercury	0.18	1.06	0.12	mg/kg	0.28 U	**0.22 J**	0.024 J	0.022 J	0.12 U	0.16	0.058 J	0.012 J	**0.2**	0 U	0.22 U
Nickel	22.7	48.6	36	mg/kg	14 J	**30.9 J**	14.3 J	10.2 J	7.7	**23.4**	11.7 J	16.4 J	**26**	20.2 J	**23.6 J**
Selenium	NSL	NSL	NSL	mg/kg	1.1 J	0.6 J	4.8 U	0.62 J	3.7 U	1.5 J	4.4 U	4.3 U	1.3 J	1.1 J	1.8 J
Silver	NSL	NSL	NSL	mg/kg	0.99 U	0.35 J	1.4 UJ	0 U	1.1 U	0.3 J	1.3 UJ	1.2 UJ	0.3 J	0 U	0.84 U
Zinc	121	459	190	mg/kg	59	**196 J**	39.2 J	30.1 J	25.9	**145**	45.7 J	40.3 J	**138**	51.3 J	110 J
Total Organic Carbon	NSL	NSL	NSL	%	1.53	1.38	2.7	1.81	0.318	2.68	1.02	1.1	2.7	2.09	1.49

NOTES:

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-26	CI13-26	CI13-26	CI13-26	CI13-26	CI13-26	CI13-27A	CI13-27A	CI13-27A	CI13-27A	CI13-27A
				Sample Name:	CI13-26-SURF	CI13-26-0001	CI13-26-0103	CI13-26-0305	CI13-26-0507	CI13-26-0709	CI13-27A-SURF	CI13-27A-0001	CI13-27A-0103	CI13-27A-0305	CI13-27A-0507
				Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	0-0.5	0-1	1-3	3-5	5-7
				Date Sampled:	9/30/13	10/1/13	10/1/13	10/1/13	10/1/13	10/1/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**											
Arsenic	9.79	33	11	mg/kg	6.4	2.3	1.8	2	2	2.3	5	7.8	**11.2**	**10.4**	4.9
Barium	NSL	NSL	NSL	mg/kg	51.2 J	14.8 J	11.7 J	13.1 J	12.3 J	9.2 J	46.9 J	113 J	116 J	117 J	52.4 J
Cadmium	0.99	4.98	0.96	mg/kg	0.97	0.29 J	0.21 J	0.18 J	0.17 J	0.19 J	**1.7**	**4.6**	**6.1**	**9.1**	**1.6**
Chromium	43.4	111	51	mg/kg	35 J	10.9 J	7.3 J	7 J	6.8 J	6.2 J	42.9 J	**116**	**115**	**71.3**	22.4
Copper	31.6	149	42	mg/kg	**37.2**	6.9	4.9	5	4.6	4.5	**45.3**	**89.7**	**144**	**166**	**76.8**
Iron	20000*	40000*	NSL	mg/kg	**28000 J**	8970 J	6260 J	7010 J	6080 J	5530 J	**31200 J**	**42300 J**	**24600 J**	**22900 J**	11500 J
Lead	35.8	128	47	mg/kg	34.1	8	4.1	4.3	4.1	3.8	**43.3**	**127**	**136**	**175**	**71.5**
Mercury	0.18	1.06	0.12	mg/kg	0.39 U	0.21 UJ	0.23 UJ	0.23 UJ	0.23 UJ	0.21 UJ	**0.55**	**2.9**	**4.4**	**4.3**	**0.5**
Nickel	22.7	48.6	36	mg/kg	**31.2 J**	10.5 J	8 J	8.6 J	8.2 J	7.5 J	**29.7 J**	**63.6 J**	**47.4 J**	**38.6 J**	16.8 J
Selenium	NSL	NSL	NSL	mg/kg	2.5 J	0.8 J	3.2 U	3 U	3 U	3.4 U	2.8 J	2.6 J	2.3 J	2.3 J	4.4 U
Silver	NSL	NSL	NSL	mg/kg	1.7 U	0.84 U	0.93 U	0.85 U	0.85 U	0.96 U	0.33 J	1.6	2.2	1.5	0.31 J
Zinc	121	459	190	mg/kg	**178 J**	42 J	20.6 J	21.6 J	19.1 J	17 J	**248 J**	**416**	**390**	**490**	**190**
Total Organic Carbon	NSL	NSL	NSL	%	7.86	1.45	1.21	1.46	1.17	1.31	5.42	9.14	8.54	6.41	3.04

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-28	CI13-29A	CI13-29A	CI13-29A	CI13-30	CI13-30
				Sample Name:	CI13-28-SURF	CI13-28-0001	CI13-28-0103	CI13-28-0305	CI13-28-0507	CI13-28-0709	CI13-28-0911	CI13-29A-SURF	CI13-29A-0001	CI13-29A-0103	CI13-30-SURF	CI13-30-0001
				Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	9-11	0-0.5	0-1	1-3	0-0.5	0-1
				Date Sampled:	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/25/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**												
Arsenic	9.79	33	11	mg/kg	5.6	2.3	2.4	2.2	2.5	2.3	1.3	4.8	2.3	2.9	4	3.7
Barium	NSL	NSL	NSL	mg/kg	53.7 J	26.2 J	29.4 J	22.3 J	29.9 J	29.2 J	10.4 J	42.3 J	10.8 J	8.4 J	27.8 J	29.5 J
Cadmium	0.99	4.98	0.96	mg/kg	**1.4**	0.29 J	0.31 J	0.26 J	0.26 J	0.27 J	0.14 J	0.82	0.22 J	0.19 J	0.92	**1.3**
Chromium	43.4	111	51	mg/kg	41.7 J	10.6 J	12.1 J	9.9 J	12.1 J	11.8 J	3.9 J	31.1 J	6.5	6.1	23.5	30.1 J
Copper	31.6	149	42	mg/kg	**43.5**	8.8	10.5	8.1	9.8	9.4	2.7	28.8	4.3	4.2	23.4	25.4 J
Iron	20000*	40000*	NSL	mg/kg	**29400 J**	11000 J	11500 J	9360 J	12300 J	11000 J	6660 J	**23700 J**	7100 J	5930 J	19100 J	15100 J
Lead	35.8	128	47	mg/kg	**38.7**	6.9	8	6.2	7.2	7.3	3.2	30.5	4	3.5	21.6	34.4
Mercury	0.18	1.06	0.12	mg/kg	**0.52**	0.28 UJ	0.26 UJ	0.25 UJ	0.24 UJ	0.25 UJ	0.24 UJ	0.39 U	0.24 U	0.23 U	0.34 U	**0.33**
Nickel	22.7	48.6	36	mg/kg	**30.1 J**	12.9 J	14.6 J	12.2 J	15.3 J	14.7 J	4.3 J	**26.1 J**	7 J	7 J	21.9 J	**24.6 J**
Selenium	NSL	NSL	NSL	mg/kg	2.9 J	0.98 J	1 J	3.4 U	1.1 J	0.95 J	3 U	2.1 J	4 U	4.3 U	1.6 J	0.66 J
Silver	NSL	NSL	NSL	mg/kg	0.38 J	1 U	1.1 U	0.97 U	1.1 U	1 U	0.85 U	1.5 U	0.97 U	0.98 U	1.4 U	0.27 J
Zinc	121	459	190	mg/kg	**195 J**	36.3 J	46.8 J	32.9 J	38.3 J	37.7 J	11.6 J	**144 J**	22.4	14.5	**127**	**159 J**
Total Organic Carbon	NSL	NSL	NSL	%	7.04	2.43	2.78	2.43	1.98	2.74	1.65	3.65	1.17	1.15	4.39	2.04

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-31	CI13-31	CI13-31	CI13-31	CI13-31	CI13-31	CI13-32	CI13-32	CI13-32	CI13-33	CI13-33	CI13-33	CI13-33
				Sample Name:	CI13-31-SURF	CI13-31-SURF-FD	CI13-31-0001	CI13-31-0103	CI13-31-0305	CI13-31-0507	CI13-32-SURF	CI13-32-0001	CI13-32-0103	CI13-33-SURF	CI13-33-0001	CI13-33-0103	CI13-33-0305
				Sample Depth (ft):	0-0.5	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	1-3	0-0.5	0-1	1-3	3-5
				Date Sampled:	9/27/13	9/27/13	9/29/13	9/29/13	9/29/13	9/29/13	9/27/13	9/30/13	9/30/13	9/27/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**													
Arsenic	9.79	33	11	mg/kg	3.9	4.2	1.9 J	2.3 J	2.8	2.3	4.3	5.4	**13.8**	5.3	5.3	3	2.5
Barium	NSL	NSL	NSL	mg/kg	29.9	27.7	12.8 J	16.9 J	22.5 J	17.4 J	34.4	31.1 J	47.8 J	59	58.5 J	35.3 J	14.2 J
Cadmium	0.99	4.98	0.96	mg/kg	**1**	**1**	0.27 J	0.27 J	0.27 J	0.25 J	**1.3**	0.43 J	0.39 J	**3.4**	**4**	0.35 J	0.23 J
Chromium	43.4	111	51	mg/kg	28.9 J	30.1 J	7.8 J	9.5 J	11.8 J	9.5 J	19.6 J	13 J	14.9 J	**59.3 J**	**61.8 J**	18.6 J	8.5 J
Copper	31.6	149	42	mg/kg	28.7	28.2	5.1 J	7.3 J	8.7	6.7	21.4	14.7	18.9	**51.4**	**48.3**	15.4	6.4
Iron	20000*	40000*	NSL	mg/kg	19900	**22100**	7060 J	9410 J	12200 J	9870 J	11200	14200 J	19600 J	**31400**	**30600 J**	16600 J	9850 J
Lead	35.8	128	47	mg/kg	26.7	27.8	4.6	5.2	6.7	5.6	22.7	10.9	11.1	**50.7**	**58.7**	10.8	5
Mercury	0.18	1.06	0.12	mg/kg	**0.59 J**	**0.68 J**	0.0081 J	0.0059 J	0.23 U	0.26 U	**0.47 J**	0.23 U	0.21 U	**1 J**	**0.75**	0.34 U	0.24 U
Nickel	22.7	48.6	36	mg/kg	19.8 J	20 J	7.4 J	10.2 J	13.5 J	10.8 J	18.4 J	16.6 J	**23 J**	**38.6 J**	**42.8 J**	20.8 J	10 J
Selenium	NSL	NSL	NSL	mg/kg	1.6 J	1.8 J	3.2 UJ	3.2 UJ	3.4 U	0.88 J	1 J	1.3 J	1.4 J	3.4 J	2.9 J	1.3 J	0.71 J
Silver	NSL	NSL	NSL	mg/kg	0.19 J	1.1 U	0.9 U	0.93 U	0.97 U	0.93 U	0.12 J	1.1 U	0.9 U	0.61 J	0.95 J	1.4 U	0.99 U
Zinc	121	459	190	mg/kg	**151**	**153**	28.7 J	36 J	39.2 J	30.9 J	**136**	56.2 J	53.1 J	**373**	**425 J**	54.6 J	25.9 J
Total Organic Carbon	NSL	NSL	NSL	%	3.39	3.06	1.78	2.69	4.48	3.13	2.52	1.18	1.64	8.35	6.33	7.27	4.09

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-34	CI13-34	CI13-34	CI13-34	CI13-34	CI13-34	CI13-35	CI13-35	CI13-35
				Sample Name:	CI13-34-SURF	CI13-34-0001	CI13-34-0103	CI13-34-0305	CI13-34-0507	CI13-34-0709	CI13-35-SURF	CI13-35-0001	CI13-35-0103
				Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	0-0.5	0-1	1-3
				Date Sampled:	9/27/13	9/29/13	9/29/13	9/29/13	9/29/13	9/29/13	9/26/13	9/26/13	9/26/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**									
Arsenic	9.79	33	11	mg/kg	5.8	4.1 J	2.5 J	2.4 J	2.5 J	3.5 J	2.4	3.6	5.7
Barium	NSL	NSL	NSL	mg/kg	68.4	46.1 J	19.1 J	14.3 J	13.1 J	42.9 J	20.9 J	79.3 J	58.3 J
Cadmium	0.99	4.98	0.96	mg/kg	**3.1**	**1.8 J**	0.29 J	0.24 J	0.24 J	0.28 J	0.5 J	0.29 J	0.26 J
Chromium	43.4	111	51	mg/kg	**55.2 J**	34.2 J	11.2 J	8.2 J	8.4 J	7.6 J	14 J	14.2 J	16.1 J
Copper	31.6	149	42	mg/kg	**59.5**	31.5 J	8.6 J	6 J	6.3 J	7.2 J	13.6 J	20.8 J	17.7 J
Iron	20000*	40000*	NSL	mg/kg	**25600**	**23000 J**	12300 J	9310 J	9350 J	8260 J	13000 J	10800 J	18400 J
Lead	35.8	128	47	mg/kg	**57.7**	31.6	6.4	4.8	5.2	4.4	12.6	11	12.1
Mercury	0.18	1.06	0.12	mg/kg	**0.9 J**	0.33 UJ	0.25 UJ	0.22 UJ	0.015 J	0.23 UJ	0.16 J	0 U	0 U
Nickel	22.7	48.6	36	mg/kg	**37.4 J**	**27.3 J**	12.6 J	9.2 J	9.7 J	9.4 J	13.7 J	17.3 J	**23.4 J**
Selenium	NSL	NSL	NSL	mg/kg	2.5 J	2.2 J	1.1 J	3.2 UJ	3.1 UJ	1 J	1 J	1.1 J	1.2 J
Silver	NSL	NSL	NSL	mg/kg	0.64 J	0.27 J	0.96 U	0.91 U	0.88 U	0.81 U	1 U	1 U	0 U
Zinc	121	459	190	mg/kg	**375**	**208 J**	36.5 J	25.1 J	26.7 J	28.4 J	73.3 J	48.7 J	47.9 J
Total Organic Carbon	NSL	NSL	NSL	%	8.61	6.95	17.1	2.56	1.94	3.17	6.42	3.69	6.46

NOTES:

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mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36	CI13-36
				Sample Name:	CI13-36-SURF	CI13-36-0001	CI13-36-0103	CI13-36-0305	CI13-36-0507	CI13-36-0709	CI13-36-0709-FD	CI13-36-0911	CI13-36-0911-FD	CI13-36-1113	CI13-36-1113-FD	CI13-36-1315	CI13-36-1315-FD
				Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9	7-9	9-11	9-11	11-13	11-13	13-15	13-15
				Date Sampled:	9/25/13	9/26/13	9/26/13	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**													
Arsenic	9.79	33	11	mg/kg	5.8	3.7	3	4.7	2.9	2.3	2.6	2.5	2.3	2.4	2.4	2.1	2
Barium	NSL	NSL	NSL	mg/kg	71 J	61.8 J	39.8 J	34.4 J	27.6 J	23.9 J	25.6 J	25.2 J	25.3 J	23.8 J	24.3 J	19.1 J	16.8 J
Cadmium	0.99	4.98	0.96	mg/kg	**4.2 J**	0.62 J	0.43 J	0.17 J	0.3 J	0.28 J	0.29 J	0.3 J	0.29 J	0.28 J	0.31 J	0.26 J	0.3 J
Chromium	43.4	111	51	mg/kg	**73.7 J**	23 J	17.4 J	14.1 J	13.2 J	10.8 J	11.8 J	11.3 J	11.2 J	10.5 J	10.7 J	9.6 J	8.4 J
Copper	31.6	149	42	mg/kg	**73.6 J**	24.9 J	13.7 J	11.2 J	10.2 J	8.2	8.4	7.9	8.6	7.8	7.9	6.5	5.3
Iron	20000*	40000*	NSL	mg/kg	**37100 J**	18900 J	14700 J	13100 J	12700 J	10700 J	11300 J	10900 J	11800 J	10200 J	11100 J	9140 J	7940 J
Lead	35.8	128	47	mg/kg	**75.7**	27	11.3	7.6	8.2	7.3	7.6	7.2	7.1	6.6	7.2	6	5.3
Mercury	0.18	1.06	0.12	mg/kg	**1.1**	**0.42**	0 U	0 U	0 U	0.021 J	0.019 J	0.019 J	0.02 J	0.017 J	0.018 J	0.014 J	0.014 J
Nickel	22.7	48.6	36	mg/kg	**46.2 J**	**25.4 J**	19.4 J	17.3 J	16.2 J	13 J	13.7 J	13.2 J	13.2 J	12.4 J	12.9 J	11 J	9.7 J
Selenium	NSL	NSL	NSL	mg/kg	3.5 J	1.4 J	1.3 J	4 U	1.2 J	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Silver	NSL	NSL	NSL	mg/kg	0.86 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Zinc	121	459	190	mg/kg	**524 J**	91.7 J	58.9 J	43 J	42.5 J	33.2 J	35.1 J	33.6 J	35.2 J	32.6 J	34.7 J	29.3 J	31 J
Total Organic Carbon	NSL	NSL	NSL	%	3.94	7.09	5.52	4.89	9.97	2.67	3.85	3.19	3.85	3.14	3.57	2.68	1.81

NOTES:

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-37	CI13-37	CI13-37	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38	CI13-38
				Sample Name:	CI13-37-SURF	CI13-37-0001	CI13-37-0103	CI13-38-SURF	CI13-38-SURF-FD	CI13-38-0001	CI13-38-0001-FD	CI13-38-0103	CI13-38-0103-FD	CI13-38-0305	CI13-38-0507
				Sample Depth (ft):	0-0.5	0-1	1-3	0-0.5	0-0.5	0-1	0-1	1-3	1-3	3-5	5-7
				Date Sampled:	9/27/13	9/30/13	9/30/13	9/27/13	9/27/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**											
Arsenic	9.79	33	11	mg/kg	8.3	5.8	4.3	5.5	6.7	6.7	6.6	3.5	2.9	3.6	8.1
Barium	NSL	NSL	NSL	mg/kg	104	52.7 J	70.7 J	75.9	89.2	81.5 J	81.6 J	53.5 J	48.3 J	53.2 J	84.8 J
Cadmium	0.99	4.98	0.96	mg/kg	**4.6**	**2.5**	0.26 J	**2.7**	**3.6**	**4.7**	**5.8**	0.49 J	0.61 J	0.27 J	0.36 J
Chromium	43.4	111	51	mg/kg	**65.9 J**	38.9 J	21.7 J	**49.3 J**	**62.1 J**	**68.4 J**	**75.7 J**	16.6 J	17.8 J	14.1 J	13.9 J
Copper	31.6	149	42	mg/kg	**71.3**	**40.5**	17.5	**57.1**	**72.9**	**77.4**	**79.6**	14.7	16.1	16.8	17.6
Iron	20000*	40000*	NSL	mg/kg	**29800**	**22600 J**	17800 J	**23600**	**29800**	**29100 J**	**29900 J**	15400 J	17800 J	12900 J	17800 J
Lead	35.8	128	47	mg/kg	**76.2**	**41.3**	15.2	**52.9**	**67.7**	**76**	**85.4**	10.7	10.7	8.3	9.9
Mercury	0.18	1.06	0.12	mg/kg	**0.9 J**	**0.72**	0.26 U	**0.62 J**	**0.61 J**	**0.7**	**0.75**	0.31 U	0.34 U	0.23 U	0.23 U
Nickel	22.7	48.6	36	mg/kg	**47.7 J**	**33.3 J**	**24.6 J**	**32.7 J**	**40.7 J**	**42.8 J**	**45.7 J**	16.2 J	18.4 J	15.9 J	**22.9 J**
Selenium	NSL	NSL	NSL	mg/kg	3.2 J	2.4 J	1.7 J	2.4 J	3 J	3 J	3.2 J	1.7 J	1.8 J	1.2 J	1.3 J
Silver	NSL	NSL	NSL	mg/kg	0.55 J	0.35 J	0.94 U	0.5 J	0.49 J	0.93 J	0.94 J	1.2 U	1.3 U	0.92 U	0.89 U
Zinc	121	459	190	mg/kg	**475**	**230 J**	64 J	**293**	**378**	**460 J**	**503 J**	53.2 J	63.4 J	39.4 J	48.2 J
Total Organic Carbon	NSL	NSL	NSL	%	7.79	6.36	1.17	7.38	6.72	8.74	7.67	5.35	7.26	1.35	5.11

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-39	CI13-39	CI13-39	CI13-39	CI13-39	CI13-40	CI13-40	CI13-40	CI13-40	CI13-40
				Sample Name:	CI13-39-SURF	CI13-39-0001	CI13-39-0103	CI13-39-0305	CI13-39-0507	CI13-40-SURF	CI13-40-0001	CI13-40-0103	CI13-40-0305	CI13-40-0507
				Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	1-3	3-5	5-7
				Date Sampled:	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**										
Arsenic	9.79	33	11	mg/kg	6.8	6.7	7.7	8	7.3	5.5	5.7	6.2	1 U	1 U
Barium	NSL	NSL	NSL	mg/kg	93.2 J	93 J	112 J	112 J	105 J	63.5 J	72.3 J	59.1 J	28.7 J	23.2 J
Cadmium	0.99	4.98	0.96	mg/kg	**4.3 J**	**4.9 J**	**11.5 J**	**10.1 J**	**1.8 J**	**2.8**	**3.7**	**3.4**	0.35 J	0.25 J
Chromium	43.4	111	51	mg/kg	**74.5 J**	**79.5 J**	**119 J**	**126 J**	33.7 J	43 J	**55.5 J**	**54.1 J**	17.8 J	15.9 J
Copper	31.6	149	42	mg/kg	**99.4 J**	**102 J**	**106 J**	**118 J**	**36.4 J**	**49**	**66.3**	**52.1**	12.7	18.3
Iron	20000*	40000*	NSL	mg/kg	**29300 J**	**28600 J**	**34100 J**	**33700 J**	15800 J	**20400 J**	**24200 J**	**22000 J**	8270 J	8910 J
Lead	35.8	128	47	mg/kg	**76.8**	**83.3**	**126**	**129**	31.5	**57.4**	**66.7**	**46.6**	12	12.2
Mercury	0.18	1.06	0.12	mg/kg	**0.74**	**0.89**	**1.3**	**3.8**	**1.9**	**0.7**	**0.71**	**0.81**	0.031 J	0.026 J
Nickel	22.7	48.6	36	mg/kg	**49.5 J**	**49.2 J**	**67.4 J**	**70.2 J**	**24.7 J**	**31.4 J**	**37.2 J**	**41.9 J**	13.2 J	13.6 J
Selenium	NSL	NSL	NSL	mg/kg	3.2 J	2.9 J	3.3 J	3.3 J	1.3 J	8 U	1.4 J	1.8 J	5 U	1.2 J
Silver	NSL	NSL	NSL	mg/kg	0.81 J	1.2 J	1.7	1.9	0.33 J	0.43 J	0.82 J	0.72 J	1 U	1 U
Zinc	121	459	190	mg/kg	**431 J**	**491 J**	**723 J**	**697 J**	111 J	**285 J**	**363 J**	**200 J**	52.8 J	52.6 J
Total Organic Carbon	NSL	NSL	NSL	%	3.32	8.69	9.3	10.2	11.4	7.14	6.93	7.83	3.36	3.05

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-41	CI13-41	CI13-41	CI13-41	CI13-41	CI13-42	CI13-42	CI13-42	CI13-42	CI13-43	CI13-43	CI13-43	CI13-43
				Sample Name:	CI13-41-SURF	CI13-41-SURF-FD	CI13-41-0001	CI13-41-0103	CI13-41-0305	CI13-42-SURF	CI13-42-0001	CI13-42-0103	CI13-42-0305	CI13-43-SURF	CI13-43-0001	CI13-43-0103	CI13-43-0305
				Sample Depth (ft):	0-0.5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5
				Date Sampled:	9/26/13	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/29/13	9/29/13	9/29/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**													
Arsenic	9.79	33	11	mg/kg	5.7	5.5	7.3	3.2	4.9	6.8	**12.7**	9.1	8.7	8.6	8.1 J	9.7 J	7.4 J
Barium	NSL	NSL	NSL	mg/kg	71.7 J	77.2 J	74.4 J	42.6	30.8	103 J	202	111 J	47.5	103 J	83.5 J	97.8 J	90.8 J
Cadmium	0.99	4.98	0.96	mg/kg	**3**	**2.9**	**3.7**	0.59 J	0.23 J	**5.2 J**	**18.9**	**8.6**	0.41 J	**3.3 J**	**3.2 J**	**3.8 J**	**3.1 J**
Chromium	43.4	111	51	mg/kg	**47.1 J**	**51.4 J**	**60 J**	14.9 J	12.6 J	**88.9 J**	**347 J**	**91.1**	15.5 J	**61 J**	**57.8 J**	**69.6 J**	**44.9 J**
Copper	31.6	149	42	mg/kg	**52.8**	**65.6**	**51.3**	15.3	15	**107 J**	**224**	**117**	14.1	**81 J**	**69.3 J**	**67.7 J**	**58.2 J**
Iron	20000*	40000*	NSL	mg/kg	**22600 J**	**24100 J**	**25200 J**	17200	15100	**34500 J**	**49500**	**29200 J**	**24800**	**28000 J**	**26400 J**	**28600 J**	**24800 J**
Lead	35.8	128	47	mg/kg	**61.3**	**61.2**	**75.7**	10.9	8.7	**89.7**	**254**	**101**	11	**77.1**	**79.4**	**85.7**	**46.5**
Mercury	0.18	1.06	0.12	mg/kg	**0.76**	**0.8**	**1.2**	**0.28 J**	0.018 J	**0.91**	**2.5 J**	**0.49**	0.018 J	**0.55**	0.39 UJ	**2.1 J**	**0.55 J**
Nickel	22.7	48.6	36	mg/kg	**34.2 J**	**35.6 J**	**45.6 J**	17.2 J	19.2 J	**55.7 J**	**156 J**	**43.7 J**	20.6 J	**42.8 J**	**37.3 J**	**41.6 J**	**33 J**
Selenium	NSL	NSL	NSL	mg/kg	1.2 J	1.2 J	1.5 J	1.6 J	1.2 J	3.6 J	4.3 J	3.7 J	1.9 J	3.1 J	3 J	2.9 J	2.6 J
Silver	NSL	NSL	NSL	mg/kg	0.46 J	0.76 J	0.57 J	1.6 U	0.86 U	0.82 J	4.3	1.5 J	0.92 U	0.53 J	0.71 J	0.8 J	0.45 J
Zinc	121	459	190	mg/kg	**305 J**	**320 J**	**309 J**	58	44	**551 J**	**934**	**371**	52.5	**390 J**	**326 J**	**259 J**	**183 J**
Total Organic Carbon	NSL	NSL	NSL	%	6.26	6.69	5.35	7.4	0.475	9.06	8.1	7.75	0.565	11.1	5.35	5.4	6.27

NOTES:

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-43
				Sample Name:	CI13-43-0507
				Sample Depth (ft):	5-7
				Date Sampled:	9/29/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**	
Arsenic	9.79	33	11	mg/kg	5.9 J
Barium	NSL	NSL	NSL	mg/kg	60.4 J
Cadmium	0.99	4.98	0.96	mg/kg	0.78 J
Chromium	43.4	111	51	mg/kg	19.2 J
Copper	31.6	149	42	mg/kg	28.3 J
Iron	20000*	40000*	NSL	mg/kg	**20100 J**
Lead	35.8	128	47	mg/kg	20.1
Mercury	0.18	1.06	0.12	mg/kg	0.17 J
Nickel	22.7	48.6	36	mg/kg	22.7 J
Selenium	NSL	NSL	NSL	mg/kg	2.1 J
Silver	NSL	NSL	NSL	mg/kg	0.15 J
Zinc	121	459	190	mg/kg	92.4 J
Total Organic Carbon	NSL	NSL	NSL	%	3.6

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-44	CI13-44	CI13-44	CI13-44	CI13-44	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45	CI13-45
				Sample Name:	CI13-44-SURF	CI13-44-0001	CI13-44-0103	CI13-44-0305	CI13-44-0507	CI13-45-SURF	CI13-45-SURF-FD	CI13-45-0001	CI13-45-0001-FD	CI13-45-0103	CI13-45-0103-FD	CI13-45-0305
				Sample Depth (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-0.5	0-1	0-1	1-3	1-3	3-5
				Date Sampled:	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/26/13	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**												
Arsenic	9.79	33	11	mg/kg	5.5	7.7 J	6.2 J	6.1 J	5.5 J	8.7	6.5	7.4	8.8	2.9	3.1	6.3
Barium	NSL	NSL	NSL	mg/kg	57.3 J	73.5 J	84.4 J	80.9 J	52.7 J	107 J	94.2 J	68.5	83.2	38.1	39.5	42
Cadmium	0.99	4.98	0.96	mg/kg	**2.1 J**	**3.5 J**	**1.9 J**	**1.3 J**	0.61 J	**7**	**6**	**3.2**	**4**	0.29 J	0.24 J	0.42 J
Chromium	43.4	111	51	mg/kg	33.4 J	**46.4 J**	29 J	26 J	13.7 J	**127 J**	**109 J**	**58.8**	**76.2**	10.9	11.9	14.8
Copper	31.6	149	42	mg/kg	**39.4 J**	**57.7 J**	**46.1 J**	**38.5 J**	24.9 J	**103**	**87.3**	**53.5**	**65.5**	9.7	7	11.7
Iron	20000*	40000*	NSL	mg/kg	14700 J	**21200 J**	**22500 J**	**22700 J**	15400 J	**33700 J**	**28800 J**	**24700 J**	**28200 J**	11400 J	16200 J	**23700 J**
Lead	35.8	128	47	mg/kg	**36.4**	**45.8**	35.8	29.7	19.1	**139**	**121**	**60.8 J**	**79.5 J**	8.5 J	7.9 J	10.8 J
Mercury	0.18	1.06	0.12	mg/kg	**0.5**	**0.79 J**	**0.25 J**	0.15 J	0.29 UJ	**1.1**	**1.3**	**0.93**	**1.3**	0.033 J	0.042 J	0.033 J
Nickel	22.7	48.6	36	mg/kg	**24.5 J**	**28.7 J**	**29.5 J**	**26.9 J**	17 J	**80.1 J**	**66.2 J**	**38.9**	**48.9**	10	10.6	16.9
Selenium	NSL	NSL	NSL	mg/kg	1.6 J	2.8 J	2.2 J	2.4 J	1.8 J	1.7 J	1.6 J	2.6 J	2.5 J	1.1 J	0.96 J	2.2 J
Silver	NSL	NSL	NSL	mg/kg	0.29 J	0.48 J	0.32 J	0.2 J	1.3 U	1.9 J	1.6 J	0.63 J	0.93 J	0.91 U	0.86 U	0.86 U
Zinc	121	459	190	mg/kg	**163 J**	**194 J**	**145 J**	**122 J**	82.2 J	**522 J**	**451 J**	**210**	**265**	42.4	47	78.4
Total Organic Carbon	NSL	NSL	NSL	%	3.11	4.87	6.92	5.02	4.91	9.16	8.1	6.99	7.39	1.04	1.04	0.472

NOTES:

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mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-46	CI13-46	CI13-46	CI13-46	CI13-47	CI13-47	CI13-47	CI13-47	CI13-47
				Sample Name:	CI13-46-SURF	CI13-46-0001	CI13-46-0103	CI13-46-0305	CI13-47-SURF	CI13-47-0001	CI13-47-0103	CI13-47-0305	CI13-47-0507
				Sample Depth (ft):	0-0.5	0-1	1-3	3-5	0-0.5	0-1	1-3	3-5	5-7
				Date Sampled:	9/26/13	9/27/13	9/27/13	9/27/13	9/26/13	9/27/13	9/27/13	9/27/13	9/27/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**									
Arsenic	9.79	33	11	mg/kg	5.6	5.6	4.2	5.5	7.3	5.8	5.7	4.7	3.7
Barium	NSL	NSL	NSL	mg/kg	39.6 J	34.8	29.4	48.2	71.6 J	54.8	53.8	64.2	72.4
Cadmium	0.99	4.98	0.96	mg/kg	0.78 J	**1.4**	0.36 J	0.41 J	**1.5 J**	0.67	0.69	0.7 J	0.52 J
Chromium	43.4	111	51	mg/kg	16 J	16.8 J	9 J	12.6 J	33.5 J	15.5 J	15.3 J	16 J	10.3 J
Copper	31.6	149	42	mg/kg	20.5 J	17.5	10.8	14	**45.4 J**	21.2	21.4	20.1	13.8
Iron	20000*	40000*	NSL	mg/kg	11700 J	9900	9900	14900	**20500 J**	17000	17100	**23500**	18800
Lead	35.8	128	47	mg/kg	24	26.8	9.9	9.4	**55.4**	15.3	15.4	11.6	8.2
Mercury	0.18	1.06	0.12	mg/kg	0.063 J	0.096 J	0.047 J	0.052 J	**0.22 J**	0.12 J	0.12 J	0.092 J	0.055 J
Nickel	22.7	48.6	36	mg/kg	18.1 J	20.8 J	12 J	16.8 J	**28.1 J**	19.6 J	19.4 J	22.5 J	16.1 J
Selenium	NSL	NSL	NSL	mg/kg	1.1 J	0.79 J	0.92 J	1.3 J	2 J	1.8 J	2 J	2.1 J	2.2 J
Silver	NSL	NSL	NSL	mg/kg	1 U	1.1 U	0.94 U	1.1 U	2 U	1.3 U	1.3 U	1.7 U	1.6 U
Zinc	121	459	190	mg/kg	107 J	102	37.4	49.6	**232 J**	74	73.5	75.2	53.3
Total Organic Carbon	NSL	NSL	NSL	%	2.08	4.66	3.39	3.95	6.77	3.8	4.33	9.14	10.4

NOTES:

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mg/kg = Milligrams per kilogram.

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48	CI13-48	CI13-49	CI13-49	CI13-49	CI13-49	CI13-49	CI13-50
				Sample Name:	CI13-48-SURF	CI13-48-0001	CI13-48-0001-FD	CI13-48-0103	CI13-48-0103-FD	CI13-48-0305	CI13-48-0305-FD	CI13-49-SURF	CI13-49-0001	CI13-49-0103	CI13-49-0305	CI13-49-0507	CI13-50-SURF
				Sample Depth (ft):	0-0.5	0-1	0-1	1-3	1-3	3-5	3-5	0-0.5	0-1	1-3	3-5	5-7	0-0.5
				Date Sampled:	9/26/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13	9/28/13	9/26/13	9/29/13	9/29/13	9/29/13	9/29/13	9/27/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**													
Arsenic	9.79	33	11	mg/kg	4.9	**11.6**	**13.7**	**14.2**	**10.2**	**18**	7.6 J	4.9	**10.8 J**	**10.5 J**	**12.6 J**	9.6 J	5.1
Barium	NSL	NSL	NSL	mg/kg	71.1 J	194	219	146	113	44.6	43.9 J	70.8 J	161 J	149 J	125 J	66.5 J	49.3
Cadmium	0.99	4.98	0.96	mg/kg	**3.5**	**15.5**	**18.8**	**11.1**	**8.9**	0.52	0.53 J	**3.3**	**10.8 J**	**10.3 J**	**14.7 J**	**2.2 J**	**1.2**
Chromium	43.4	111	51	mg/kg	**59.4 J**	**290**	**309**	**174**	**133**	15	16.5 J	**55.3 J**	**216 J**	**236 J**	**160 J**	27.3 J	37.3 J
Copper	31.6	149	42	mg/kg	**78.2**	**187**	**207**	**191**	**143**	20.8	23.2 J	**79.6**	**170 J**	**160 J**	**232 J**	**48.1 J**	**36.5**
Iron	20000*	40000*	NSL	mg/kg	**23300 J**	**50900 J**	**55500 J**	**34500 J**	**28600 J**	17400 J	**21900 J**	**23400 J**	**49600 J**	**57900 J**	**34500 J**	19800 J	**27500**
Lead	35.8	128	47	mg/kg	**62.9**	**230 J**	**263 J**	**187 J**	**144 J**	14.3 J	14.8	**59.3**	**175**	**173**	**174**	**38**	34.1
Mercury	0.18	1.06	0.12	mg/kg	**0.78**	**2.1**	**3**	**3.3**	**2.1**	0.16 J	**0.21 J**	**1.1**	0.53 UJ	**3.3 J**	**2.8 J**	0.092 J	**0.42 J**
Nickel	22.7	48.6	36	mg/kg	**40.2 J**	**137**	**153**	**76.5**	**59.5**	**22.8**	**23.6 J**	**39.6 J**	**135 J**	**134 J**	**56.4 J**	**32.1 J**	**30.9 J**
Selenium	NSL	NSL	NSL	mg/kg	2.2 J	4.9 J	5.7 J	4 J	3.3 J	1.5 J	2 J	2.7 J	5 J	5 J	3.7 J	2.3 J	2.2 J
Silver	NSL	NSL	NSL	mg/kg	0.78 J	4	4.3	2.5	1.9	0.97 U	1 U	0.61 J	3	2.5	2.6	0.29 J	0.25 J
Zinc	121	459	190	mg/kg	**401 J**	**855**	**1030**	**618**	**465**	65.6	62.4 J	**355 J**	**789 J**	**706 J**	**632 J**	**125 J**	**190**
Total Organic Carbon	NSL	NSL	NSL	%	12.3	10	12.8	7.49	8.2	3.54	5.51	13.3	16.3	12.2	9.02	11.3	3.45

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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOTAL ORGANIC CARBON
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

				Sample Location:	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50	CI13-50
				Sample Name:	CI13-50-0001	CI13-50-0001-FD	CI13-50-0103	CI13-50-0103-FD	CI13-50-0305	CI13-50-0507
				Sample Depth (ft):	0-1	0-1	1-3	1-3	3-5	5-7
				Date Sampled:	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13
Analyte	**TEC**	**PEC**	**SEDREF**	**Units**						
Arsenic	9.79	33	11	mg/kg	2.2	1.9	2	1.7	2.1	2
Barium	NSL	NSL	NSL	mg/kg	17.5 J	14.6 J	15.6 J	14.9 J	20 J	27.1 J
Cadmium	0.99	4.98	0.96	mg/kg	0.39 J	0.47 J	0.24 J	0.26 J	0.26 J	0.22 J
Chromium	43.4	111	51	mg/kg	9.8	10	6.9	6.7	7.4	7.9
Copper	31.6	149	42	mg/kg	6.3	6	3.9	5.4	4.7	5
Iron	20000*	40000*	NSL	mg/kg	9460 J	9540 J	5520 J	5840 J	6780 J	7130 J
Lead	35.8	128	47	mg/kg	6.9	8.2	4.1	3.9	4.4	4.8
Mercury	0.18	1.06	0.12	mg/kg	0.24 U	0.23 U	0.22 U	0.23 U	0.23 U	0.22 U
Nickel	22.7	48.6	36	mg/kg	10 J	10.5 J	7.7 J	7.3 J	8.3 J	8.9 J
Selenium	NSL	NSL	NSL	mg/kg	4.1 U	4.2 U	4.4 U	4.4 U	4.3 U	4.2 U
Silver	NSL	NSL	NSL	mg/kg	0.99 U	0.95 U	1 U	1 U	0.9 U	0.99 U
Zinc	121	459	190	mg/kg	41.1	47.8	19.6	29.7	24.7	20.6
Total Organic Carbon	NSL	NSL	NSL	%	1.7	1.7	1.37	1.32	1.79	3.44

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

mg/kg = Milligrams per kilogram.

TEC = Threshold effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

* TEC/PEC for iron based off of Persaud et al. 1993.

Bolded values exceed the TEC.

Bolded and gray shaded values exceed the PEC.

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-01	CI13-02	CI13-03	CI13-04	CI13-05	CI13-05	CI13-06	CI13-07	CI13-08	CI13-09	CI13-10
	Sample Name:	CI13-01-SURF	CI13-02-SURF	CI13-03-SURF	CI13-04-SURF	CI13-05-SURF	CI13-05-SURF-FD	CI13-06-SURF	CI13-07-SURF	CI13-08-SURF	CI13-09-SURF	CI13-10-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/30/13	9/30/13
Analyte	**Units**											
Cadmium	µmol/g dry	0.0046 J	0.0053 J	0.0071 J	0.0076 J	0.0064 J	0.0058 J	0.0043 J	0.0053 J	0.018 U	0.0038 J	0.014 U
Copper	µmol/g dry	0.13	0.27	0.16 J	0.071 J	0.13 J	0.11 J	0.085 J	0.09 J	0.14 J	0.11 J	0.039 J
Lead	µmol/g dry	0.074	0.12	0.066	0.034	0.047	0.044	0.038	0.053	0.041	0.035	0.018
Mercury	µmol/g dry	0.00016	0.0001 J	0.000046 J	0.000011 J	0.00002 J	0.000021 J	0.000018 J	0.0001 U	0.0001 U	0.000062 J	0.000081 U
Nickel	µmol/g dry	0.15 J	0.27 J	0.15 J	0.071 J	0.12 J	0.11 J	0.07 J	0.083 J	0.076 J	0.12 J	0.038 J
Zinc	µmol/g dry	1.2	1.8	1.1	0.51	0.81	0.74	0.6	0.69	0.39	0.57	0.26
Σ SEM	µmol/g dry	1.5586	2.4653	1.4831	0.6936	1.1134	1.0098	0.7973	0.9213	0.665	0.8388	0.369
AVS	µmol/g dry	0.65	2.4	6.3	6.5	11	9.5	8.8	7.6	7.4	3.5	5.2
foc	fraction	0.0308	0.0603	0.0567	0.0145	0.0258	0.0263	0.0135	0.026	0.0175	0.0111	0.0228
(Σ SEM - AVS) / foc	µmol/g dry	30	1	-85	-400	-383	-323	-593	-257	-385	-240	-212
SEM/AVS Ratio	none	**2.42**	**1.04**	0.225	0.106	0.101	0.106	0.0896	0.121	0.0879	0.239	0.069

NOTES:

Bold = indicates potential toxicity to benthic organisms

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U = Indicates the analyte was analyzed for but not detected.

AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-11	CI13-12	CI13-13	CI13-14	CI13-15	CI13-16	CI13-17	CI13-18	CI13-20	CI13-21	CI13-22
	Sample Name:	CI13-11-SURF	CI13-12-SURF	CI13-13-SURF	CI13-14-SURF	CI13-15-SURF	CI13-16-SURF	CI13-17-SURF	CI13-18A-SURF	CI13-20-SURF	CI13-21-SURF	CI13-22-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/26/13	10/28/13
Analyte	**Units**											
Cadmium	µmol/g dry	0.0028 J	0.0059 J	0.02 J	0.01 J	0.0087 J	0.0075 J	0.013 U	0.0036 J	0.00045 J	0.016 U	0.0073 J
Copper	µmol/g dry	0.059 J	0.14 J	0.31	0.33	0.28	0.24	0.027 J	0.093 J	0.0087 J	0.074 J	0.039 J
Lead	µmol/g dry	0.028	0.087	0.099	0.12	0.099	0.094	0.02	0.04	0.0047	0.026	0.025
Mercury	µmol/g dry	0.000096 U	0.00015 U	0.00015 J	0.00025	0.00017	0.00022	0.000023 J	0.000024 J	0.000038 J	0.000029 J	0.000027 J
Nickel	µmol/g dry	0.057 J	0.15 J	0.27 J	0.24 J	0.2 J	0.2 J	0.05 J	0.079 J	0.011 J	0.065 J	0.068 J
Zinc	µmol/g dry	0.34	1.1	1.3	1.9	1.6	1.5	0.28	0.43	0.088	0.22	0.26
Σ SEM	µmol/g dry	0.4868	1.4829	1.999	2.6	2.1877	2.0415	0.39	0.6456	0.11285	0.401	0.3993
AVS	µmol/g dry	7.5	12.2	14.3	9.6	7.7	8.7	6.2	6.3	5.6	1.8	9.5
foc	fraction	0.0212	0.0552	0.0443	0.0347	0.0369	0.0376	0.00789	0.0355	0.0153	0.0181	0.00318
(Σ SEM - AVS) / foc	µmol/g dry	-331	-194	-278	-202	-149	-177	-736	-159	-359	-77	-2862
SEM/AVS Ratio	none	0.0642	0.118	0.143	0.27	0.283	0.234	0.0611	0.102	0.0203	0.211	0.0425

NOTES:

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AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-23	CI13-24	CI13-25	CI13-26	CI13-27	CI13-28	CI13-29	CI13-30	CI13-31	CI13-31	CI13-32
	Sample Name:	CI13-23-SURF	CI13-24-SURF	CI13-25-SURF	CI13-26-SURF	CI13-27A-SURF	CI13-28-SURF	CI13-29A-SURF	CI13-30-SURF	CI13-31-SURF	CI13-31-SURF-FD	CI13-32-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	10/28/13	10/28/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/27/13	9/27/13	9/27/13
Analyte	**Units**											
Cadmium	µmol/g dry	0.0098 J	0.006 J	0.003 J	0.0055 J	0.0091 J	0.0087 J	0.0045 J	0.00066 J	0.0071 J	0.0072 J	0.012 J
Copper	µmol/g dry	0.21	0.2	0.095 J	0.17 J	0.24	0.22	0.18 J	0.017 J	0.21	0.21	0.21
Lead	µmol/g dry	0.1	0.092	0.074	0.11	0.13	0.11	0.097	0.0099	0.085	0.091	0.1
Mercury	µmol/g dry	0.00011	0.000043 J	0.00021	0.00014 U	0.000036 J	0.00013 U	0.00014 U	0.000029 J	0.000093 J	0.000079 J	0.00006 J
Nickel	µmol/g dry	0.18 J	0.18 J	0.24	0.19 J	0.16 J	0.17 J	0.16 J	0.02 J	0.14 J	0.14 J	0.14 J
Zinc	µmol/g dry	1.6	1.3	1.2	1.4	1.9	1.7	1.2	0.15	1.5	1.5	2.1
Σ SEM	µmol/g dry	2.0998	1.778	1.612	1.8755	2.4391	2.2087	1.6415	0.19756	1.9421	1.9482	2.562
AVS	µmol/g dry	11.1	9.9	5.8	11.2	7.6	1.8	9.2	9.9	8.3	14.2	6.5
foc	fraction	0.0268	0.027	0.0149	0.0786	0.0542	0.0704	0.0365	0.0439	0.0339	0.0306	0.0252
(Σ SEM - AVS) / foc	µmol/g dry	-336	-301	-281	-119	-95	6	-207	-221	-188	-400	-156
SEM/AVS Ratio	none	0.187	0.179	0.284	0.165	0.325	**1.27**	0.177	0.0196	0.232	0.139	0.387

NOTES:

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AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-33	CI13-34	CI13-35	CI13-36	CI13-37	CI13-38	CI13-38	CI13-39	CI13-40	CI13-41
	Sample Name:	CI13-33-SURF	CI13-34-SURF	CI13-35-SURF	CI13-36-SURF	CI13-37-SURF	CI13-38-SURF	CI13-38-SURF-FD	CI13-39-SURF	CI13-40-SURF	CI13-41-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/27/13	9/27/13	9/26/13	9/25/13	9/27/13	9/27/13	9/27/13	9/26/13	9/26/13	9/26/13
Analyte	**Units**										
Cadmium	μmol/g dry	0.022	0.02 J	0.0037 J	0.032	0.026 J	0.017 J	0.018 J	0.025 J	0.021 J	0.023 J
Copper	μmol/g dry	0.28	0.29	0.16	0.6	0.39	0.3	0.33	0.73	0.43	0.51
Lead	μmol/g dry	0.18	0.18	0.032	0.29	0.22	0.16	0.17	0.23	0.22	0.23
Mercury	μmol/g dry	0.000023 J	0.00016 U	0.00014	0.00014	0.000028 J	0.00018 U	0.000024 J	0.00011 J	0.000079 J	0.000081 J
Nickel	μmol/g dry	0.28 J	0.22 J	0.08 J	0.29 J	0.26 J	0.21 J	0.21 J	0.28 J	0.2 J	0.22 J
Zinc	μmol/g dry	4.1	3.5	0.64	6	4.4	2.9	3	3.9	3.4	3.7
Σ SEM	μmol/g dry	4.862	4.21	0.9157	7.212	5.296	3.587	3.728	5.165	4.271	4.683
AVS	μmol/g dry	7.1	19.1	3.6	9.4	23.7	9.2	20.8	11.1	10.8	13.3
foc	fraction	0.0835	0.0861	0.0642	0.0394	0.0779	0.0738	0.0672	0.0332	0.0714	0.0626
(Σ SEM - AVS) / foc	μmol/g dry	-27	-173	-42	-56	-236	-76	-254	-179	-91	-138
SEM/AVS Ratio	none	0.686	0.218	0.255	0.773	0.224	0.388	0.181	0.465	0.395	0.351

NOTES:

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AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

μmol/g dry = micromole per gram dry weight

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-41	CI13-42	CI13-43	CI13-44	CI13-45	CI13-45	CI13-46	CI13-47	CI13-48	CI13-49
	Sample Name:	CI13-41-SURF-FD	CI13-42-SURF	CI13-43-SURF	CI13-44-SURF	CI13-45-SURF	CI13-45-SURF-FD	CI13-46-SURF	CI13-47-SURF	CI13-48-SURF	CI13-49-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13
Analyte	**Units**										
Cadmium	µmol/g dry	0.02 J	0.031 J	0.017 J	0.015 J	0.046	0.05	0.0049 J	0.0091 J	0.032 J	0.028 J
Copper	µmol/g dry	0.57	0.68	0.51	0.36	0.73	0.81	0.16 J	0.39	0.75	0.78
Lead	µmol/g dry	0.2	0.26	0.21	0.13	0.45	0.56	0.069	0.18	0.3	0.27
Mercury	µmol/g dry	0.00009 J	0.00008 J	0.000078 J	0.000074 J	0.000087 J	0.000068 J	0.000051 J	0.000065 J	0.00012 J	0.000099 J
Nickel	µmol/g dry	0.22 J	0.3 J	0.21 J	0.18 J	0.6	0.79	0.089 J	0.18 J	0.35 J	0.36 J
Zinc	µmol/g dry	3.3	5.1	3.2	1.9	5.4	6	0.97	2.4	5.9	5.1
Σ SEM	µmol/g dry	4.31	6.371	4.147	2.585	7.226	8.21	1.2929	3.1591	7.332	6.538
AVS	µmol/g dry	11.4	11.4	8.3	9.3	12.1	15.8	10.9	13.6	16.8	14.2
foc	fraction	0.0669	0.0906	0.111	0.0311	0.0916	0.081	0.0208	0.0677	0.123	0.133
(Σ SEM - AVS) / foc	µmol/g dry	-106	-56	-37	-216	-53	-94	-462	-154	-77	-58
SEM/AVS Ratio	none	0.38	0.563	0.499	0.272	0.597	0.52	0.119	0.232	0.435	0.459

NOTES:

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AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-50
	Sample Name:	CI13-50-SURF
	Sample Depth (ft):	0-0.5
	Date Sampled:	9/27/13
Analyte	**Units**	
Cadmium	µmol/g dry	0.0079 J
Copper	µmol/g dry	0.26 J
Lead	µmol/g dry	0.11
Mercury	µmol/g dry	0.000028 J
Nickel	µmol/g dry	0.22 J
Zinc	µmol/g dry	1.8
Σ SEM	µmol/g dry	2.3979
AVS	µmol/g dry	14.4
foc	fraction	0.0345
(Σ SEM - AVS) / foc	µmol/g dry	-348
SEM/AVS Ratio	none	0.165

NOTES:

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U = Indicates the analyte was analyzed for but not detected.

AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-01				CI13-01				CI13-02				CI13-03				CI13-03			
		Field Sample ID	CI13-01-SURF				CI13-01-0001				CI13-02-SURF				CI13-03-SURF				CI13-03-0001			
		Sample Depth	0-0.5				0-1				0-0.5				0-0.5				0-1			
		Sample Date	09/27/2013				09/23/2013				09/27/2013				09/27/2013				09/24/2013			
	Coc, PAHi, FCVi[a]	Coc, PAHi, Maxi[a]	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	3.08	0.0308	---	---	5.13	0.0513	---	---	6.03	0.0603	---	---	5.67	0.0567	---	---	1.85	0.0185	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																						
1-Methylnaphthalene	446.00	165700	0.11	3.57	3.57	0.008	0.00	0.04	0.04	0.0001	0.20	3.32	3.32	0.01	0.34	5.91	5.91	0.01	0.04	2.35	2.35	0.01
2-Methylnaphthalene	447.00	154800	0.11	3.57	3.57	0.008	0.00	0.04	0.04	0.0001	0.20	3.32	3.32	0.01	0.34	5.91	5.91	0.01	0.04	2.35	2.35	0.01
Acenaphthene (a)	491.00	33400	0.05	1.59	1.59	0.003	0.00	0.03	0.03	0.0001	0.08	1.28	1.28	0.00	0.10	1.76	1.76	0.00	0.01	0.59	0.59	0.00
Acenaphthylene (a)	452.00	24000	0.04	1.23	1.23	0.003	0.00	0.01	0.01	0.0000	0.10	1.66	1.66	0.00	0.12	2.12	2.12	0.00	0.02	1.03	1.03	0.00
Anthracene (a)	594.00	1300	0.19	6.17	6.17	0.010	0.00	0.03	0.03	0.0000	0.67	11.11	11.11	0.02	0.56	9.88	9.88	0.02	0.06	3.24	3.24	0.01
Benzo(a)anthracene (a)	841.00	4153	0.96	31.17	31.17	0.037	0.01	0.13	0.13	0.0002	2.60	43.12	43.12	0.05	2.60	45.86	45.86	0.05	0.39	21.08	21.08	0.03
Benzo(a)pyrene (a)	965.00	3840	1.00	32.47	32.47	0.034	0.00	0.08	0.08	0.0001	2.30	38.14	38.14	0.04	2.60	45.86	45.86	0.05	0.38	20.54	20.54	0.02
Benzo(b)fluoranthene (a)	979.00	2169	0.99	32.14	32.14	0.033	0.00	0.08	0.08	0.0001	1.70	28.19	28.19	0.03	2.00	35.27	35.27	0.04	0.23	12.43	12.43	0.01
Benzo(e)pyrene (a)	967.00	4300	0.65	21.10	21.10	0.022	0.00	0.09	0.09	0.0001	1.40	23.22	23.22	0.02	1.60	28.22	28.22	0.03	0.22	11.89	11.89	0.01
Benzo(g,h,i)perylene (a)	1095.00	648	0.57	18.51	18.51	0.017	0.00	0.08	0.08	0.0001	1.10	18.24	18.24	0.02	1.10	19.40	19.40	0.02	0.16	8.65	8.65	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.78	25.32	25.32	0.026	0.00	0.05	0.05	0.0001	2.00	33.17	33.17	0.03	2.30	40.56	40.56	0.04	0.28	15.14	15.14	0.02
C1 Chrysenes (a)	929.00	---	0.60	19.48	19.48	0.021	0.02	0.35	0.35	0.0004	1.70	28.19	28.19	0.03	1.60	28.22	28.22	0.03	0.28	15.14	15.14	0.02
C1 Fluorenes (a)	611.00	---	0.03	0.88	0.88	0.001	0.00	0.06	0.06	0.0001	0.06	0.91	0.91	0.00	0.34	5.91	5.91	0.01	0.01	0.54	0.54	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.89	28.90	28.90	0.038	0.03	0.53	0.53	0.0007	2.80	46.43	46.43	0.06	2.50	44.09	44.09	0.06	0.62	33.51	33.51	0.04
C1-Naphthalenes (a)	444.00	---	0.06	1.88	1.88	0.004	0.00	0.04	0.04	0.0001	0.11	1.82	1.82	0.00	0.10	1.76	1.76	0.00	0.04	2.35	2.35	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.53	17.21	17.21	0.026	0.04	0.80	0.80	0.0012	1.30	21.56	21.56	0.03	1.20	21.16	21.16	0.03	0.24	12.97	12.97	0.02
C2 Chrysenes (a)	1008.00	---	0.37	12.01	12.01	0.012	0.03	0.64	0.64	0.0006	0.89	14.76	14.76	0.01	0.90	15.87	15.87	0.02	0.22	11.89	11.89	0.01
C2 Fluorenes (a)	686.00	---	0.05	1.56	1.56	0.002	0.01	0.16	0.16	0.0002	0.09	1.51	1.51	0.00	0.08	1.39	1.39	0.00	0.02	1.08	1.08	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.43	13.96	13.96	---	0.04	0.72	0.72	---	1.20	19.90	19.90	---	1.10	19.40	19.40	---	0.29	15.68	15.68	---
C2-Naphthalenes (a)	510.00	---	0.20	6.49	6.49	0.013	0.00	0.04	0.04	0.0001	0.31	5.14	5.14	0.01	0.26	4.59	4.59	0.01	0.04	2.35	2.35	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.39	12.66	12.66	0.017	0.05	0.94	0.94	0.0013	0.84	13.93	13.93	0.02	0.81	14.29	14.29	0.02	0.18	9.73	9.73	0.01
C3 Chrysenes (a)	1112.00	---	0.14	4.55	4.55	0.004	0.02	0.41	0.41	0.0004	0.32	5.31	5.31	0.00	0.34	6.00	6.00	0.01	0.07	3.68	3.68	0.00
C3 Fluorenes (a)	769.00	---	0.11	3.57	3.57	0.005	0.02	0.35	0.35	0.0005	0.16	2.65	2.65	0.00	0.16	2.82	2.82	0.00	0.03	1.57	1.57	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.24	7.79	7.79	0.008	0.04	0.68	0.68	0.0007	0.54	8.96	8.96	0.01	0.53	9.35	9.35	0.01	0.12	6.49	6.49	0.01
C3-Naphthalenes (a)	581.00	---	0.24	7.79	7.79	0.013	0.00	0.04	0.04	0.0001	0.34	5.64	5.64	0.01	0.31	5.47	5.47	0.01	0.04	2.35	2.35	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.30	9.74	9.74	0.012	0.07	1.38	1.38	0.0017	0.55	9.12	9.12	0.01	0.53	9.35	9.35	0.01	0.16	8.65	8.65	0.01
C4 Chrysenes (a)	1214.00	---	0.04	1.36	1.36	0.001	0.01	0.15	0.15	0.0001	0.08	1.31	1.31	0.00	0.09	1.50	1.50	0.00	0.04	2.35	2.35	0.00
C4-Naphthalenes (a)	657.00	---	0.15	4.87	4.87	0.007	0.08	1.56	1.56	0.0024	0.22	3.65	3.65	0.01	0.18	3.17	3.17	0.00	0.04	2.27	2.27	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.16	5.19	5.19	0.006	0.04	0.82	0.82	0.0009	0.27	4.48	4.48	0.00	0.28	4.94	4.94	0.01	0.08	4.22	4.22	0.00
Chrysene (a)	844.00	826	0.91	29.55	29.55	0.035	0.01	0.21	0.21	0.0003	2.40	39.80	39.80	0.05	2.40	42.33	42.33	0.05	0.33	17.84	17.84	0.02
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.17	5.52	5.52	0.005	0.00	0.02	0.02	0.0000	0.35	5.80	5.80	0.01	0.32	5.64	5.64	0.01	0.05	2.81	2.81	0.00
Fluoranthene (a)	707.00	23870	1.50	48.70	48.70	0.069	0.01	0.10	0.10	0.0001	3.10	51.41	51.41	0.07	3.60	63.49	63.49	0.09	0.43	23.24	23.24	0.03
Fluorene (a)	538.00	26000	0.06	2.05	2.05	0.004	0.00	0.05	0.05	0.0001	0.11	1.82	1.82	0.00	0.15	2.65	2.65	0.00	0.01	0.65	0.65	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.51	16.56	16.56	0.015	0.00	0.03	0.03	0.0000	1.00	16.58	16.58	0.01	1.10	19.40	19.40	0.02	0.15	8.11	8.11	0.01
Naphthalene (a)	385.00	61700	0.11	3.57	3.57	0.009	0.00	0.04	0.04	0.0001	0.20	3.32	3.32	0.01	0.34	5.91	5.91	0.02	0.04	2.35	2.35	0.01
Perylene (a)	967.00	431	0.27	8.77	8.77	0.009	0.00	0.05	0.05	0.0001	0.54	8.96	8.96	0.01	0.67	11.82	11.82	0.01	0.15	8.11	8.11	0.01
Phenanthrene (a)	596.00	34300	0.53	17.21	17.21	0.029	0.01	0.15	0.15	0.0003	1.10	18.24	18.24	0.03	1.20	21.16	21.16	0.04	0.12	6.49	6.49	0.01
Pyrene (a)	697.00	9,090.00	0.93	30.19	30.19	0.043	0.01	0.21	0.21	0.0003	2.30	38.14	38.14	0.05	2.40	42.33	42.33	0.06	0.54	29.19	29.19	0.04
	---	**ESBTU FCVi**	---	---	---	0.51	---	---	---	0.01	---	---	---	0.60	---	---	---	0.68	---	---	---	0.33

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-03				CI13-04				CI13-04				CI13-04			
		Field Sample ID	CI13-03-0103				CI13-04-SURF				CI13-04-0001				CI13-04-0103			
		Sample Depth	1-3				0-0.5				0-1				#N/A			
		Sample Date	09/24/2013				09/27/2013				09/24/2013				09/24/2013			
	Coc, PAHi, FCVi^a	Coc, PAHi, Maxi^a	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g Dry wt	µg/g oc	Coc^b	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc^b	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc^b	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc^b	ESBTU FCVi
Total Organic Carbon**	--	--	1.4	0.014	---	---	1.45	0.0145	---	---	1.78	0.0178	---	---	3.99	0.0399	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.01	1.04	1.04	0.00	0.02	1.69	1.69	0.00	0.22	12.36	12.36	0.03	0.38	9.52	9.52	0.02
2-Methylnaphthalene	447.00	154800	0.01	1.04	1.04	0.00	0.02	1.69	1.69	0.00	0.22	12.36	12.36	0.03	0.38	9.52	9.52	0.02
Acenaphthene $^{(a)}$	491.00	33400	0.01	1.04	1.04	0.00	0.01	0.69	0.69	0.00	0.16	8.99	8.99	0.02	0.27	6.77	6.77	0.01
Acenaphthylene $^{(a)}$	452.00	24000	0.01	1.04	1.04	0.00	0.01	0.83	0.83	0.00	0.10	5.39	5.39	0.01	0.19	4.76	4.76	0.01
Anthracene $^{(a)}$	594.00	1300	0.01	1.04	1.04	0.00	0.07	4.55	4.55	0.01	0.55	30.90	30.90	0.05	1.20	30.08	30.08	0.05
Benzo(a)anthracene $^{(a)}$	841.00	4153	0.00	0.29	0.29	0.00	0.30	20.69	20.69	0.02	2.20	123.60	123.60	0.15	3.70	92.73	92.73	0.11
Benzo(a)pyrene $^{(a)}$	965.00	3840	0.00	0.21	0.21	0.00	0.25	17.24	17.24	0.02	1.90	106.74	106.74	0.11	3.50	87.72	87.72	0.09
Benzo(b)fluoranthene $^{(a)}$	979.00	2169	0.00	0.35	0.35	0.00	0.24	16.55	16.55	0.02	1.30	73.03	73.03	0.07	2.70	67.67	67.67	0.07
Benzo(e)pyrene $^{(a)}$	967.00	4300	0.00	0.29	0.29	0.00	0.17	11.72	11.72	0.01	1.10	61.80	61.80	0.06	2.00	50.13	50.13	0.05
Benzo(g,h,i)perylene $^{(a)}$	1095.00	648	0.00	0.32	0.32	0.00	0.12	8.28	8.28	0.01	0.87	48.88	48.88	0.04	1.50	37.59	37.59	0.03
Benzo(k)fluoranthene $^{(a)}$	981.00	1220	0.00	0.21	0.21	0.00	0.20	13.79	13.79	0.01	1.60	89.89	89.89	0.09	2.50	62.66	62.66	0.06
C1 Chrysenes $^{(a)}$	929.00	---	0.01	0.64	0.64	0.00	0.21	14.48	14.48	0.02	1.30	73.03	73.03	0.08	2.10	52.63	52.63	0.06
C1 Fluorenes $^{(a)}$	611.00	---	0.00	0.02	0.02	0.00	0.01	0.76	0.76	0.00	0.12	6.74	6.74	0.01	0.19	4.76	4.76	0.01
C1-Fluoranthenes/Pyrenes $^{(a)}$	770.00	---	0.01	0.79	0.79	0.00	0.36	24.83	24.83	0.03	2.90	162.92	162.92	0.21	5.20	130.33	130.33	0.17
C1-Naphthalenes $^{(a)}$	444.00	---	0.01	1.04	1.04	0.00	0.01	0.97	0.97	0.00	0.22	12.36	12.36	0.03	0.38	9.52	9.52	0.02
C1-Phenanthrenes/Anthracenes $^{(a)}$	670.00	---	0.01	0.37	0.37	0.00	0.19	13.10	13.10	0.02	1.50	84.27	84.27	0.13	3.10	77.69	77.69	0.12
C2 Chrysenes $^{(a)}$	1008.00	---	0.01	0.79	0.79	0.00	0.13	8.97	8.97	0.01	1.30	73.03	73.03	0.07	1.90	47.62	47.62	0.05
C2 Fluorenes $^{(a)}$	686.00	---	0.00	0.07	0.07	0.00	0.02	1.17	1.17	0.00	0.27	15.17	15.17	0.02	0.38	9.52	9.52	0.01
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.79	0.79	---	0.18	12.41	12.41	---	1.70	95.51	95.51	---	2.50	62.66	62.66	---
C2-Naphthalenes $^{(a)}$	510.00	---	0.01	1.04	1.04	0.00	0.05	3.45	3.45	0.01	0.22	12.36	12.36	0.02	0.38	9.52	9.52	0.02
C2-Phenanthrenes/Anthracenes $^{(a)}$	746	---	0.01	0.51	0.51	0.00	0.17	11.72	11.72	0.02	1.60	89.89	89.89	0.12	2.40	60.15	60.15	0.08
C3 Chrysenes $^{(a)}$	1112.00	---	0.00	0.28	0.28	0.00	0.05	3.52	3.52	0.00	0.47	26.40	26.40	0.02	0.62	15.54	15.54	0.01
C3 Fluorenes $^{(a)}$	769.00	---	0.01	1.04	1.04	0.00	0.04	2.41	2.41	0.00	0.58	32.58	32.58	0.04	0.79	19.80	19.80	0.03
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.59	0.59	0.00	0.09	6.34	6.34	0.01	0.99	55.62	55.62	0.06	1.20	30.08	30.08	0.03
C3-Naphthalenes $^{(a)}$	581.00	---	0.01	1.04	1.04	0.00	0.09	5.86	5.86	0.01	0.22	12.36	12.36	0.02	0.38	9.52	9.52	0.02
C3-Phenanthrenes/Anthracenes $^{(a)}$	829.00	---	0.02	1.14	1.14	0.00	0.12	8.28	8.28	0.01	2.20	123.60	123.60	0.15	3.00	75.19	75.19	0.09
C4 Chrysenes $^{(a)}$	1214.00	---	0.01	1.04	1.04	0.00	0.01	0.90	0.90	0.00	0.17	9.55	9.55	0.01	0.22	5.51	5.51	0.00
C4-Naphthalenes $^{(a)}$	657.00	---	0.01	1.04	1.04	0.00	0.06	4.34	4.34	0.01	1.00	56.18	56.18	0.09	1.50	37.59	37.59	0.06
C4-Phenanthrenes/Anthracenes $^{(a)}$	913.00	---	0.01	0.79	0.79	0.00	0.07	4.90	4.90	0.01	1.30	73.03	73.03	0.08	1.80	45.11	45.11	0.05
Chrysene $^{(a)}$	844.00	826	0.01	0.52	0.52	0.00	0.29	20.00	20.00	0.02	2.00	112.36	112.36	0.13	3.40	85.21	85.21	0.10
Dibenzo(a,h)anthracene $^{(a)}$	1123.00	2389	0.01	1.04	1.04	0.00	0.04	2.55	2.55	0.00	0.29	16.29	16.29	0.01	0.48	12.03	12.03	0.01
Fluoranthene $^{(a)}$	707.00	23870	0.01	1.04	1.04	0.00	0.37	25.52	25.52	0.04	3.50	196.63	196.63	0.28	5.30	132.83	132.83	0.19
Fluorene $^{(a)}$	538.00	26000	0.01	1.04	1.04	0.00	0.02	1.31	1.31	0.00	0.45	25.28	25.28	0.05	0.78	19.55	19.55	0.04
Indeno(1,2,3-cd)pyrene $^{(a)}$	1115.00	---	0.00	0.14	0.14	0.00	0.11	7.59	7.59	0.01	0.88	49.44	49.44	0.04	1.50	37.59	37.59	0.03
Naphthalene $^{(a)}$	385.00	61700	0.01	1.04	1.04	0.00	0.02	1.69	1.69	0.00	0.22	12.36	12.36	0.03	0.38	9.52	9.52	0.02
Perylene $^{(a)}$	967.00	431	0.21	15.00	15.00	0.02	0.07	4.48	4.48	0.00	0.49	27.53	27.53	0.03	0.82	20.55	20.55	0.02
Phenanthrene $^{(a)}$	596.00	34300	0.01	1.04	1.04	0.00	0.11	7.59	7.59	0.01	1.20	67.42	67.42	0.11	2.80	70.18	70.18	0.12
Pyrene $^{(a)}$	697.00	9,090.00	0.01	1.04	1.04	0.00	0.27	18.62	18.62	0.03	3.20	179.78	179.78	0.26	5.20	130.33	130.33	0.19
	---	**ESBTU FCVi**	---	---	---	0.04	---	---	---	0.31	---	---	---	2.33	---	---	---	1.77

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-05**				**CI13-05**				**CI13-05**				**CI13-05**			
		Field Sample ID	**CI13-05-SURF**				**CI13-05-SURF-FD**				**CI13-05-0001**				**CI13-05-0001-FD**			
		Sample Depth	**0-0.5**				**0-0.5**				**0-1**				**0-1**			
		Sample Date	**09/27/2013**				**09/27/2013**				**09/24/2013**				**09/24/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	2.58	0.0258	---	---	2.63	0.0263	---	---	2.95	0.0295	---	---	1.35	0.0135	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.11	4.26	4.26	0.01	0.05	1.90	1.90	0.00	0.01	0.37	0.37	0.00	0.10	7.04	7.04	0.01
2-Methylnaphthalene	447.00	154800	0.11	4.26	4.26	0.01	0.05	1.90	1.90	0.00	0.00	0.12	0.12	0.00	0.07	5.33	5.33	0.01
Acenaphthene (a)	491.00	33400	0.04	1.59	1.59	0.00	0.03	1.18	1.18	0.00	0.00	0.11	0.11	0.00	0.05	3.93	3.93	0.00
Acenaphthylene (a)	452.00	24000	0.06	2.25	2.25	0.00	0.03	1.10	1.10	0.00	0.01	0.22	0.22	0.00	0.04	3.11	3.11	0.00
Anthracene (a)	594.00	1300	0.20	7.75	7.75	0.01	0.12	4.56	4.56	0.01	0.03	0.92	0.92	0.00	0.09	6.59	6.59	0.01
Benzo(a)anthracene (a)	841.00	4153	1.00	38.76	38.76	0.05	0.61	23.19	23.19	0.03	0.00	0.14	0.14	0.00	0.06	4.15	4.15	0.00
Benzo(a)pyrene (a)	965.00	3840	0.99	38.37	38.37	0.04	0.57	21.67	21.67	0.02	0.05	1.56	1.56	0.00	0.00	0.14	0.14	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.79	30.62	30.62	0.03	0.55	20.91	20.91	0.02	0.00	0.04	0.04	0.00	0.12	8.89	8.89	0.01
Benzo(e)pyrene (a)	967.00	4300	0.63	24.42	24.42	0.03	0.37	14.07	14.07	0.01	0.01	0.37	0.37	0.00	0.01	0.52	0.52	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.44	17.05	17.05	0.02	0.30	11.41	11.41	0.01	0.00	0.12	0.12	0.00	0.04	2.81	2.81	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.88	34.11	34.11	0.03	0.45	17.11	17.11	0.02	0.01	0.21	0.21	0.00	0.05	3.33	3.33	0.00
C1 Chrysenes (a)	929.00	---	0.59	22.87	22.87	0.02	0.42	15.97	15.97	0.02	0.01	0.41	0.41	0.00	0.00	0.30	0.30	0.00
C1 Fluorenes (a)	611.00	---	0.11	4.26	4.26	0.01	0.02	0.57	0.57	0.00	0.04	1.39	1.39	0.00	0.05	4.00	4.00	---
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.98	37.98	37.98	0.05	0.61	23.19	23.19	0.03	0.00	0.12	0.12	0.00	0.01	0.52	0.52	0.00
C1-Naphthalenes (a)	444.00	---	0.04	1.71	1.71	0.00	0.04	1.41	1.41	0.00	0.00	0.12	0.12	0.00	0.03	2.07	2.07	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.48	18.60	18.60	0.03	0.28	10.65	10.65	0.02	0.00	0.02	0.02	0.00	0.02	1.41	1.41	0.00
C2 Chrysenes (a)	1008.00	---	0.40	15.50	15.50	0.02	0.28	10.65	10.65	0.01	0.00	0.07	0.07	0.00	0.01	0.53	0.53	0.00
C2 Fluorenes (a)	686.00	---	0.04	1.40	1.40	0.00	0.02	0.87	0.87	0.00	0.00	0.15	0.15	0.00	0.02	1.70	1.70	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.44	17.05	17.05	---	0.30	11.41	11.41	---	0.03	1.05	1.05	0.00	0.01	0.52	0.52	0.00
C2-Naphthalenes (a)	510.00	---	0.11	4.26	4.26	0.01	0.11	4.18	4.18	0.01	0.02	0.78	0.78	0.00	0.03	2.37	2.37	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.32	12.40	12.40	0.02	0.22	8.37	8.37	0.01	0.02	0.71	0.71	0.00	0.00	0.27	0.27	0.00
C3 Chrysenes (a)	1112.00	---	0.18	6.98	6.98	0.01	0.14	5.32	5.32	0.00	0.02	0.51	0.51	0.00	0.01	0.52	0.52	0.00
C3 Fluorenes (a)	769.00	---	0.08	2.98	2.98	0.00	0.05	1.98	1.98	0.00	0.01	0.34	0.34	0.00	0.02	1.56	1.56	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.23	8.91	8.91	0.01	0.18	6.84	6.84	0.01	0.02	0.75	0.75	0.00	0.09	6.81	6.81	0.01
C3-Naphthalenes (a)	581.00	---	0.14	5.43	5.43	0.01	0.11	4.18	4.18	0.01	0.02	0.61	0.61	0.00	0.02	1.19	1.19	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.25	9.69	9.69	0.01	0.21	7.98	7.98	0.01	0.00	0.02	0.02	0.00	0.12	8.89	8.89	0.01
C4 Chrysenes (a)	1214.00	---	0.05	1.78	1.78	0.00	0.03	1.29	1.29	0.00	0.04	1.39	1.39	0.00	0.00	0.31	0.31	0.00
C4-Naphthalenes (a)	657.00	---	0.10	3.88	3.88	0.01	0.08	3.08	3.08	0.00	0.00	0.12	0.12	0.00	0.05	3.48	3.48	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.17	6.59	6.59	0.01	0.13	4.94	4.94	0.01	0.02	0.54	0.54	0.00	0.02	1.70	1.70	0.00
Chrysene (a)	844.00	826	0.86	33.33	33.33	0.04	0.55	20.91	20.91	0.02	0.02	0.54	0.54	0.00	0.03	1.85	1.85	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.12	4.65	4.65	0.00	0.09	3.27	3.27	0.00	0.00	0.05	0.05	0.00	0.03	2.00	2.00	0.00
Fluoranthene (a)	707.00	23870	1.70	65.89	65.89	0.09	0.85	32.32	32.32	0.05	0.02	0.68	0.68	---	0.10	7.41	7.41	0.01
Fluorene (a)	538.00	26000	0.07	2.60	2.60	0.00	0.04	1.52	1.52	0.00	0.00	0.12	0.12	0.00	0.01	0.52	0.52	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.40	15.50	15.50	0.01	0.27	10.27	10.27	0.01	0.01	0.37	0.37	0.00	0.01	0.52	0.52	0.00
Naphthalene (a)	385.00	61700	0.11	4.26	4.26	0.01	0.05	1.90	1.90	0.00	0.01	0.24	0.24	0.00	0.00	0.19	0.19	0.00
Perylene (a)	967.00	431	0.28	10.85	10.85	0.01	0.16	6.08	6.08	0.01	0.00	0.08	0.08	0.00	0.00	0.30	0.30	0.00
Phenanthrene (a)	596.00	34300	0.62	24.03	24.03	0.04	0.28	10.65	10.65	0.02	0.01	0.28	0.28	0.00	0.02	1.33	1.33	0.00
Pyrene (a)	697.00	9,090.00	1.20	46.51	46.51	0.07	0.57	21.67	21.67	0.03	0.00	0.12	0.12	0.00	0.11	8.15	8.15	0.01
	---	**ESBTU FCVi**	---	---	---	0.62	---	---	---	0.35	---	---	---	0.02	---	---	---	0.11

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-05				CI13-05				CI13-06				CI13-06			
		Field Sample ID	CI13-05-0103				CI13-05-0103-FD				CI13-06-SURF				CI13-06-0001			
		Sample Depth	1-3				1-3				0-0.5				0-1			
		Sample Date	09/24/2013				09/24/2013				09/24/2013				09/24/2013			
	Coc, PAHi, FCVi[a]	Coc, PAHi, Maxi[a]	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	3.66	0.0366	---	---	3.62	0.0362	---	---	1.35	0.0135	---	---	3.01	0.0301	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.07	4.81	4.81	0.01	0.30	9.80	9.80	0.02
2-Methylnaphthalene	447.00	154800	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.07	4.81	4.81	0.01	0.30	9.80	9.80	0.02
Acenaphthene (a)	491.00	33400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	1.85	1.85	0.00	0.10	3.29	3.29	0.01
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.04	3.19	3.19	0.01	0.12	3.99	3.99	0.01
Anthracene (a)	594.00	1300	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.14	10.37	10.37	0.02	0.47	15.61	15.61	0.03
Benzo(a)anthracene (a)	841.00	4153	0.00	0.05	0.05	0.00	0.00	0.04	0.04	0.00	0.78	57.78	57.78	0.07	3.30	109.63	109.63	0.13
Benzo(a)pyrene (a)	965.00	3840	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00	0.75	55.56	55.56	0.06	3.00	99.67	99.67	0.10
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.06	0.06	0.00	0.00	0.04	0.04	0.00	0.67	49.63	49.63	0.05	1.70	56.48	56.48	0.06
Benzo(e)pyrene (a)	967.00	4300	0.00	0.08	0.08	0.00	0.00	0.06	0.06	0.00	0.48	35.56	35.56	0.04	1.80	59.80	59.80	0.06
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.08	0.08	0.00	0.00	0.06	0.06	0.00	0.35	25.93	25.93	0.02	1.10	36.54	36.54	0.03
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.04	0.04	0.00	0.00	0.02	0.02	0.00	0.53	39.26	39.26	0.04	2.00	66.45	66.45	0.07
C1 Chrysenes (a)	929.00	---	0.01	0.16	0.16	0.00	0.00	0.11	0.11	0.00	0.60	44.44	44.44	0.05	3.50	116.28	116.28	0.13
C1 Fluorenes (a)	611.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.02	1.19	1.19	0.00	0.14	4.65	4.65	0.01
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.14	0.14	0.00	0.00	0.10	0.10	0.00	0.77	57.04	57.04	0.07	6.20	205.98	205.98	0.27
C1-Naphthalenes (a)	444.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.03	2.30	2.30	0.01	0.30	9.80	9.80	0.02
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.00	0.09	0.09	0.00	0.00	0.07	0.07	0.00	0.37	27.41	27.41	0.04	2.30	76.41	76.41	0.11
C2 Chrysenes (a)	1008.00	---	0.01	0.27	0.27	0.00	0.01	0.18	0.18	0.00	0.36	26.67	26.67	0.03	2.30	76.41	76.41	0.08
C2 Fluorenes (a)	686.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.03	2.00	2.00	0.00	0.32	10.63	10.63	0.02
C2-Fluoranthenes/Pyrenes	---	---	0.00	0.13	0.13	---	0.00	0.10	0.10	---	0.39	28.89	28.89	---	3.80	126.25	126.25	---
C2-Naphthalenes (a)	510.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.09	6.67	6.67	0.01	0.30	9.80	9.80	0.02
C2-Phenanthrenes/Anthracenes (a)	746	---	0.01	0.14	0.14	0.00	0.00	0.10	0.10	0.00	0.29	21.48	21.48	0.03	2.30	76.41	76.41	0.10
C3 Chrysenes (a)	1112.00	---	0.01	0.16	0.16	0.00	0.00	0.12	0.12	0.00	0.14	10.37	10.37	0.01	0.81	26.91	26.91	0.02
C3 Fluorenes (a)	769.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.06	4.67	4.67	0.01	0.41	13.62	13.62	0.02
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.16	0.16	0.00	0.00	0.10	0.10	0.00	0.21	15.56	15.56	0.02	1.90	63.12	63.12	0.07
C3-Naphthalenes (a)	581.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.11	8.15	8.15	0.01	0.30	9.80	9.80	0.02
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.01	0.30	0.30	0.00	0.01	0.19	0.19	0.00	0.21	15.56	15.56	0.02	2.10	69.77	69.77	0.08
C4 Chrysenes (a)	1214.00	---	0.00	0.05	0.05	0.00	0.00	0.03	0.03	0.00	0.04	2.59	2.59	0.00	0.24	7.97	7.97	0.01
C4-Naphthalenes (a)	657.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.07	5.41	5.41	0.01	0.50	16.61	16.61	0.03
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	0.19	0.19	0.00	0.00	0.13	0.13	0.00	0.13	9.63	9.63	0.01	1.00	33.22	33.22	0.04
Chrysene (a)	844.00	826	0.00	0.13	0.13	0.00	0.00	0.09	0.09	0.00	0.74	54.81	54.81	0.06	2.90	96.35	96.35	0.11
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.11	8.15	8.15	0.01	0.33	10.96	10.96	0.01
Fluoranthene (a)	707.00	23870	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	1.00	74.07	74.07	0.10	3.10	102.99	102.99	0.15
Fluorene (a)	538.00	26000	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.03	2.52	2.52	0.00	0.21	6.98	6.98	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.31	22.96	22.96	0.02	0.87	28.90	28.90	0.03
Naphthalene (a)	385.00	61700	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.07	4.81	4.81	0.01	0.30	9.80	9.80	0.03
Perylene (a)	967.00	431	0.00	0.05	0.05	0.00	0.00	0.03	0.03	0.00	0.18	13.33	13.33	0.01	0.56	18.60	18.60	0.02
Phenanthrene (a)	596.00	34300	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.33	24.44	24.44	0.04	0.69	22.92	22.92	0.04
Pyrene (a)	697.00	9,090.00	0.01	0.14	0.14	0.00	0.00	0.06	0.06	0.00	0.69	51.11	51.11	0.07	4.10	136.21	136.21	0.20
	---	**ESBTU FCVi**	---	---	---	0.00	---	---	---	0.00	---	---	---	0.83	---	---	---	1.73

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-06**				**CI13-07**				**CI13-07**				**CI13-07**			
		Field Sample ID	**CI13-06-0103**				**CI13-07-SURF**				**CI13-07-0001**				**CI13-07-0103**			
		Sample Depth	**1-3**				**0-0.5**				**0-1**				**1-3**			
		Sample Date	**09/24/2013**				**09/27/2013**				**09/24/2013**				**09/24/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi**[a]	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**
Total Organic Carbon**	--	--	0.542	0.00542	---	---	2.6	0.026	---	---	2.36	0.0236	---	---	2.98	0.0298	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.07	12.92	12.92	0.03	0.14	5.38	5.38	0.01	0.07	2.97	2.97	0.01	0.00	0.07	0.07	0.00
2-Methylnaphthalene	447.00	154800	0.07	12.92	12.92	0.03	0.14	5.38	5.38	0.01	0.07	2.97	2.97	0.01	0.00	0.07	0.07	0.00
Acenaphthene (a)	491.00	33400	0.04	7.01	7.01	0.01	0.05	1.85	1.85	0.00	0.03	1.19	1.19	0.00	0.00	0.02	0.02	0.00
Acenaphthylene (a)	452.00	24000	0.01	2.58	2.58	0.01	0.11	4.23	4.23	0.01	0.02	0.89	0.89	0.00	0.00	0.04	0.04	0.00
Anthracene (a)	594.00	1300	0.11	20.30	20.30	0.03	0.38	14.62	14.62	0.02	0.11	4.66	4.66	0.01	0.00	0.11	0.11	0.00
Benzo(a)anthracene (a)	841.00	4153	0.48	88.56	88.56	0.11	2.10	80.77	80.77	0.10	0.55	23.31	23.31	0.03	0.02	0.67	0.67	0.00
Benzo(a)pyrene (a)	965.00	3840	0.41	75.65	75.65	0.08	2.10	80.77	80.77	0.08	0.50	21.19	21.19	0.02	0.03	0.84	0.84	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.20	36.90	36.90	0.04	1.40	53.85	53.85	0.06	0.29	12.29	12.29	0.01	0.02	0.74	0.74	0.00
Benzo(e)pyrene (a)	967.00	4300	0.23	42.44	42.44	0.04	1.20	46.15	46.15	0.05	0.29	12.29	12.29	0.01	0.02	0.57	0.57	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.16	29.52	29.52	0.03	0.94	36.15	36.15	0.03	0.18	7.63	7.63	0.01	0.02	0.54	0.54	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.30	55.35	55.35	0.06	1.70	65.38	65.38	0.07	0.40	16.95	16.95	0.02	0.02	0.57	0.57	0.00
C1 Chrysenes (a)	929.00	---	0.42	77.49	77.49	0.08	1.60	61.54	61.54	0.07	0.45	19.07	19.07	0.02	0.02	0.70	0.70	0.00
C1 Fluorenes (a)	611.00	---	0.04	6.83	6.83	0.01	0.04	1.69	1.69	0.00	0.03	1.06	1.06	0.00	0.00	0.02	0.02	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	1.00	184.50	184.50	0.24	2.40	92.31	92.31	0.12	0.94	39.83	39.83	0.05	0.03	0.84	0.84	0.00
C1-Naphthalenes (a)	444.00	---	0.07	12.92	12.92	0.03	0.05	1.85	1.85	0.00	0.07	2.97	2.97	0.01	0.00	0.07	0.07	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.52	95.94	95.94	0.14	0.97	37.31	37.31	0.06	0.36	15.25	15.25	0.02	0.01	0.31	0.31	0.00
C2 Chrysenes (a)	1008.00	---	0.35	64.58	64.58	0.06	0.88	33.85	33.85	0.03	0.38	16.10	16.10	0.02	0.02	0.77	0.77	0.00
C2 Fluorenes (a)	686.00	---	0.06	11.81	11.81	0.02	0.07	2.81	2.81	0.00	0.05	1.95	1.95	0.00	0.00	0.04	0.04	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.52	95.94	95.94	---	1.10	42.31	42.31	---	0.50	21.19	21.19	---	0.02	0.54	0.54	---
C2-Naphthalenes (a)	510.00	---	0.07	12.92	12.92	0.03	0.16	6.15	6.15	0.01	0.07	2.97	2.97	0.01	0.00	0.07	0.07	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.40	73.80	73.80	0.10	0.71	27.31	27.31	0.04	0.30	12.71	12.71	0.02	0.01	0.25	0.25	0.00
C3 Chrysenes (a)	1112.00	---	0.13	23.99	23.99	0.02	0.32	12.31	12.31	0.01	0.14	5.93	5.93	0.01	0.01	0.31	0.31	0.00
C3 Fluorenes (a)	769.00	---	0.07	12.18	12.18	0.02	0.12	4.62	4.62	0.01	0.05	2.20	2.20	0.00	0.00	0.06	0.06	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.23	42.44	42.44	0.04	0.52	20.00	20.00	0.02	0.25	10.59	10.59	0.01	0.01	0.37	0.37	0.00
C3-Naphthalenes (a)	581.00	---	0.07	12.92	12.92	0.02	0.21	8.08	8.08	0.01	0.07	2.97	2.97	0.01	0.00	0.07	0.07	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.34	62.73	62.73	0.08	0.56	21.54	21.54	0.03	0.31	13.14	13.14	0.02	0.01	0.32	0.32	0.00
C4 Chrysenes (a)	1214.00	---	0.02	3.69	3.69	0.00	0.09	3.31	3.31	0.00	0.03	1.06	1.06	0.00	0.00	0.11	0.11	0.00
C4-Naphthalenes (a)	657.00	---	0.11	20.30	20.30	0.03	0.16	6.15	6.15	0.01	0.08	3.31	3.31	0.01	0.00	0.13	0.13	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.14	25.83	25.83	0.03	0.23	8.85	8.85	0.01	0.14	5.93	5.93	0.01	0.01	0.20	0.20	0.00
Chrysene (a)	844.00	826	0.42	77.49	77.49	0.09	1.80	69.23	69.23	0.08	0.48	20.34	20.34	0.02	0.02	0.81	0.81	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.04	8.12	8.12	0.01	0.27	10.38	10.38	0.01	0.06	2.54	2.54	0.00	0.01	0.17	0.17	0.00
Fluoranthene (a)	707.00	23870	0.57	105.17	105.17	0.15	2.40	92.31	92.31	0.13	0.64	27.12	27.12	0.04	0.01	0.44	0.44	0.00
Fluorene (a)	538.00	26000	0.04	7.01	7.01	0.01	0.08	3.12	3.12	0.01	0.04	1.53	1.53	0.00	0.00	0.03	0.03	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.13	23.99	23.99	0.02	0.84	32.31	32.31	0.03	0.17	7.20	7.20	0.01	0.01	0.47	0.47	0.00
Naphthalene (a)	385.00	61700	0.07	12.92	12.92	0.03	0.14	5.38	5.38	0.01	0.07	2.97	2.97	0.01	0.00	0.07	0.07	0.00
Perylene (a)	967.00	431	0.09	16.05	16.05	0.02	0.49	18.85	18.85	0.02	0.11	4.66	4.66	0.00	0.01	0.23	0.23	0.00
Phenanthrene (a)	596.00	34300	0.18	33.21	33.21	0.06	0.82	31.54	31.54	0.05	0.18	7.63	7.63	0.01	0.01	0.22	0.22	0.00
Pyrene (a)	697.00	9,090.00	0.85	156.83	156.83	0.23	2.00	76.92	76.92	0.11	0.82	34.75	34.75	0.05	0.02	0.54	0.54	0.00
	---	**ESBTU FCVi**	---	---	---	1.65	---	---	---	1.13	---	---	---	0.38	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-08				CI13-09				CI13-09				CI13-09			
		Field Sample ID	CI13-08-SURF				CI13-09-SURF				CI13-09-0001				CI13-09-0103			
		Sample Depth	0-0.5				0-0.5				0-1				1-3			
		Sample Date	09/27/2013				09/30/2013				09/24/2013				09/24/2013			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	1.75	0.0175	---	---	1.11	0.0111	---	---	2.93	0.0293	---	---	2.49	0.0249	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.01	0.77	0.77	0.00	0.01	0.51	0.51	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
2-Methylnaphthalene	447.00	154800	0.01	0.77	0.77	0.00	0.0088	0.79	0.79	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
Acenaphthene (a)	491.00	33400	0.00	0.22	0.22	0.00	0.01	0.82	0.82	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00
Acenaphthylene (a)	452.00	24000	0.01	0.63	0.63	0.00	0.02	1.35	1.35	0.00	0.00	0.02	0.02	0.00	0.00	0.05	0.05	0.00
Anthracene (a)	594.00	1300	0.02	1.03	1.03	0.00	0.05	4.77	4.77	0.01	0.00	0.08	0.08	0.00	0.00	0.01	0.01	0.00
Benzo(a)anthracene (a)	841.00	4153	0.16	9.14	9.14	0.01	0.34	30.63	30.63	0.04	0.02	0.51	0.51	0.00	0.00	0.03	0.03	0.00
Benzo(a)pyrene (a)	965.00	3840	0.18	10.29	10.29	0.01	0.34	30.63	30.63	0.03	0.01	0.44	0.44	0.00	0.00	0.02	0.02	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.14	8.00	8.00	0.01	0.26	23.42	23.42	0.02	0.01	0.44	0.44	0.00	0.00	0.03	0.03	0.00
Benzo(e)pyrene (a)	967.00	4300	0.12	6.86	6.86	0.01	0.22	19.82	19.82	0.02	0.01	0.31	0.31	0.00	0.00	0.03	0.03	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.09	5.09	5.09	0.00	0.17	15.32	15.32	0.01	0.01	0.21	0.21	0.00	0.00	0.02	0.02	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.13	7.43	7.43	0.01	0.31	27.93	27.93	0.03	0.01	0.44	0.44	0.00	0.00	0.02	0.02	0.00
C1 Chrysenes (a)	929.00	---	0.15	8.57	8.57	0.01	0.24	21.62	21.62	0.02	0.01	0.28	0.28	0.00	0.00	0.03	0.03	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.25	0.25	0.00	0.01	0.63	0.63	0.00	0.00	0.02	0.02	0.00	0.00	0.05	0.05	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.21	12.00	12.00	0.02	0.36	32.43	32.43	0.04	0.02	0.51	0.51	0.00	0.00	0.04	0.04	0.00
C1-Naphthalenes (a)	444.00	---	0.01	0.39	0.39	0.00	0.01	0.88	0.88	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.08	4.40	4.40	0.01	0.14	12.61	12.61	0.02	0.01	0.22	0.22	0.00	0.00	0.03	0.03	0.00
C2 Chrysenes (a)	1008.00	---	0.10	5.54	5.54	0.01	0.15	13.51	13.51	0.01	0.01	0.32	0.32	0.00	0.00	0.04	0.04	0.00
C2 Fluorenes (a)	686.00	---	0.01	0.55	0.55	0.00	0.01	0.99	0.99	0.00	0.00	0.03	0.03	0.00	0.00	0.05	0.05	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.13	7.43	7.43	---	0.18	16.22	16.22	---	0.01	0.24	0.24	---	0.00	0.04	0.04	---
C2-Naphthalenes (a)	510.00	---	0.02	1.37	1.37	0.00	0.04	3.15	3.15	0.01	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.09	5.37	5.37	0.01	0.12	10.81	10.81	0.01	0.01	0.19	0.19	0.00	0.00	0.03	0.03	0.00
C3 Chrysenes (a)	1112.00	---	0.05	2.80	2.80	0.00	0.07	6.04	6.04	0.01	0.00	0.12	0.12	0.00	0.00	0.05	0.05	0.00
C3 Fluorenes (a)	769.00	---	0.03	1.66	1.66	0.00	0.03	2.43	2.43	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.07	4.06	4.06	0.00	0.10	8.56	8.56	0.01	0.00	0.14	0.14	0.00	0.00	0.03	0.03	0.00
C3-Naphthalenes (a)	581.00	---	0.04	2.06	2.06	0.00	0.05	4.50	4.50	0.01	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.10	5.71	5.71	0.01	0.12	10.81	10.81	0.01	0.01	0.22	0.22	0.00	0.00	0.03	0.03	0.00
C4 Chrysenes (a)	1214.00	---	0.01	0.74	0.74	0.00	0.02	1.80	1.80	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
C4-Naphthalenes (a)	657.00	---	0.04	2.29	2.29	0.00	0.04	3.69	3.69	0.01	0.00	0.12	0.12	0.00	0.00	0.02	0.02	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.06	3.14	3.14	0.00	0.07	5.95	5.95	0.01	0.00	0.14	0.14	0.00	0.00	0.02	0.02	0.00
Chrysene (a)	844.00	826	0.18	10.29	10.29	0.01	0.34	30.63	30.63	0.04	0.01	0.48	0.48	0.00	0.00	0.03	0.03	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.02	1.31	1.31	0.00	0.05	4.23	4.23	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00
Fluoranthene (a)	707.00	23870	0.17	9.71	9.71	0.01	0.38	34.23	34.23	0.05	0.02	0.72	0.72	0.00	0.00	0.05	0.05	0.00
Fluorene (a)	538.00	26000	0.01	0.45	0.45	0.00	0.02	1.53	1.53	0.00	0.00	0.04	0.04	0.00	0.00	0.01	0.01	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.08	4.29	4.29	0.00	0.16	14.41	14.41	0.01	0.01	0.22	0.22	0.00	0.00	0.01	0.01	0.00
Naphthalene (a)	385.00	61700	0.01	0.77	0.77	0.00	0.02	1.44	1.44	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
Perylene (a)	967.00	431	0.04	2.29	2.29	0.00	0.09	8.20	8.20	0.01	0.00	0.14	0.14	0.00	0.00	0.01	0.01	0.00
Phenanthrene (a)	596.00	34300	0.05	2.91	2.91	0.00	0.11	9.91	9.91	0.02	0.01	0.20	0.20	0.00	0.00	0.05	0.05	0.00
Pyrene (a)	697.00	9,090.00	0.15	8.57	8.57	0.01	0.32	28.83	28.83	0.04	0.02	0.61	0.61	0.00	0.00	0.05	0.05	0.00
	---	**ESBTU FCVi**	---	---	---	0.15	---	---	---	0.44	---	---	---	0.01	---	---	---	0.00

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-10**				**CI13-10**				**CI13-10**				**CI13-10**			
		Field Sample ID	**CI13-10-SURF**				**CI13-10-0001**				**CI13-10-0001-FD**				**CI13-10-0103**			
		Sample Depth	**0-0.5**				**0-1**				**0-1**				**1-3**			
		Sample Date	**09/30/2013**				**09/30/2013**				**09/24/2013**				**09/24/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	2.28	0.0228	---	---	13.9	0.139	---	---	13.3	0.133	---	---	4.12	0.0412	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.08	3.29	3.29	0.01	0.08	3.29	3.29	0.01	0.06	0.45	0.45	0.00	0.00	0.06	0.06	0.00
2-Methylnaphthalene	447.00	154800	0.08	3.29	3.29	0.01	0.075	3.29	3.29	0.01	0.06	0.45	0.45	0.00	0.00	0.06	0.06	0.00
Acenaphthene (a)	491.00	33400	0.02	0.79	0.79	0.00	0.02	0.79	0.79	0.00	0.01	0.09	0.09	0.00	0.00	0.00	0.00	0.00
Acenaphthylene (a)	452.00	24000	0.09	3.73	3.73	0.01	0.09	3.73	3.73	0.01	0.05	0.35	0.35	0.00	0.00	0.01	0.01	0.00
Anthracene (a)	594.00	1300	0.18	7.89	7.89	0.01	0.18	7.89	7.89	0.01	0.11	0.83	0.83	0.00	0.00	0.00	0.00	0.00
Benzo(a)anthracene (a)	841.00	4153	0.92	40.35	40.35	0.05	0.92	40.35	40.35	0.05	0.78	5.86	5.86	0.01	0.00	0.03	0.03	0.00
Benzo(a)pyrene (a)	965.00	3840	1.00	43.86	43.86	0.05	1.00	43.86	43.86	0.05	0.89	6.69	6.69	0.01	0.00	0.03	0.03	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.81	35.53	35.53	0.04	0.81	35.53	35.53	0.04	0.55	4.14	4.14	0.00	0.00	0.05	0.05	0.00
Benzo(e)pyrene (a)	967.00	4300	0.61	26.75	26.75	0.03	0.61	26.75	26.75	0.03	0.49	3.68	3.68	0.00	0.00	0.04	0.04	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.50	21.93	21.93	0.02	0.50	21.93	21.93	0.02	0.39	2.93	2.93	0.00	0.00	0.03	0.03	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.67	29.39	29.39	0.03	0.67	29.39	29.39	0.03	0.61	4.59	4.59	0.00	0.00	0.03	0.03	0.00
C1 Chrysenes (a)	929.00	---	0.66	28.95	28.95	0.03	0.66	28.95	28.95	0.03	0.52	3.91	3.91	0.00	0.00	0.08	0.08	0.00
C1 Fluorenes (a)	611.00	---	0.02	0.83	0.83	0.00	0.02	0.83	0.83	0.00	0.02	0.13	0.13	0.00	0.00	0.06	0.06	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	1.00	43.86	43.86	0.06	1.00	43.86	43.86	0.06	1.20	9.02	9.02	0.01	0.00	0.12	0.12	0.00
C1-Naphthalenes (a)	444.00	---	0.08	3.29	3.29	0.01	0.08	3.29	3.29	0.01	0.06	0.45	0.45	0.00	0.00	0.06	0.06	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.39	17.11	17.11	0.03	0.39	17.11	17.11	0.03	0.33	2.48	2.48	0.00	0.00	0.06	0.06	0.00
C2 Chrysenes (a)	1008.00	---	0.43	18.86	18.86	0.02	0.43	18.86	18.86	0.02	0.41	3.08	3.08	0.00	0.00	0.08	0.08	0.00
C2 Fluorenes (a)	686.00	---	0.03	1.23	1.23	0.00	0.03	1.23	1.23	0.00	0.03	0.23	0.23	0.00	0.00	0.02	0.02	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.49	21.49	21.49		0.49	21.49	21.49	---	0.51	3.83	3.83	---	0.00	0.10	0.10	---
C2-Naphthalenes (a)	510.00	---	0.05	2.28	2.28	0.00	0.05	2.28	2.28	0.00	0.06	0.45	0.45	0.00	0.00	0.06	0.06	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.31	13.60	13.60	0.02	0.31	13.60	13.60	0.02	0.26	1.95	1.95	0.00	0.00	0.06	0.06	0.00
C3 Chrysenes (a)	1112.00	---	0.16	7.02	7.02	0.01	0.16	7.02	7.02	0.01	0.12	0.90	0.90	0.00	0.00	0.06	0.06	0.00
C3 Fluorenes (a)	769.00	---	0.06	2.46	2.46	0.00	0.06	2.46	2.46	0.00	0.05	0.34	0.34	0.00	0.00	0.06	0.06	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.21	9.21	9.21	0.01	0.21	9.21	9.21	0.01	0.23	1.73	1.73	0.00	0.00	0.08	0.08	0.00
C3-Naphthalenes (a)	581.00	---	0.06	2.50	2.50	0.00	0.06	2.50	2.50	0.00	0.06	0.45	0.45	0.00	0.00	0.06	0.06	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.20	8.77	8.77	0.01	0.20	8.77	8.77	0.01	0.26	1.95	1.95	0.00	0.00	0.05	0.05	0.00
C4 Chrysenes (a)	1214.00	---	0.05	2.19	2.19	0.00	0.05	2.19	2.19	0.00	0.03	0.19	0.19	0.00	0.00	0.06	0.06	0.00
C4-Naphthalenes (a)	657.00	---	0.06	2.46	2.46	0.00	0.06	2.46	2.46	0.00	0.04	0.32	0.32	0.00	0.00	0.03	0.03	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.11	4.82	4.82	0.01	0.11	4.82	4.82	0.01	0.16	1.20	1.20	0.00	0.00	0.06	0.06	0.00
Chrysene (a)	844.00	826	0.87	38.16	38.16	0.05	0.87	38.16	38.16	0.05	0.70	5.26	5.26	0.01	0.00	0.06	0.06	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.15	6.58	6.58	0.01	0.15	6.58	6.58	0.01	0.11	0.83	0.83	0.00	0.00	0.01	0.01	0.00
Fluoranthene (a)	707.00	23870	1.20	52.63	52.63	0.07	1.20	52.63	52.63	0.07	0.70	5.26	5.26	0.01	0.00	0.06	0.06	0.00
Fluorene (a)	538.00	26000	0.03	1.40	1.40	0.00	0.03	1.40	1.40	0.00	0.04	0.29	0.29	0.00	0.00	0.01	0.01	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.45	19.74	19.74	0.02	0.45	19.74	19.74	0.02	0.37	2.78	2.78	0.00	0.00	0.02	0.02	0.00
Naphthalene (a)	385.00	61700	0.08	3.29	3.29	0.01	0.08	3.29	3.29	0.01	0.06	0.45	0.45	0.00	0.00	0.06	0.06	0.00
Perylene (a)	967.00	431	0.21	9.21	9.21	0.01	0.21	9.21	9.21	0.01	0.18	1.35	1.35	0.00	0.01	0.19	0.19	0.00
Phenanthrene (a)	596.00	34300	0.43	18.86	18.86	0.03	0.43	18.86	18.86	0.03	0.22	1.65	1.65	0.00	0.00	0.06	0.06	0.00
Pyrene (a)	697.00	9,090.00	0.84	36.84	36.84	0.05	0.84	36.84	36.84	0.05	0.89	6.69	6.69	0.01	0.00	0.06	0.06	0.00
	---	**ESBTU FCVi**	---	---	---	0.60	---	---	---	0.04	---	---	---	0.09	---	---	---	0.00

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-10**				**CI13-10**				**CI13-10**				**CI13-11**			
		Field Sample ID	**CI13-10-0103-FD**				**CI13-10-0305**				**CI13-10-0305-FD**				**CI13-11-SURF**			
		Sample Depth	**1-3**				**3-5**				**3-5**				**0-0.5**			
		Sample Date	**09/24/2013**				**09/24/2013**				**09/24/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a]** µg/g oc	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**
Total Organic Carbon**	--	--	2.53	0.0253	---	---	1.76	0.0176	---	---	1.7	0.017	---	---	2.12	0.0212	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.01	0.01	0.00	0.01	0.40	0.40	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.13	0.13	0.00	0.01	0.40	0.40	0.00
Acenaphthene (a)	491.00	33400	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.09	0.09	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.01	0.01	0.00	0.00	0.19	0.19	0.00
Anthracene (a)	594.00	1300	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.47	0.47	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.03	0.03	0.00	0.00	0.05	0.05	0.00	0.00	0.13	0.13	0.00	0.06	2.69	2.69	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.06	2.88	2.88	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.07	0.07	0.00	0.00	0.20	0.20	0.00	0.00	0.13	0.13	0.00	0.07	3.44	3.44	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00	0.05	0.05	0.00	0.00	0.20	0.20	0.00	0.00	0.13	0.13	0.00	0.05	2.31	2.31	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.03	0.03	0.00	0.00	0.19	0.19	0.00	0.00	0.13	0.13	0.00	0.04	1.98	1.98	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.03	0.03	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00	0.05	2.26	2.26	0.00
C1 Chrysenes (a)	929.00	---	0.00	0.09	0.09	0.00	0.01	0.30	0.30	0.00	0.00	0.25	0.25	0.00	0.06	2.88	2.88	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.13	0.13	0.00	0.00	0.17	0.17	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.00	0.12	0.12	0.00	0.00	0.24	0.24	0.00	0.00	0.19	0.19	0.00	0.08	3.58	3.58	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.13	0.13	0.00	0.00	0.17	0.17	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.00	0.06	0.06	0.00	0.00	0.19	0.19	0.00	0.00	0.16	0.16	0.00	0.05	2.12	2.12	0.00
C2 Chrysenes (a)	1008.00	---	0.00	0.11	0.11	0.00	0.01	0.51	0.51	0.00	0.01	0.39	0.39	0.00	0.05	2.50	2.50	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.02	0.02	0.00	0.00	0.05	0.05	0.00	0.00	0.13	0.13	0.00	0.01	0.34	0.34	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.00	0.15	0.15	---	0.01	0.30	0.30	---	0.00	0.23	0.23	---	0.06	2.69	2.69	---
C2-Naphthalenes (a)	510.00	---	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.08	0.08	0.00	0.02	0.71	0.71	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.00	0.07	0.07	0.00	0.01	0.29	0.29	0.00	0.00	0.26	0.26	0.00	0.05	2.17	2.17	0.00
C3 Chrysenes (a)	1112.00	---	0.00	0.10	0.10	0.00	0.00	0.27	0.27	0.00	0.00	0.25	0.25	0.00	0.03	1.51	1.51	0.00
C3 Fluorenes (a)	769.00	---	0.00	0.03	0.03	0.00	0.00	0.13	0.13	0.00	0.00	0.13	0.13	0.00	0.02	0.99	0.99	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.00	0.09	0.09	0.00	0.01	0.41	0.41	0.00	0.00	0.24	0.24	0.00	0.04	1.65	1.65	0.00
C3-Naphthalenes (a)	581.00	---	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.16	0.16	0.00	0.03	1.23	1.23	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.00	0.06	0.06	0.00	0.01	0.53	0.53	0.00	0.01	0.47	0.47	0.00	0.05	2.22	2.22	0.00
C4 Chrysenes (a)	1214.00	---	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.08	0.08	0.00	0.01	0.52	0.52	0.00
C4-Naphthalenes (a)	657.00	---	0.00	0.10	0.10	0.00	0.00	0.23	0.23	0.00	0.00	0.20	0.20	0.00	0.02	1.13	1.13	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.00	0.08	0.08	0.00	0.01	0.35	0.35	0.00	0.00	0.29	0.29	0.00	0.04	1.79	1.79	0.00
Chrysene (a)	844.00	826	0.00	0.06	0.06	0.00	0.00	0.28	0.28	0.00	0.00	0.25	0.25	0.00	0.07	3.25	3.25	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.13	0.13	0.00	0.01	0.52	0.52	0.00
Fluoranthene (a)	707.00	23870	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.11	0.11	0.00	0.12	5.66	5.66	0.01
Fluorene (a)	538.00	26000	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.22	0.22	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.00	0.13	0.13	0.00	0.04	1.89	1.89	0.00
Naphthalene (a)	385.00	61700	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.13	0.13	0.00	0.01	0.40	0.40	0.00
Perylene (a)	967.00	431	0.01	0.25	0.25	0.00	0.00	0.12	0.12	0.00	0.00	0.10	0.10	0.00	0.02	0.85	0.85	0.00
Phenanthrene (a)	596.00	34300	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.13	0.13	0.00	0.03	1.27	1.27	0.00
Pyrene (a)	697.00	9,090.00	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.15	0.15	0.00	0.08	3.92	3.92	0.01
	---	**ESBTU FCVi**	---	---	---	0.00	---	---	---	0.00	---	---	---	0.00	---	---	---	0.06

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-11**				**CI13-11**				**CI13-12**				**CI13-13**			
		Field Sample ID	**CI13-11-0001**				**CI13-11-0103**				**CI13-12-SURF**				**CI13-13-SURF**			
		Sample Depth	**0-1**				**1-3**				**0-0.5**				**0-0.5**			
		Sample Date	**09/24/2013**				**09/24/2013**				**09/30/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a] μg/g oc	**Coc, PAHi, Maxi[a] μg/g oc**	**Conc μg/g Dry wt**	**Coc μg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc μg/g Dry wt**	**Coc μg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc μg/g Dry wt**	**Coc μg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc μg/g Dry wt**	**Coc μg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	2.6	0.026	---	---	1.13	0.0113	---	---	5.52	0.0552	---	---	4.43	0.0443	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (μg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.10	1.81	1.81	0.00	0.06	1.33	1.33	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.17	0.17	0.00	0.00	0.19	0.19	0.00	0.10	1.81	1.81	0.00	0.10	2.21	2.21	0.00
Acenaphthene (a)	491.00	33400	0.00	0.07	0.07	0.00	0.00	0.19	0.19	0.00	0.04	0.69	0.69	0.00	0.07	1.51	1.51	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.02	0.02	0.00	0.00	0.19	0.19	0.00	0.07	1.34	1.34	0.00	0.09	2.01	2.01	0.00
Anthracene (a)	594.00	1300	0.01	0.23	0.23	0.00	0.00	0.01	0.01	0.00	0.18	3.26	3.26	0.01	0.40	9.03	9.03	0.02
Benzo(a)anthracene (a)	841.00	4153	0.03	0.96	0.96	0.00	0.00	0.19	0.19	0.00	0.87	15.76	15.76	0.02	1.40	31.60	31.60	0.04
Benzo(a)pyrene (a)	965.00	3840	0.02	0.73	0.73	0.00	0.00	0.02	0.02	0.00	0.91	16.49	16.49	0.02	1.50	33.86	33.86	0.04
Benzo(b)fluoranthene (a)	979.00	2169	0.02	0.73	0.73	0.00	0.00	0.19	0.19	0.00	0.80	14.49	14.49	0.01	1.50	33.86	33.86	0.03
Benzo(e)pyrene (a)	967.00	4300	0.02	0.58	0.58	0.00	0.00	0.19	0.19	0.00	0.58	10.51	10.51	0.01	0.93	20.99	20.99	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.01	0.35	0.35	0.00	0.00	0.19	0.19	0.00	0.50	9.06	9.06	0.01	0.53	11.96	11.96	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.02	0.77	0.77	0.00	0.00	0.03	0.03	0.00	0.66	11.96	11.96	0.01	1.40	31.60	31.60	0.03
C1 Chrysenes (a)	929.00	---	0.02	0.62	0.62	0.00	0.00	0.16	0.16	0.00	0.60	10.87	10.87	0.01	0.69	15.58	15.58	0.02
C1 Fluorenes (a)	611.00	---	0.00	0.17	0.17	0.00	0.00	0.19	0.19	0.00	0.03	0.56	0.56	0.00	0.03	0.77	0.77	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.03	1.15	1.15	0.00	0.00	0.13	0.13	0.00	0.91	16.49	16.49	0.02	1.20	27.09	27.09	0.04
C1-Naphthalenes (a)	444.00	---	0.00	0.17	0.17	0.00	0.00	0.19	0.19	0.00	0.04	0.67	0.67	0.00	0.11	2.48	2.48	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.01	0.50	0.50	0.00	0.00	0.07	0.07	0.00	0.48	8.70	8.70	0.01	0.60	13.54	13.54	0.02
C2 Chrysenes (a)	1008.00	---	0.01	0.50	0.50	0.00	0.00	0.19	0.19	0.00	0.33	5.98	5.98	0.01	0.57	12.87	12.87	0.01
C2 Fluorenes (a)	686.00	---	0.00	0.05	0.05	0.00	0.00	0.19	0.19	0.00	0.04	0.63	0.63	0.00	0.04	0.97	0.97	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.02	0.69	0.69	---	0.00	0.14	0.14	---	0.45	8.15	8.15	---	0.45	10.16	10.16	---
C2-Naphthalenes (a)	510.00	---	0.00	0.10	0.10	0.00	0.00	0.09	0.09	0.00	0.12	2.17	2.17	0.00	0.25	5.64	5.64	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	0.01	0.35	0.35	0.00	0.00	0.11	0.11	0.00	0.37	6.70	6.70	0.01	0.38	8.58	8.58	0.01
C3 Chrysenes (a)	1112.00	---	0.00	0.19	0.19	0.00	0.00	0.11	0.11	0.00	0.14	2.54	2.54	0.00	0.23	5.19	5.19	0.00
C3 Fluorenes (a)	769.00	---	0.00	0.10	0.10	0.00	0.00	0.19	0.19	0.00	0.09	1.61	1.61	0.00	0.09	2.12	2.12	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.36	0.36	0.00	0.00	0.12	0.12	0.00	0.20	3.62	3.62	0.00	0.26	5.87	5.87	0.01
C3-Naphthalenes (a)	581.00	---	0.00	0.15	0.15	0.00	0.00	0.12	0.12	0.00	0.16	2.90	2.90	0.00	0.30	6.77	6.77	0.01
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.01	0.42	0.42	0.00	0.00	0.16	0.16	0.00	0.24	4.35	4.35	0.01	0.28	6.32	6.32	0.01
C4 Chrysenes (a)	1214.00	---	0.00	0.08	0.08	0.00	0.00	0.07	0.07	0.00	0.04	0.78	0.78	0.00	0.15	3.27	3.27	0.00
C4-Naphthalenes (a)	657.00	---	0.00	0.12	0.12	0.00	0.00	0.19	0.19	0.00	0.11	1.99	1.99	0.00	0.18	4.06	4.06	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	0.30	0.30	0.00	0.00	0.14	0.14	0.00	0.12	2.17	2.17	0.00	0.17	3.84	3.84	0.00
Chrysene (a)	844.00	826	0.02	0.88	0.88	0.00	0.00	0.12	0.12	0.00	0.87	15.76	15.76	0.02	1.30	29.35	29.35	0.03
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.00	0.17	0.17	0.00	0.00	0.19	0.19	0.00	0.16	2.90	2.90	0.00	0.15	3.39	3.39	0.00
Fluoranthene (a)	707.00	23870	0.05	2.04	2.04	0.00	0.00	0.10	0.10	0.00	1.30	23.55	23.55	0.03	2.20	49.66	49.66	0.07
Fluorene (a)	538.00	26000	0.00	0.08	0.08	0.00	0.00	0.01	0.01	0.00	0.07	1.18	1.18	0.00	0.12	2.71	2.71	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.17	0.17	0.00	0.00	0.19	0.19	0.00	0.46	8.33	8.33	0.01	0.52	11.74	11.74	0.01
Naphthalene (a)	385.00	61700	0.00	0.17	0.17	0.00	0.00	0.19	0.19	0.00	0.10	1.81	1.81	0.00	0.22	4.97	4.97	0.01
Perylene (a)	967.00	431	0.01	0.29	0.29	0.00	0.00	0.04	0.04	0.00	0.21	3.80	3.80	0.00	0.40	9.03	9.03	0.01
Phenanthrene (a)	596.00	34300	0.02	0.77	0.77	0.00	0.00	0.19	0.19	0.00	0.46	8.33	8.33	0.01	0.69	15.58	15.58	0.03
Pyrene (a)	697.00	9,090.00	0.04	1.69	1.69	0.00	0.00	0.11	0.11	0.00	0.94	17.03	17.03	0.02	1.50	33.86	33.86	0.05
	---	**ESBTU FCVi**	---	---	---	0.02	---	---	---	0.01	---	---	---	0.26	---	---	---	0.50

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
μg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-13**				**CI13-13**				**CI13-13**				**CI13-14**			
		Field Sample ID	**CI13-13-0001**				**CI13-13-0103**				**CI13-13-0305**				**CI13-14-SURF**			
		Sample Depth	**0-1**				**1-3**				**3-5**				**0-0.5**			
		Sample Date	**09/24/2013**				**09/24/2013**				**09/24/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.6	0.016	---	---	2.3	0.023	---	---	2.94	0.0294	---	---	3.47	0.0347	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.01	0.69	0.69	0.00	0.00	0.20	0.20	0.00	0.00	0.06	0.06	0.00	0.05	1.33	1.33	0.00
2-Methylnaphthalene	447.00	154800	0.05	3.13	3.13	0.01	0.01	0.28	0.28	0.00	0.00	0.08	0.08	0.00	0.08	2.39	2.39	0.01
Acenaphthene (a)	491.00	33400	0.03	1.94	1.94	0.00	0.00	0.14	0.14	0.00	0.00	0.02	0.02	0.00	0.07	2.10	2.10	0.00
Acenaphthylene (a)	452.00	24000	0.03	1.75	1.75	0.00	0.00	0.17	0.17	0.00	0.00	0.01	0.01	0.00	0.17	4.90	4.90	0.01
Anthracene (a)	594.00	1300	0.36	22.50	22.50	0.04	0.01	0.26	0.26	0.00	0.00	0.02	0.02	0.00	0.71	20.46	20.46	0.03
Benzo(a)anthracene (a)	841.00	4153	0.60	37.50	37.50	0.04	0.01	0.43	0.43	0.00	0.00	0.08	0.08	0.00	3.30	95.10	95.10	0.11
Benzo(a)pyrene (a)	965.00	3840	0.55	34.38	34.38	0.04	0.01	0.31	0.31	0.00	0.00	0.04	0.04	0.00	3.30	95.10	95.10	0.10
Benzo(b)fluoranthene (a)	979.00	2169	0.50	31.25	31.25	0.03	0.01	0.33	0.33	0.00	0.00	0.08	0.08	0.00	2.90	83.57	83.57	0.09
Benzo(e)pyrene (a)	967.00	4300	0.32	20.00	20.00	0.02	0.01	0.28	0.28	0.00	0.00	0.08	0.08	0.00	1.90	54.76	54.76	0.06
Benzo(g,h,i)perylene (a)	1095.00	648	0.23	14.38	14.38	0.01	0.00	0.10	0.10	0.00	0.00	0.08	0.08	0.00	1.10	31.70	31.70	0.03
Benzo(k)fluoranthene (a)	981.00	1220	0.45	28.13	28.13	0.03	0.01	0.33	0.33	0.00	0.00	0.04	0.04	0.00	3.00	86.46	86.46	0.09
C1 Chrysenes (a)	929.00	---	0.31	19.38	19.38	0.02	0.01	0.52	0.52	0.00	0.01	0.28	0.28	0.00	1.80	51.87	51.87	0.06
C1 Fluorenes (a)	611.00	---	0.02	1.00	1.00	0.00	0.00	0.09	0.09	0.00	0.00	0.05	0.05	0.00	0.33	9.51	9.51	0.02
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.59	36.88	36.88	0.05	0.02	0.83	0.83	0.00	0.01	0.33	0.33	0.00	3.20	92.22	92.22	0.12
C1-Naphthalenes (a)	444.00	---	0.02	1.38	1.38	0.00	0.01	0.31	0.31	0.00	0.00	0.08	0.08	0.00	0.09	2.62	2.62	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.29	18.13	18.13	0.03	0.02	1.04	1.04	0.00	0.02	0.51	0.51	0.00	1.30	37.46	37.46	0.06
C2 Chrysenes (a)	1008.00	---	0.18	11.25	11.25	0.01	0.02	0.65	0.65	0.00	0.02	0.58	0.58	0.00	1.20	34.58	34.58	0.03
C2 Fluorenes (a)	686.00	---	0.03	1.56	1.56	0.00	0.00	0.17	0.17	0.00	0.00	0.11	0.11	0.00	0.09	2.62	2.62	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.23	14.38	14.38	---	0.01	0.61	0.61	---	0.01	0.37	0.37	---	1.20	34.58	34.58	---
C2-Naphthalenes (a)	510.00	---	0.07	4.19	4.19	0.01	0.02	0.70	0.70	0.00	0.01	0.31	0.31	0.00	0.28	8.07	8.07	0.02
C2-Phenanthrenes/Anthracenes (a)	746	---	0.24	15.00	15.00	0.02	0.05	2.00	2.00	0.00	0.03	0.85	0.85	0.00	0.87	25.07	25.07	0.03
C3 Chrysenes (a)	1112.00	---	0.07	4.19	4.19	0.00	0.01	0.34	0.34	0.00	0.01	0.28	0.28	0.00	0.41	11.82	11.82	0.01
C3 Fluorenes (a)	769.00	---	0.03	2.13	2.13	0.00	0.01	0.27	0.27	0.00	0.01	0.18	0.18	0.00	0.16	4.61	4.61	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.10	6.25	6.25	0.01	0.01	0.52	0.52	0.00	0.01	0.44	0.44	0.00	0.54	15.56	15.56	0.02
C3-Naphthalenes (a)	581.00	---	0.10	6.25	6.25	0.01	0.03	1.26	1.26	0.00	0.03	0.85	0.85	0.00	0.34	9.80	9.80	0.02
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.16	10.00	10.00	0.01	0.03	1.30	1.30	0.00	0.03	0.95	0.95	0.00	0.61	17.58	17.58	0.02
C4 Chrysenes (a)	1214.00	---	0.05	3.13	3.13	0.00	0.00	0.10	0.10	0.00	0.00	0.11	0.11	0.00	0.33	9.51	9.51	0.01
C4-Naphthalenes (a)	657.00	---	0.08	5.25	5.25	0.01	0.03	1.09	1.09	0.00	0.03	0.88	0.88	0.00	0.22	6.34	6.34	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.07	4.13	4.13	0.00	0.01	0.61	0.61	0.00	0.02	0.51	0.51	0.00	0.26	7.49	7.49	0.01
Chrysene (a)	844.00	826	0.64	40.00	40.00	0.05	0.01	0.52	0.52	0.00	0.01	0.21	0.21	0.00	3.20	92.22	92.22	0.11
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.05	3.13	3.13	0.00	0.00	0.10	0.10	0.00	0.00	0.08	0.08	0.00	0.31	8.93	8.93	0.01
Fluoranthene (a)	707.00	23870	0.73	45.63	45.63	0.06	0.02	0.78	0.78	0.00	0.00	0.14	0.14	0.00	3.70	106.63	106.63	0.15
Fluorene (a)	538.00	26000	0.07	4.44	4.44	0.01	0.01	0.39	0.39	0.00	0.00	0.05	0.05	0.00	0.14	4.03	4.03	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.23	14.38	14.38	0.01	0.00	0.10	0.10	0.00	0.00	0.08	0.08	0.00	1.10	31.70	31.70	0.03
Naphthalene (a)	385.00	61700	0.05	3.13	3.13	0.01	0.03	1.17	1.17	0.00	0.00	0.08	0.08	0.00	0.23	6.63	6.63	0.02
Perylene (a)	967.00	431	0.15	9.38	9.38	0.01	0.02	0.83	0.83	0.00	0.03	0.95	0.95	0.00	0.87	25.07	25.07	0.03
Phenanthrene (a)	596.00	34300	0.24	15.00	15.00	0.03	0.02	0.78	0.78	0.00	0.00	0.08	0.08	0.00	1.10	31.70	31.70	0.05
Pyrene (a)	697.00	9,090.00	0.58	36.25	36.25	0.05	0.01	0.61	0.61	0.00	0.00	0.14	0.14	0.00	2.80	80.69	80.69	0.12
	---	**ESBTU FCVi**	---	---	---	0.57	---	---	---	0.02	---	---	---	0.01	---	---	---	1.30

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-14				CI13-14				CI13-15				CI13-15			
		Field Sample ID	CI13-14-0001				CI13-14-0103				CI13-15-SURF				CI13-15-0001			
		Sample Depth	0-1				1-3				0-0.5				0-1			
		Sample Date	09/25/2013				09/25/2013				09/30/2013				09/25/2013			
	Coc, PAHi, FCVi[a]	Coc, PAHi, Maxi[a]	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	2.86	0.0286	---	---	1.13	0.0113	---	---	3.69	0.0369	---	---	1.68	0.0168	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.07	2.31	2.31	0.01	0.00	0.13	0.13	0.00	0.09	2.38	2.38	0.01	0.03	2.02	2.02	0.00
2-Methylnaphthalene	447.00	154800	0.38	13.29	13.29	0.03	0.01	0.75	0.75	0.00	0.14	3.79	3.79	0.01	0.23	13.39	13.39	0.03
Acenaphthene (a)	491.00	33400	0.13	4.55	4.55	0.01	0.01	0.63	0.63	0.00	0.20	5.42	5.42	0.01	0.05	2.98	2.98	0.01
Acenaphthylene (a)	452.00	24000	0.20	6.99	6.99	0.02	0.00	0.23	0.23	0.00	0.26	7.05	7.05	0.02	0.09	5.12	5.12	0.01
Anthracene (a)	594.00	1300	0.80	27.97	27.97	0.05	0.03	2.21	2.21	0.00	1.10	29.81	29.81	0.05	0.53	31.55	31.55	0.05
Benzo(a)anthracene (a)	841.00	4153	3.70	129.37	129.37	0.15	0.05	4.78	4.78	0.01	4.60	124.66	124.66	0.15	2.00	119.05	119.05	0.14
Benzo(a)pyrene (a)	965.00	3840	3.40	118.88	118.88	0.12	0.04	3.36	3.36	0.00	4.40	119.24	119.24	0.12	1.80	107.14	107.14	0.11
Benzo(b)fluoranthene (a)	979.00	2169	2.60	90.91	90.91	0.09	0.03	2.30	2.30	0.00	3.40	92.14	92.14	0.09	1.30	77.38	77.38	0.08
Benzo(e)pyrene (a)	967.00	4300	2.00	69.93	69.93	0.07	0.02	2.04	2.04	0.00	2.50	67.75	67.75	0.07	0.98	58.33	58.33	0.06
Benzo(g,h,i)perylene (a)	1095.00	648	1.40	48.95	48.95	0.04	0.01	0.75	0.75	0.00	1.60	43.36	43.36	0.04	0.70	41.67	41.67	0.04
Benzo(k)fluoranthene (a)	981.00	1220	2.50	87.41	87.41	0.09	0.03	2.65	2.65	0.00	3.60	97.56	97.56	0.10	1.30	77.38	77.38	0.08
C1 Chrysenes (a)	929.00	---	3.00	104.90	104.90	0.11	0.04	3.89	3.89	0.00	0.42	11.38	11.38	0.01	1.20	71.43	71.43	0.08
C1 Fluorenes (a)	611.00	---	0.12	4.20	4.20	0.01	0.01	0.55	0.55	0.00	0.12	3.25	3.25	0.01	0.23	13.39	13.39	0.02
C1-Fluoranthenes/Pyrenes (a)	770.00	---	4.90	171.33	171.33	0.22	0.11	9.73	9.73	0.01	0.42	11.38	11.38	0.01	2.30	136.90	136.90	0.18
C1-Naphthalenes (a)	444.00	---	0.12	4.20	4.20	0.01	0.00	0.19	0.19	0.00	0.16	4.34	4.34	0.01	0.07	4.23	4.23	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	2.80	97.90	97.90	0.15	0.09	8.14	8.14	0.01	2.60	70.46	70.46	0.11	1.00	59.52	59.52	0.09
C2 Chrysenes (a)	1008.00	---	1.90	66.43	66.43	0.07	0.03	2.57	2.57	0.00	0.42	11.38	11.38	0.01	0.62	36.90	36.90	0.04
C2 Fluorenes (a)	686.00	---	0.25	8.74	8.74	0.01	0.01	0.88	0.88	0.00	0.16	4.34	4.34	0.01	0.07	3.99	3.99	0.01
C2-Fluoranthenes/Pyrenes	---	---	2.80	97.90	97.90	---	0.05	4.69	4.69	---	0.42	11.38	11.38	---	0.90	53.57	53.57	---
C2-Naphthalenes (a)	510.00	---	0.45	15.73	15.73	0.03	0.02	1.42	1.42	0.00	0.52	14.09	14.09	0.03	0.16	9.52	9.52	0.02
C2-Phenanthrenes/Anthracenes (a)	746	---	2.20	76.92	76.92	0.10	0.07	6.28	6.28	0.01	1.60	43.36	43.36	0.06	0.57	33.93	33.93	0.05
C3 Chrysenes (a)	1112.00	---	0.59	20.63	20.63	0.02	0.01	1.15	1.15	0.00	0.42	11.38	11.38	0.01	0.20	11.90	11.90	0.01
C3 Fluorenes (a)	769.00	---	0.39	13.64	13.64	0.02	0.01	1.06	1.06	0.00	0.26	7.05	7.05	0.01	0.10	5.83	5.83	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	1.30	45.45	45.45	0.05	0.03	2.39	2.39	0.00	0.42	11.38	11.38	0.01	0.35	20.83	20.83	0.02
C3-Naphthalenes (a)	581.00	---	0.91	31.82	31.82	0.05	0.03	3.01	3.01	0.01	0.64	17.34	17.34	0.03	0.20	11.90	11.90	0.02
C3-Phenanthrenes/Anthracenes (a)	829.00	---	1.80	62.94	62.94	0.08	0.05	4.34	4.34	0.01	1.70	46.07	46.07	0.06	0.40	23.81	23.81	0.03
C4 Chrysenes (a)	1214.00	---	0.16	5.59	5.59	0.00	0.00	0.31	0.31	0.00	0.42	11.38	11.38	0.01	0.23	13.39	13.39	0.01
C4-Naphthalenes (a)	657.00	---	0.43	15.03	15.03	0.02	0.03	2.30	2.30	0.00	0.33	8.94	8.94	0.01	0.11	6.55	6.55	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.89	31.12	31.12	0.03	0.02	1.95	1.95	0.00	3.30	89.43	89.43	0.10	0.20	11.90	11.90	0.01
Chrysene (a)	844.00	826	3.40	118.88	118.88	0.14	0.05	4.51	4.51	0.01	3.90	105.69	105.69	0.13	1.70	101.19	101.19	0.12
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.38	13.29	13.29	0.01	0.01	0.75	0.75	0.00	0.51	13.82	13.82	0.01	0.23	13.39	13.39	0.01
Fluoranthene (a)	707.00	23870	4.10	143.36	143.36	0.20	0.09	7.52	7.52	0.01	6.60	178.86	178.86	0.25	2.90	172.62	172.62	0.24
Fluorene (a)	538.00	26000	0.27	9.44	9.44	0.02	0.01	0.56	0.56	0.00	0.31	8.40	8.40	0.02	0.12	7.14	7.14	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	1.20	41.96	41.96	0.04	0.01	0.75	0.75	0.00	1.50	40.65	40.65	0.04	0.65	38.69	38.69	0.03
Naphthalene (a)	385.00	61700	0.38	13.29	13.29	0.03	0.01	0.75	0.75	0.00	0.34	9.21	9.21	0.02	0.23	13.39	13.39	0.03
Perylene (a)	967.00	431	0.75	26.22	26.22	0.03	0.02	1.42	1.42	0.00	1.00	27.10	27.10	0.03	0.40	23.81	23.81	0.02
Phenanthrene (a)	596.00	34300	1.50	52.45	52.45	0.09	0.03	3.01	3.01	0.01	2.30	62.33	62.33	0.10	0.90	53.57	53.57	0.09
Pyrene (a)	697.00	9,090.00	3.60	125.87	125.87	0.18	0.09	7.96	7.96	0.01	5.00	135.50	135.50	0.19	2.20	130.95	130.95	0.19
	---	**ESBTU FCVi**	---	---	---	2.01	---	---	---	0.10	---	---	---	1.80	---	---	---	1.73

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-15**				**CI13-16**				**CI13-16**				**CI13-16**			
		Field Sample ID	**CI13-15-0103**				**CI13-16-SURF**				**CI13-16-0001**				**CI13-16-0103**			
		Sample Depth	**1-3**				**0-0.5**				**0-1**				**1-3**			
		Sample Date	**09/25/2013**				**09/30/2013**				**09/25/2013**				**09/25/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi**[a]	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc**[b]	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.93	0.0193	---	---	3.76	0.0376	---	---	2.71	0.0271	---	---	0.677	0.00677	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.05	0.05	0.00	0.22	5.85	5.85	0.01	0.03	1.07	1.07	0.00	0.00	0.19	0.19	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.11	0.11	0.00	0.21	5.59	5.59	0.01	0.23	8.30	8.30	0.02	0.02	2.81	2.81	0.01
Acenaphthene (a)	491.00	33400	0.00	0.06	0.06	0.00	1.30	34.57	34.57	0.07	0.09	3.28	3.28	0.01	0.01	0.80	0.80	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.06	0.06	0.00	1.20	31.91	31.91	0.07	0.17	6.27	6.27	0.01	0.01	2.07	2.07	0.00
Anthracene (a)	594.00	1300	0.01	0.30	0.30	0.00	13.00	345.74	345.74	0.58	0.51	18.82	18.82	0.03	0.03	3.99	3.99	0.01
Benzo(a)anthracene (a)	841.00	4153	0.02	0.83	0.83	0.00	34.00	904.26	904.26	1.08	3.40	125.46	125.46	0.15	0.25	36.93	36.93	0.04
Benzo(a)pyrene (a)	965.00	3840	0.01	0.67	0.67	0.00	26.00	691.49	691.49	0.72	3.40	125.46	125.46	0.13	0.27	39.88	39.88	0.04
Benzo(b)fluoranthene (a)	979.00	2169	0.01	0.67	0.67	0.00	19.00	505.32	505.32	0.52	2.30	84.87	84.87	0.09	0.16	23.63	23.63	0.02
Benzo(e)pyrene (a)	967.00	4300	0.01	0.44	0.44	0.00	15.00	398.94	398.94	0.41	1.90	70.11	70.11	0.07	0.15	22.16	22.16	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.01	0.28	0.28	0.00	9.40	250.00	250.00	0.23	1.20	44.28	44.28	0.04	0.09	13.15	13.15	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.01	0.57	0.57	0.00	25.00	664.89	664.89	0.68	2.30	84.87	84.87	0.09	0.17	25.11	25.11	0.03
C1 Chrysenes (a)	929.00	---	0.01	0.57	0.57	0.00	19.00	505.32	505.32	0.54	3.00	110.70	110.70	0.12	0.21	31.02	31.02	0.03
C1 Fluorenes (a)	611.00	---	0.00	0.04	0.04	0.00	1.20	31.91	31.91	0.05	0.08	2.95	2.95	0.00	0.01	0.74	0.74	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.02	1.04	1.04	0.00	40.00	1063.83	1063.83	1.38	4.70	173.43	173.43	0.23	0.34	50.22	50.22	0.07
C1-Naphthalenes (a)	444.00	---	0.00	0.07	0.07	0.00	3.90	103.72	103.72	0.23	0.06	2.21	2.21	0.00	0.02	2.81	2.81	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.01	0.67	0.67	0.00	29.00	771.28	771.28	1.15	1.60	59.04	59.04	0.09	0.11	16.25	16.25	0.02
C2 Chrysenes (a)	1008.00	---	0.01	0.49	0.49	0.00	11.00	292.55	292.55	0.29	2.00	73.80	73.80	0.07	0.14	20.68	20.68	0.02
C2 Fluorenes (a)	686.00	---	0.00	0.07	0.07	0.00	1.20	31.91	31.91	0.05	0.17	6.27	6.27	0.01	0.01	1.62	1.62	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.51	0.51	---	13.00	345.74	345.74	---	2.70	99.63	99.63	---	0.19	28.06	28.06	---
C2-Naphthalenes (a)	510.00	---	0.00	0.22	0.22	0.00	2.80	74.47	74.47	0.15	0.23	8.49	8.49	0.02	0.01	1.62	1.62	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.01	0.57	0.57	0.00	12.00	319.15	319.15	0.43	1.50	55.35	55.35	0.07	0.11	16.25	16.25	0.02
C3 Chrysenes (a)	1112.00	---	0.00	0.20	0.20	0.00	3.40	90.43	90.43	0.08	0.75	27.68	27.68	0.02	0.04	5.76	5.76	0.01
C3 Fluorenes (a)	769.00	---	0.00	0.13	0.13	0.00	1.30	34.57	34.57	0.05	0.26	9.59	9.59	0.01	0.02	2.51	2.51	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.36	0.36	0.00	4.80	127.66	127.66	0.13	1.40	51.66	51.66	0.05	0.08	12.41	12.41	0.01
C3-Naphthalenes (a)	581.00	---	0.01	0.38	0.38	0.00	4.40	117.02	117.02	0.20	0.43	15.87	15.87	0.03	0.02	3.40	3.40	0.01
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.01	0.57	0.57	0.00	5.10	135.64	135.64	0.16	1.30	47.97	47.97	0.06	0.09	12.85	12.85	0.02
C4 Chrysenes (a)	1214.00	---	0.00	0.07	0.07	0.00	3.90	103.72	103.72	0.09	0.23	8.49	8.49	0.01	0.01	1.62	1.62	0.00
C4-Naphthalenes (a)	657.00	---	0.01	0.38	0.38	0.00	1.90	50.53	50.53	0.08	0.27	9.96	9.96	0.02	0.02	2.22	2.22	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	0.34	0.34	0.00	1.50	39.89	39.89	0.04	0.67	24.72	24.72	0.03	0.04	5.91	5.91	0.01
Chrysene (a)	844.00	826	0.02	0.78	0.78	0.00	28.00	744.68	744.68	0.88	3.20	118.08	118.08	0.14	0.23	33.97	33.97	0.04
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.00	0.11	0.11	0.00	3.00	79.79	79.79	0.07	0.23	8.30	8.30	0.01	0.02	2.81	2.81	0.00
Fluoranthene (a)	707.00	23870	0.03	1.50	1.50	0.00	54.00	1436.17	1436.17	2.03	3.20	118.08	118.08	0.17	0.19	28.06	28.06	0.04
Fluorene (a)	538.00	26000	0.00	0.10	0.10	0.00	2.50	66.49	66.49	0.12	0.15	5.54	5.54	0.01	0.01	1.03	1.03	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.25	0.25	0.00	9.10	242.02	242.02	0.22	1.10	40.59	40.59	0.04	0.08	11.52	11.52	0.01
Naphthalene (a)	385.00	61700	0.00	0.11	0.11	0.00	0.58	15.43	15.43	0.04	0.23	8.30	8.30	0.02	0.02	2.81	2.81	0.01
Perylene (a)	967.00	431	0.03	1.30	1.30	0.00	6.90	183.51	183.51	0.19	0.67	24.72	24.72	0.03	0.05	7.09	7.09	0.01
Phenanthrene (a)	596.00	34300	0.01	0.67	0.67	0.00	25.00	664.89	664.89	1.12	0.68	25.09	25.09	0.04	0.02	2.81	2.81	0.00
Pyrene (a)	697.00	9,090.00	0.02	1.04	1.04	0.00	42.00	1,117.02	1,117.02	1.60	3.20	118.08	118.08	0.17	0.19	28.06	28.06	0.04
	---	**ESBTU FCVi**	---	---	---	0.02	---	---	---	13.93	---	---	---	1.74	---	---	---	0.48

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-17**				**CI13-17**				**CI13-18**				**CI13-18**			
		Field Sample ID	**CI13-17-SURF**				**CI13-17-0001**				**CI13-18A-SURF**				**CI13-18A-0001**			
		Sample Depth	**0-0.5**				**0-1**				**0-0.5**				**0-1**			
		Sample Date	**09/30/2013**				**09/25/2013**				**09/30/2013**				**09/25/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	μg/g oc	**μg/g oc**	**μg/g Dry wt**	**μg/g oc**	**Coc[b]**	**ESBTU FCVi**	**μg/g Dry wt**	**μg/g oc**	**Coc[b]**	**ESBTU FCVi**	**μg/g Dry wt**	**μg/g oc**	**Coc[b]**	**ESBTU FCVi**	**μg/g Dry wt**	**μg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	0.789	0.00789	---	---	3.11	0.0311	---	---	3.55	0.0355	---	---	3.84	0.0384	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (μg/kg)																		
1-Methylnaphthalene	446.00	165700	0.02	2.66	2.66	0.01	0.03	0.90	0.90	0.00	0.02	0.68	0.68	0.00	0.00	0.01	0.01	0.00
2-Methylnaphthalene	447.00	154800	0.02	2.66	2.66	0.01	0.22	6.91	6.91	0.02	0.02	0.68	0.68	0.00	0.00	0.05	0.05	0.00
Acenaphthene (a)	491.00	33400	0.00	0.30	0.30	0.00	0.05	1.74	1.74	0.00	0.01	0.28	0.28	0.00	0.00	0.03	0.03	0.00
Acenaphthylene (a)	452.00	24000	0.01	1.52	1.52	0.00	0.09	2.80	2.80	0.01	0.01	0.24	0.24	0.00	0.00	0.02	0.02	0.00
Anthracene (a)	594.00	1300	0.06	7.73	7.73	0.01	0.64	20.58	20.58	0.03	0.03	0.96	0.96	0.00	0.00	0.09	0.09	0.00
Benzo(a)anthracene (a)	841.00	4153	0.18	22.81	22.81	0.03	1.80	57.88	57.88	0.07	0.16	4.51	4.51	0.01	0.01	0.34	0.34	0.00
Benzo(a)pyrene (a)	965.00	3840	0.15	19.01	19.01	0.02	1.40	45.02	45.02	0.05	0.15	4.23	4.23	0.00	0.01	0.31	0.31	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.14	17.74	17.74	0.02	1.20	38.59	38.59	0.04	0.14	3.94	3.94	0.00	0.01	0.29	0.29	0.00
Benzo(e)pyrene (a)	967.00	4300	0.10	12.04	12.04	0.01	0.88	28.30	28.30	0.03	0.10	2.82	2.82	0.00	0.01	0.20	0.20	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.08	10.01	10.01	0.01	0.68	21.86	21.86	0.02	0.09	2.65	2.65	0.00	0.01	0.14	0.14	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.12	15.21	15.21	0.02	1.50	48.23	48.23	0.05	0.12	3.38	3.38	0.00	0.01	0.29	0.29	0.00
C1 Chrysenes (a)	929.00	---	0.09	11.66	11.66	0.01	0.69	22.19	22.19	0.02	0.11	3.10	3.10	0.00	0.01	0.19	0.19	0.00
C1 Fluorenes (a)	611.00	---	0.02	2.66	2.66	0.00	0.22	6.91	6.91	0.01	0.01	0.18	0.18	0.00	0.00	0.05	0.05	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.15	19.01	19.01	0.02	1.50	48.23	48.23	0.06	0.15	4.23	4.23	0.01	0.01	0.36	0.36	0.00
C1-Naphthalenes (a)	444.00	---	0.02	2.66	2.66	0.01	0.05	1.70	1.70	0.00	0.02	0.54	0.54	0.00	0.00	0.03	0.03	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.07	9.00	9.00	0.01	0.71	22.83	22.83	0.03	0.14	3.94	3.94	0.01	0.01	0.22	0.22	0.00
C2 Chrysenes (a)	1008.00	---	0.05	6.59	6.59	0.01	0.37	11.90	11.90	0.01	0.07	1.89	1.89	0.00	0.00	0.12	0.12	0.00
C2 Fluorenes (a)	686.00	---	0.02	2.66	2.66	0.00	0.22	6.91	6.91	0.01	0.02	0.68	0.68	0.00	0.00	0.02	0.02	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.06	7.48	7.48	---	0.46	14.79	14.79	---	0.10	2.82	2.82	---	0.01	0.15	0.15	---
C2-Naphthalenes (a)	510.00	---	0.01	1.39	1.39	0.00	0.15	4.82	4.82	0.01	0.05	1.30	1.30	0.00	0.00	0.07	0.07	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.04	5.20	5.20	0.01	0.30	9.65	9.65	0.01	0.07	2.08	2.08	0.00	0.01	0.13	0.13	0.00
C3 Chrysenes (a)	1112.00	---	0.02	3.04	3.04	0.00	0.14	4.50	4.50	0.00	0.03	0.93	0.93	0.00	0.00	0.05	0.05	0.00
C3 Fluorenes (a)	769.00	---	0.01	1.39	1.39	0.00	0.05	1.48	1.48	0.00	0.02	0.68	0.68	0.00	0.00	0.05	0.05	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.03	3.42	3.42	0.00	0.19	6.11	6.11	0.01	0.05	1.30	1.30	0.00	0.00	0.07	0.07	0.00
C3-Naphthalenes (a)	581.00	---	0.01	1.52	1.52	0.00	0.17	5.47	5.47	0.01	0.04	1.04	1.04	0.00	0.00	0.11	0.11	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.03	3.42	3.42	0.00	0.21	6.75	6.75	0.01	0.04	1.07	1.07	0.00	0.00	0.08	0.08	0.00
C4 Chrysenes (a)	1214.00	---	0.01	0.98	0.98	0.00	0.22	6.91	6.91	0.01	0.01	0.28	0.28	0.00	0.00	0.05	0.05	0.00
C4-Naphthalenes (a)	657.00	---	0.01	1.05	1.05	0.00	0.05	1.74	1.74	0.00	0.02	0.56	0.56	0.00	0.00	0.04	0.04	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	1.90	1.90	0.00	0.10	3.12	3.12	0.00	0.02	0.62	0.62	0.00	0.00	0.04	0.04	0.00
Chrysene (a)	844.00	826	0.17	21.55	21.55	0.03	1.60	51.45	51.45	0.06	0.16	4.51	4.51	0.01	0.01	0.31	0.31	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.02	3.04	3.04	0.00	0.22	6.91	6.91	0.01	0.03	0.79	0.79	0.00	0.00	0.05	0.05	0.00
Fluoranthene (a)	707.00	23870	0.29	36.76	36.76	0.05	3.40	109.32	109.32	0.15	0.32	9.01	9.01	0.01	0.02	0.49	0.49	0.00
Fluorene (a)	538.00	26000	0.01	1.52	1.52	0.00	0.16	5.14	5.14	0.01	0.02	0.48	0.48	0.00	0.00	0.04	0.04	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.08	9.89	9.89	0.01	0.66	21.22	21.22	0.02	0.09	2.42	2.42	0.00	0.01	0.13	0.13	0.00
Naphthalene (a)	385.00	61700	0.02	2.66	2.66	0.01	0.22	6.91	6.91	0.02	0.02	0.68	0.68	0.00	0.00	0.05	0.05	0.00
Perylene (a)	967.00	431	0.04	4.94	4.94	0.01	0.41	13.18	13.18	0.01	0.04	1.10	1.10	0.00	0.00	0.10	0.10	0.00
Phenanthrene (a)	596.00	34300	0.11	13.94	13.94	0.02	1.50	48.23	48.23	0.08	0.19	5.35	5.35	0.01	0.01	0.23	0.23	0.00
Pyrene (a)	697.00	9,090.00	0.17	21.55	21.55	0.03	2.30	73.95	73.95	0.11	0.21	5.92	5.92	0.01	0.01	0.36	0.36	0.00
	---	**ESBTU FCVi**	---	---	---	0.34	---	---	---	0.91	---	---	---	0.09	---	---	---	0.01

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
μg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-20**				**CI13-20**				**CI13-20**				**CI13-21**			
		Field Sample ID	**CI13-20-SURF**				**CI13-20-0001**				**CI13-20-0103**				**CI13-21-SURF**			
		Sample Depth	**0-0.5**				**0-1**				**1-3**				**0-0.5**			
		Sample Date	**09/30/2013**				**09/25/2013**				**09/25/2013**				**09/26/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.53	0.0153	---	---	1.38	0.0138	---	---	2.7	0.027	---	---	1.81	0.0181	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.05	3.24	3.24	0.01	0.01	1.01	1.01	0.00	0.00	0.04	0.04	0.00	0.01	0.46	0.46	0.00
2-Methylnaphthalene	447.00	154800	0.05	3.24	3.24	0.01	0.06	3.99	3.99	0.01	0.00	0.09	0.09	0.00	0.02	0.86	0.86	0.00
Acenaphthene (a)	491.00	33400	0.03	1.90	1.90	0.00	0.04	3.19	3.19	0.01	0.00	0.07	0.07	0.00	0.02	0.83	0.83	0.00
Acenaphthylene (a)	452.00	24000	0.03	2.16	2.16	0.00	0.02	1.52	1.52	0.00	0.00	0.03	0.03	0.00	0.01	0.41	0.41	0.00
Anthracene (a)	594.00	1300	0.13	8.50	8.50	0.01	0.15	10.87	10.87	0.02	0.00	0.14	0.14	0.00	0.04	2.27	2.27	0.00
Benzo(a)anthracene (a)	841.00	4153	0.47	30.72	30.72	0.04	0.44	31.88	31.88	0.04	0.01	0.44	0.44	0.00	0.15	8.29	8.29	0.01
Benzo(a)pyrene (a)	965.00	3840	0.49	32.03	32.03	0.03	0.37	26.81	26.81	0.03	0.01	0.37	0.37	0.00	0.13	7.18	7.18	0.01
Benzo(b)fluoranthene (a)	979.00	2169	0.41	26.80	26.80	0.03	0.31	22.46	22.46	0.02	0.01	0.28	0.28	0.00	0.13	7.18	7.18	0.01
Benzo(e)pyrene (a)	967.00	4300	0.31	20.26	20.26	0.02	0.23	16.67	16.67	0.02	0.01	0.24	0.24	0.00	0.09	5.03	5.03	0.01
Benzo(g,h,i)perylene (a)	1095.00	648	0.26	16.99	16.99	0.02	0.15	10.87	10.87	0.01	0.00	0.09	0.09	0.00	0.05	2.71	2.71	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.36	23.53	23.53	0.02	0.36	26.09	26.09	0.03	0.01	0.27	0.27	0.00	0.11	6.08	6.08	0.01
C1 Chrysenes (a)	929.00	---	0.29	18.95	18.95	0.02	0.29	21.01	21.01	0.02	0.01	0.48	0.48	0.00	0.09	4.86	4.86	0.01
C1 Fluorenes (a)	611.00	---	0.02	1.18	1.18	0.00	0.02	1.74	1.74	0.00	0.00	0.06	0.06	0.00	0.00	0.19	0.19	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.50	32.68	32.68	0.04	0.53	38.41	38.41	0.05	0.02	0.81	0.81	0.00	0.14	7.73	7.73	0.01
C1-Naphthalenes (a)	444.00	---	0.02	1.24	1.24	0.00	0.02	1.67	1.67	0.00	0.00	0.05	0.05	0.00	0.02	0.94	0.94	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.30	19.61	19.61	0.03	0.34	24.64	24.64	0.04	0.02	0.78	0.78	0.00	0.08	4.59	4.59	0.01
C2 Chrysenes (a)	1008.00	---	0.17	11.11	11.11	0.01	0.19	13.77	13.77	0.01	0.01	0.44	0.44	0.00	0.07	3.92	3.92	0.00
C2 Fluorenes (a)	686.00	---	0.02	1.50	1.50	0.00	0.04	2.83	2.83	0.00	0.00	0.10	0.10	0.00	0.01	0.39	0.39	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.23	15.03	15.03	---	0.30	21.74	21.74	---	0.01	0.52	0.52	---	0.07	4.03	4.03	---
C2-Naphthalenes (a)	510.00	---	0.07	4.25	4.25	0.01	0.09	6.16	6.16	0.01	0.01	0.24	0.24	0.00	0.03	1.71	1.71	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.21	13.73	13.73	0.02	0.26	18.84	18.84	0.03	0.02	0.67	0.67	0.00	0.06	3.20	3.20	0.00
C3 Chrysenes (a)	1112.00	---	0.06	3.66	3.66	0.00	0.07	4.78	4.78	0.00	0.01	0.19	0.19	0.00	0.03	1.66	1.66	0.00
C3 Fluorenes (a)	769.00	---	0.05	3.46	3.46	0.00	0.09	6.52	6.52	0.01	0.00	0.17	0.17	0.00	0.02	0.83	0.83	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.10	6.54	6.54	0.01	0.16	11.59	11.59	0.01	0.01	0.36	0.36	0.00	0.04	2.43	2.43	0.00
C3-Naphthalenes (a)	581.00	---	0.08	5.49	5.49	0.01	0.18	13.04	13.04	0.02	0.02	0.74	0.74	0.00	0.03	1.66	1.66	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.14	9.15	9.15	0.01	0.28	20.29	20.29	0.02	0.02	0.74	0.74	0.00	0.06	3.37	3.37	0.00
C4 Chrysenes (a)	1214.00	---	0.02	1.44	1.44	0.00	0.02	1.45	1.45	0.00	0.00	0.07	0.07	0.00	0.01	0.66	0.66	0.00
C4-Naphthalenes (a)	657.00	---	0.06	3.99	3.99	0.01	0.12	8.70	8.70	0.01	0.02	0.56	0.56	0.00	0.03	1.49	1.49	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.08	5.42	5.42	0.01	0.16	11.59	11.59	0.01	0.01	0.37	0.37	0.00	0.03	1.60	1.60	0.00
Chrysene (a)	844.00	826	0.46	30.07	30.07	0.04	0.43	31.16	31.16	0.04	0.01	0.48	0.48	0.00	0.15	8.29	8.29	0.01
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.08	5.49	5.49	0.00	0.06	3.99	3.99	0.00	0.00	0.09	0.09	0.00	0.02	0.94	0.94	0.00
Fluoranthene (a)	707.00	23870	0.69	45.10	45.10	0.06	0.81	58.70	58.70	0.08	0.02	0.63	0.63	0.00	0.23	12.71	12.71	0.02
Fluorene (a)	538.00	26000	0.04	2.55	2.55	0.00	0.07	5.07	5.07	0.01	0.00	0.08	0.08	0.00	0.02	0.99	0.99	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.24	15.69	15.69	0.01	0.15	10.87	10.87	0.01	0.00	0.09	0.09	0.00	0.05	2.65	2.65	0.00
Naphthalene (a)	385.00	61700	0.05	3.24	3.24	0.01	0.06	3.99	3.99	0.01	0.00	0.09	0.09	0.00	0.03	1.77	1.77	0.00
Perylene (a)	967.00	431	0.11	7.19	7.19	0.01	0.11	7.97	7.97	0.01	0.01	0.52	0.52	0.00	0.03	1.77	1.77	0.00
Phenanthrene (a)	596.00	34300	0.30	19.61	19.61	0.03	0.39	28.26	28.26	0.05	0.01	0.30	0.30	0.00	0.11	6.08	6.08	0.01
Pyrene (a)	697.00	9,090.00	0.51	33.33	33.33	0.05	0.60	43.48	43.48	0.06	0.02	0.63	0.63	0.00	0.16	8.84	8.84	0.01
	---	**ESBTU FCVi**	---	---	---	0.52	---	---	---	0.61	---	---	---	0.01	---	---	---	0.14

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-22**				**CI13-23**				**CI13-23**				**CI13-23**			
		Field Sample ID	**CI13-22-SURF**				**CI13-23-SURF**				**CI13-23-0001**				**CI13-23-0103**			
		Sample Depth	**0-0.5**				**0-0.5**				**0-1**				**1-3**			
		Sample Date	**10/28/2013**				**10/28/2013**				**09/25/2013**				**09/25/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	0.318	0.00318	---	---	2.68	0.0268	---	---	1.02	0.0102	---	---	1.1	0.011	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.29	0.29	0.00	0.04	1.34	1.34	0.00	0.01	0.72	0.72	0.00	0.00	0.05	0.05	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.44	0.44	0.00	0.06	2.20	2.20	0.00	0.03	2.65	2.65	0.01	0.00	0.20	0.20	0.00
Acenaphthene (a)	491.00	33400	0.00	0.29	0.29	0.00	0.07	2.43	2.43	0.00	0.02	1.57	1.57	0.00	0.00	0.03	0.03	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.69	0.69	0.00	0.05	1.94	1.94	0.00	0.01	1.27	1.27	0.00	0.00	0.01	0.01	0.00
Anthracene (a)	594.00	1300	0.01	2.39	2.39	0.00	0.36	13.43	13.43	0.02	0.06	5.39	5.39	0.01	0.00	0.04	0.04	0.00
Benzo(a)anthracene (a)	841.00	4153	0.06	18.24	18.24	0.02	1.40	52.24	52.24	0.06	0.27	26.47	26.47	0.03	0.00	0.20	0.20	0.00
Benzo(a)pyrene (a)	965.00	3840	0.05	15.09	15.09	0.02	1.30	48.51	48.51	0.05	0.24	23.53	23.53	0.02	0.00	0.09	0.09	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.05	16.98	16.98	0.02	1.10	41.04	41.04	0.04	0.19	18.63	18.63	0.02	0.00	0.20	0.20	0.00
Benzo(e)pyrene (a)	967.00	4300	0.04	11.32	11.32	0.01	0.79	29.48	29.48	0.03	0.15	14.71	14.71	0.02	0.00	0.20	0.20	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.01	4.40	4.40	0.00	0.49	18.28	18.28	0.02	0.08	7.94	7.94	0.01	0.00	0.20	0.20	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.04	13.84	13.84	0.01	1.00	37.31	37.31	0.04	0.20	19.61	19.61	0.02	0.00	0.11	0.11	0.00
C1 Chrysenes (a)	929.00	---	0.04	12.89	12.89	0.01	0.81	30.22	30.22	0.03	0.23	22.55	22.55	0.02	0.00	0.29	0.29	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.53	0.53	0.00	0.04	1.42	1.42	0.00	0.01	1.27	1.27	0.00	0.00	0.05	0.05	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.07	22.96	22.96	0.03	1.70	63.43	63.43	0.08	0.36	35.29	35.29	0.05	0.01	0.49	0.49	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.53	0.53	0.00	0.07	2.50	2.50	0.01	0.01	1.27	1.27	0.00	0.00	0.07	0.07	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.04	11.01	11.01	0.02	0.84	31.34	31.34	0.05	0.19	18.63	18.63	0.03	0.01	0.55	0.55	0.00
C2 Chrysenes (a)	1008.00	---	0.03	10.69	10.69	0.01	0.56	20.90	20.90	0.02	0.16	15.69	15.69	0.02	0.01	0.76	0.76	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.94	0.94	0.00	0.05	1.98	1.98	0.00	0.03	2.55	2.55	0.00	0.00	0.10	0.10	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.04	12.26	12.26	---	0.68	25.37	25.37	---	0.20	19.61	19.61	---	0.00	0.37	0.37	---
C2-Naphthalenes (a)	510.00	---	0.01	1.86	1.86	0.00	0.20	7.46	7.46	0.01	0.04	4.12	4.12	0.01	0.00	0.25	0.25	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.03	9.75	9.75	0.01	0.53	19.78	19.78	0.03	0.17	16.67	16.67	0.02	0.01	0.86	0.86	0.00
C3 Chrysenes (a)	1112.00	---	0.02	5.35	5.35	0.00	0.19	7.09	7.09	0.01	0.05	5.00	5.00	0.00	0.00	0.18	0.18	0.00
C3 Fluorenes (a)	769.00	---	0.01	3.46	3.46	0.00	0.10	3.54	3.54	0.00	0.04	3.63	3.63	0.00	0.00	0.19	0.19	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.02	6.92	6.92	0.01	0.30	11.19	11.19	0.01	0.10	9.80	9.80	0.01	0.00	0.33	0.33	0.00
C3-Naphthalenes (a)	581.00	---	0.01	3.08	3.08	0.01	0.22	8.21	8.21	0.01	0.08	7.84	7.84	0.01	0.01	0.62	0.62	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.04	11.32	11.32	0.01	0.43	16.04	16.04	0.02	0.16	15.69	15.69	0.02	0.01	0.67	0.67	0.00
C4 Chrysenes (a)	1214.00	---	0.00	1.13	1.13	0.00	0.03	1.27	1.27	0.00	0.01	0.98	0.98	0.00	0.00	0.06	0.06	0.00
C4-Naphthalenes (a)	657.00	---	0.01	4.09	4.09	0.01	0.16	5.97	5.97	0.01	0.06	6.18	6.18	0.01	0.01	0.67	0.67	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	6.29	6.29	0.01	0.20	7.46	7.46	0.01	0.09	8.33	8.33	0.01	0.00	0.41	0.41	0.00
Chrysene (a)	844.00	826	0.06	17.92	17.92	0.02	1.20	44.78	44.78	0.05	0.25	24.51	24.51	0.03	0.00	0.24	0.24	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.01	1.57	1.57	0.00	0.16	5.97	5.97	0.01	0.03	2.65	2.65	0.00	0.00	0.20	0.20	0.00
Fluoranthene (a)	707.00	23870	0.07	21.38	21.38	0.03	1.90	70.90	70.90	0.10	0.33	32.35	32.35	0.05	0.00	0.33	0.33	0.00
Fluorene (a)	538.00	26000	0.00	0.72	0.72	0.00	0.11	4.10	4.10	0.01	0.02	2.25	2.25	0.00	0.00	0.06	0.06	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.02	4.72	4.72	0.00	0.46	17.16	17.16	0.02	0.08	7.45	7.45	0.01	0.00	0.20	0.20	0.00
Naphthalene (a)	385.00	61700	0.00	1.43	1.43	0.00	0.12	4.48	4.48	0.01	0.03	2.65	2.65	0.01	0.00	0.20	0.20	0.00
Perylene (a)	967.00	431	0.01	3.77	3.77	0.00	0.32	11.94	11.94	0.01	0.07	7.16	7.16	0.01	0.01	1.18	1.18	0.00
Phenanthrene (a)	596.00	34300	0.02	6.29	6.29	0.01	0.66	24.63	24.63	0.04	0.09	9.02	9.02	0.02	0.00	0.20	0.20	0.00
Pyrene (a)	697.00	9,090.00	0.07	22.64	22.64	0.03	1.70	63.43	63.43	0.09	0.28	27.45	27.45	0.04	0.00	0.37	0.37	0.00
	---	**ESBTU FCVi**	---	---	---	0.29	---	---	---	0.80	---	---	---	0.42	---	---	---	0.01

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration
in sediment on an organic carbon basis; only the contribution up to the
maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the
PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-24				CI13-24				CI13-25				CI13-26			
		Field Sample ID	CI13-24-SURF				CI13-24-0001				CI13-25-SURF				CI13-26-SURF			
		Sample Depth	0-0.5				0-1				0-0.5				0-0.5			
		Sample Date	10/28/2013				09/26/2013				09/30/2013				09/30/2013			
	Coc, PAHi, FCVi[a]	Coc, PAHi, Maxi[a]	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	2.7	0.027	---	---	2.09	0.0209	---	---	1.49	0.0149	---	---	7.86	0.0786	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.08	2.85	2.85	0.01	0.00	0.08	0.08	0.00	0.03	1.81	1.81	0.00	0.08	0.97	0.97	0.00
2-Methylnaphthalene	447.00	154800	0.11	4.07	4.07	0.01	0.01	0.48	0.48	0.00	0.02	1.54	1.54	0.00	0.09	1.16	1.16	0.00
Acenaphthene (a)	491.00	33400	0.22	8.15	8.15	0.02	0.01	0.46	0.46	0.00	0.06	3.83	3.83	0.01	0.21	2.67	2.67	0.01
Acenaphthylene (a)	452.00	24000	0.03	1.19	1.19	0.00	0.00	0.14	0.14	0.00	0.13	8.72	8.72	0.02	0.39	4.96	4.96	0.01
Anthracene (a)	594.00	1300	0.48	17.78	17.78	0.03	0.02	1.15	1.15	0.00	0.66	44.30	44.30	0.07	1.10	13.99	13.99	0.02
Benzo(a)anthracene (a)	841.00	4153	1.50	55.56	55.56	0.07	0.06	2.97	2.97	0.00	1.60	107.38	107.38	0.13	5.40	68.70	68.70	0.08
Benzo(a)pyrene (a)	965.00	3840	1.30	48.15	48.15	0.05	0.05	2.44	2.44	0.00	1.20	80.54	80.54	0.08	4.90	62.34	62.34	0.06
Benzo(b)fluoranthene (a)	979.00	2169	1.20	44.44	44.44	0.05	0.05	2.54	2.54	0.00	1.20	80.54	80.54	0.08	4.00	50.89	50.89	0.05
Benzo(e)pyrene (a)	967.00	4300	0.81	30.00	30.00	0.03	0.04	1.72	1.72	0.00	0.74	49.66	49.66	0.05	3.00	38.17	38.17	0.04
Benzo(g,h,i)perylene (a)	1095.00	648	0.47	17.41	17.41	0.02	0.02	1.15	1.15	0.00	0.63	42.28	42.28	0.04	2.60	33.08	33.08	0.03
Benzo(k)fluoranthene (a)	981.00	1220	1.40	51.85	51.85	0.05	0.05	2.25	2.25	0.00	0.94	63.09	63.09	0.06	3.20	40.71	40.71	0.04
C1 Chrysenes (a)	929.00	---	0.77	28.52	28.52	0.03	0.04	1.91	1.91	0.00	0.63	42.28	42.28	0.05	3.70	47.07	47.07	0.05
C1 Fluorenes (a)	611.00	---	0.25	9.07	9.07	0.01	0.00	0.21	0.21	0.00	0.06	4.16	4.16	0.01	0.17	2.16	2.16	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	1.50	55.56	55.56	0.07	0.08	3.73	3.73	0.00	1.80	120.81	120.81	0.16	7.70	97.96	97.96	0.13
C1-Naphthalenes (a)	444.00	---	0.13	4.81	4.81	0.01	0.00	0.13	0.13	0.00	0.23	15.10	15.10	0.03	0.14	1.78	1.78	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.87	32.22	32.22	0.05	0.06	2.73	2.73	0.00	0.97	65.10	65.10	0.10	4.30	54.71	54.71	0.08
C2 Chrysenes (a)	1008.00	---	0.62	22.96	22.96	0.02	0.03	1.53	1.53	0.00	0.38	25.50	25.50	0.03	2.00	25.45	25.45	0.03
C2 Fluorenes (a)	686.00	---	0.05	1.93	1.93	0.00	0.01	0.25	0.25	0.00	0.07	4.63	4.63	0.01	0.25	3.18	3.18	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.74	27.41	27.41	---	0.04	1.77	1.77	---	0.59	39.60	39.60	---	3.10	39.44	39.44	---
C2-Naphthalenes (a)	510.00	---	0.28	10.37	10.37	0.02	0.01	0.67	0.67	0.00	0.23	15.44	15.44	0.03	0.51	6.49	6.49	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	0.44	16.30	16.30	0.02	0.04	1.77	1.77	0.00	0.55	36.91	36.91	0.05	2.40	30.53	30.53	0.04
C3 Chrysenes (a)	1112.00	---	0.23	8.52	8.52	0.01	0.01	0.67	0.67	0.00	0.23	15.10	15.10	0.01	0.63	8.02	8.02	0.01
C3 Fluorenes (a)	769.00	---	0.06	2.26	2.26	0.00	0.01	0.42	0.42	0.00	0.12	8.05	8.05	0.01	0.36	4.58	4.58	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.34	12.59	12.59	0.01	0.02	0.96	0.96	0.00	0.19	12.75	12.75	0.01	1.10	13.99	13.99	0.01
C3-Naphthalenes (a)	581.00	---	0.26	9.63	9.63	0.02	0.03	1.29	1.29	0.00	0.26	17.45	17.45	0.03	0.72	9.16	9.16	0.02
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.37	13.70	13.70	0.02	0.03	1.58	1.58	0.00	0.36	24.16	24.16	0.03	1.40	17.81	17.81	0.02
C4 Chrysenes (a)	1214.00	---	0.25	9.07	9.07	0.01	0.00	0.18	0.18	0.00	0.23	15.10	15.10	0.01	0.49	6.17	6.17	0.01
C4-Naphthalenes (a)	657.00	---	0.17	6.30	6.30	0.01	0.02	0.86	0.86	0.00	0.23	15.44	15.44	0.02	0.60	7.63	7.63	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.21	7.78	7.78	0.01	0.02	0.91	0.91	0.00	0.15	10.07	10.07	0.01	0.56	7.12	7.12	0.01
Chrysene (a)	844.00	826	1.40	51.85	51.85	0.06	0.06	2.82	2.82	0.00	1.40	93.96	93.96	0.11	4.80	61.07	61.07	0.07
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.14	5.19	5.19	0.00	0.01	0.31	0.31	0.00	0.19	12.75	12.75	0.01	0.68	8.65	8.65	0.01
Fluoranthene (a)	707.00	23870	2.70	100.00	100.00	0.14	0.12	5.74	5.74	0.01	3.80	255.03	255.03	0.36	7.30	92.88	92.88	0.13
Fluorene (a)	538.00	26000	0.25	9.26	9.26	0.02	0.01	0.53	0.53	0.00	0.17	11.41	11.41	0.02	0.21	2.67	2.67	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.48	17.78	17.78	0.02	0.02	0.96	0.96	0.00	0.60	40.27	40.27	0.04	2.20	27.99	27.99	0.03
Naphthalene (a)	385.00	61700	0.25	9.07	9.07	0.02	0.01	0.48	0.48	0.00	0.23	15.10	15.10	0.04	0.49	6.17	6.17	0.02
Perylene (a)	967.00	431	0.40	14.81	14.81	0.02	0.01	0.67	0.67	0.00	0.29	19.46	19.46	0.02	0.99	12.60	12.60	0.01
Phenanthrene (a)	596.00	34300	1.80	66.67	66.67	0.11	0.06	2.63	2.63	0.00	1.50	100.67	100.67	0.17	3.00	38.17	38.17	0.06
Pyrene (a)	697.00	9,090.00	2.30	85.19	85.19	0.12	0.09	4.26	4.26	0.01	2.60	174.50	174.50	0.25	7.40	94.15	94.15	0.14
	---	**ESBTU FCVi**	---	---	---	1.01	---	---	---	0.06	---	---	---	1.94	---	---	---	1.11

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-26**				**CI13-26**				**CI13-26**				**CI13-26**			
		Field Sample ID	**CI13-26-0001**				**CI13-26-0103**				**CI13-26-0305**				**CI13-26-0507**			
		Sample Depth	**0-1**				**1-3**				**3-5**				**5-7**			
		Sample Date	**10/01/2013**				**10/01/2013**				**10/01/2013**				**10/01/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.45	0.0145	---	---	1.21	0.0121	---	---	1.46	0.0146	---	---	1.17	0.0117	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.02	1.10	1.10	0.00	0.00	0.10	0.10	0.00	0.00	0.08	0.08	0.00	0.00	0.06	0.06	0.00
2-Methylnaphthalene	447.00	154800	0.02	1.38	1.38	0.00	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00	0.00	0.04	0.04	0.00
Acenaphthene (a)	491.00	33400	0.02	1.59	1.59	0.00	0.00	0.05	0.05	0.00	0.00	0.03	0.03	0.00	0.00	0.18	0.18	0.00
Acenaphthylene (a)	452.00	24000	0.04	2.41	2.41	0.01	0.00	0.07	0.07	0.00	0.00	0.04	0.04	0.00	0.00	0.01	0.01	0.00
Anthracene (a)	594.00	1300	0.10	6.90	6.90	0.01	0.00	0.25	0.25	0.00	0.00	0.10	0.10	0.00	0.00	0.02	0.02	0.00
Benzo(a)anthracene (a)	841.00	4153	0.62	42.76	42.76	0.05	0.01	0.99	0.99	0.00	0.01	0.47	0.47	0.00	0.00	0.09	0.09	0.00
Benzo(a)pyrene (a)	965.00	3840	0.60	41.38	41.38	0.04	0.01	0.99	0.99	0.00	0.01	0.43	0.43	0.00	0.00	0.06	0.06	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.50	34.48	34.48	0.04	0.02	1.32	1.32	0.00	0.01	0.66	0.66	0.00	0.00	0.24	0.24	0.00
Benzo(e)pyrene (a)	967.00	4300	0.37	25.52	25.52	0.03	0.01	0.83	0.83	0.00	0.01	0.45	0.45	0.00	0.00	0.24	0.24	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.19	13.10	13.10	0.01	0.01	0.41	0.41	0.00	0.00	0.26	0.26	0.00	0.00	0.12	0.12	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.60	41.38	41.38	0.04	0.01	1.07	1.07	0.00	0.01	0.47	0.47	0.00	0.00	0.10	0.10	0.00
C1 Chrysenes (a)	929.00	---	0.48	33.10	33.10	0.04	0.02	1.24	1.24	0.00	0.01	0.68	0.68	0.00	0.01	0.70	0.70	0.00
C1 Fluorenes (a)	611.00	---	0.01	0.97	0.97	0.00	0.00	0.08	0.08	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.70	48.28	48.28	0.06	0.02	1.57	1.57	0.00	0.01	0.89	0.89	0.00	0.01	0.69	0.69	0.00
C1-Naphthalenes (a)	444.00	---	0.02	1.66	1.66	0.00	0.00	0.14	0.14	0.00	0.00	0.10	0.10	0.00	0.00	0.08	0.08	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.27	18.62	18.62	0.03	0.02	1.40	1.40	0.00	0.01	0.82	0.82	0.00	0.01	0.85	0.85	0.00
C2 Chrysenes (a)	1008.00	---	0.41	28.28	28.28	0.03	0.03	2.31	2.31	0.00	0.02	1.64	1.64	0.00	0.03	2.31	2.31	0.00
C2 Fluorenes (a)	686.00	---	0.03	1.79	1.79	0.00	0.00	0.21	0.21	0.00	0.00	0.14	0.14	0.00	0.00	0.19	0.19	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.36	24.83	24.83	---	0.02	1.24	1.24	---	0.01	0.82	0.82	---	0.01	0.94	0.94	---
C2-Naphthalenes (a)	510.00	---	0.08	5.72	5.72	0.01	0.01	0.55	0.55	0.00	0.01	0.39	0.39	0.00	0.01	0.43	0.43	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.32	22.07	22.07	0.03	0.09	7.36	7.36	0.01	0.03	2.19	2.19	0.00	0.11	9.40	9.40	0.01
C3 Chrysenes (a)	1112.00	---	0.11	7.59	7.59	0.01	0.01	0.99	0.99	0.00	0.01	0.75	0.75	0.00	0.01	1.03	1.03	0.00
C3 Fluorenes (a)	769.00	---	0.05	3.59	3.59	0.00	0.01	0.64	0.64	0.00	0.01	0.46	0.46	0.00	0.01	0.58	0.58	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.19	13.10	13.10	0.01	0.02	1.24	1.24	0.00	0.01	0.96	0.96	0.00	0.02	1.28	1.28	0.00
C3-Naphthalenes (a)	581.00	---	0.09	6.48	6.48	0.01	0.02	1.24	1.24	0.00	0.01	0.89	0.89	0.00	0.01	1.11	1.11	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.23	15.86	15.86	0.02	0.04	3.14	3.14	0.00	0.03	2.05	2.05	0.00	0.04	3.59	3.59	0.00
C4 Chrysenes (a)	1214.00	---	0.02	1.52	1.52	0.00	0.00	0.40	0.40	0.00	0.00	0.29	0.29	0.00	0.01	0.43	0.43	0.00
C4-Naphthalenes (a)	657.00	---	0.08	5.72	5.72	0.01	0.03	2.07	2.07	0.00	0.02	1.51	1.51	0.00	0.02	1.97	1.97	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.10	6.62	6.62	0.01	0.02	1.40	1.40	0.00	0.02	1.10	1.10	0.00	0.02	1.45	1.45	0.00
Chrysene (a)	844.00	826	0.56	38.62	38.62	0.05	0.02	1.32	1.32	0.00	0.01	0.68	0.68	0.00	0.01	0.51	0.51	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.07	4.55	4.55	0.00	0.00	0.11	0.11	0.00	0.00	0.05	0.05	0.00	0.00	0.01	0.01	0.00
Fluoranthene (a)	707.00	23870	0.62	42.76	42.76	0.06	0.02	1.74	1.74	0.00	0.01	0.96	0.96	0.00	0.00	0.25	0.25	0.00
Fluorene (a)	538.00	26000	0.04	2.83	2.83	0.01	0.00	0.12	0.12	0.00	0.00	0.07	0.07	0.00	0.00	0.03	0.03	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.18	12.41	12.41	0.01	0.00	0.31	0.31	0.00	0.00	0.16	0.16	0.00	0.00	0.03	0.03	0.00
Naphthalene (a)	385.00	61700	0.06	4.41	4.41	0.01	0.00	0.15	0.15	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
Perylene (a)	967.00	431	0.18	12.41	12.41	0.01	0.03	2.07	2.07	0.00	0.03	2.33	2.33	0.00	0.03	2.22	2.22	0.00
Phenanthrene (a)	596.00	34300	0.24	16.55	16.55	0.03	0.01	0.66	0.66	0.00	0.01	0.43	0.43	0.00	0.00	0.14	0.14	0.00
Pyrene (a)	697.00	9,090.00	0.50	34.48	34.48	0.05	0.01	1.16	1.16	0.00	---	---	---	---	0.00	0.24	0.24	0.00
	---	**ESBTU FCVi**	---	---	---	0.61	---	---	---	0.04	---	---	---	0.02	---	---	---	0.03

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-26**				**CI13-27**				**CI13-27**				**CI13-27**			
		Field Sample ID	**CI13-26-0709**				**CI13-27A-SURF**				**CI13-27A-0001**				**CI13-27A-0103**			
		Sample Depth	**7-9**				**0-0.5**				**0-1**				**1-3**			
		Sample Date	**10/01/2013**				**09/30/2013**				**09/30/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.31	0.0131	---	---	5.42	0.0542	---	---	9.14	0.0914	---	---	8.54	0.0854	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.04	0.04	0.00	0.03	0.57	0.57	0.00	0.37	4.05	4.05	0.01	0.36	4.22	4.22	0.01
2-Methylnaphthalene	447.00	154800	0.00	0.02	0.02	0.00	0.05	0.90	0.90	0.00	0.37	4.05	4.05	0.01	0.36	4.22	4.22	0.01
Acenaphthene (a)	491.00	33400	0.00	0.15	0.15	0.00	0.04	0.70	0.70	0.00	0.19	2.08	2.08	0.00	0.25	2.93	2.93	0.01
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.04	0.79	0.79	0.00	0.20	2.19	2.19	0.00	0.29	3.40	3.40	0.01
Anthracene (a)	594.00	1300	0.00	0.01	0.01	0.00	0.08	1.38	1.38	0.00	0.86	9.41	9.41	0.02	0.91	10.66	10.66	0.02
Benzo(a)anthracene (a)	841.00	4153	0.00	0.06	0.06	0.00	0.66	12.18	12.18	0.01	3.50	38.29	38.29	0.05	4.00	46.84	46.84	0.06
Benzo(a)pyrene (a)	965.00	3840	0.00	0.05	0.05	0.00	0.77	14.21	14.21	0.01	3.10	33.92	33.92	0.04	3.70	43.33	43.33	0.04
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.17	0.17	0.00	0.77	14.21	14.21	0.01	2.80	30.63	30.63	0.03	2.90	33.96	33.96	0.03
Benzo(e)pyrene (a)	967.00	4300	0.00	0.18	0.18	0.00	0.57	10.52	10.52	0.01	2.70	29.54	29.54	0.03	2.70	31.62	31.62	0.03
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.11	0.11	0.00	0.56	10.33	10.33	0.01	1.90	20.79	20.79	0.02	2.10	24.59	24.59	0.02
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.06	0.06	0.00	0.61	11.25	11.25	0.01	2.50	27.35	27.35	0.03	2.90	33.96	33.96	0.03
C1 Chrysenes (a)	929.00	---	0.01	0.54	0.54	0.00	0.63	11.62	11.62	0.01	4.70	51.42	51.42	0.06	4.70	55.04	55.04	0.06
C1 Fluorenes (a)	611.00	---	0.00	0.03	0.03	0.00	0.02	0.44	0.44	0.00	0.28	3.06	3.06	0.01	0.29	3.40	3.40	0.01
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.63	0.63	0.00	0.74	13.65	13.65	0.02	5.60	61.27	61.27	0.08	6.50	76.11	76.11	0.10
C1-Naphthalenes (a)	444.00	---	0.00	0.05	0.05	0.00	0.06	1.05	1.05	0.00	0.22	2.41	2.41	0.01	0.32	3.75	3.75	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.01	0.69	0.69	0.00	0.42	7.75	7.75	0.01	4.50	49.23	49.23	0.07	5.00	58.55	58.55	0.09
C2 Chrysenes (a)	1008.00	---	0.03	2.06	2.06	0.00	0.48	8.86	8.86	0.01	4.40	48.14	48.14	0.05	4.20	49.18	49.18	0.05
C2 Fluorenes (a)	686.00	---	0.00	0.13	0.13	0.00	0.05	0.92	0.92	0.00	0.79	8.64	8.64	0.01	0.85	9.95	9.95	0.01
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.84	0.84	---	0.50	9.23	9.23	---	4.50	49.23	49.23	---	5.30	62.06	62.06	---
C2-Naphthalenes (a)	510.00	---	0.00	0.27	0.27	0.00	0.18	3.32	3.32	0.01	1.50	16.41	16.41	0.03	1.90	22.25	22.25	0.04
C2-Phenanthrenes/Anthracenes (a)	746	---	0.08	5.95	5.95	0.01	0.39	7.20	7.20	0.01	6.50	71.12	71.12	0.10	7.30	85.48	85.48	0.11
C3 Chrysenes (a)	1112.00	---	0.01	0.92	0.92	0.00	0.23	4.24	4.24	0.00	1.80	19.69	19.69	0.02	1.90	22.25	22.25	0.02
C3 Fluorenes (a)	769.00	---	0.01	0.43	0.43	0.00	0.12	2.21	2.21	0.00	2.30	25.16	25.16	0.03	2.40	28.10	28.10	0.04
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.99	0.99	0.00	0.31	5.72	5.72	0.01	3.30	36.11	36.11	0.04	4.00	46.84	46.84	0.05
C3-Naphthalenes (a)	581.00	---	0.01	0.76	0.76	0.00	0.21	3.87	3.87	0.01	3.60	39.39	39.39	0.07	3.40	39.81	39.81	0.07
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.04	2.82	2.82	0.00	0.37	6.83	6.83	0.01	7.50	82.06	82.06	0.10	9.20	107.73	107.73	0.13
C4 Chrysenes (a)	1214.00	---	0.00	0.36	0.36	0.00	0.08	1.55	1.55	0.00	0.72	7.88	7.88	0.01	0.83	9.72	9.72	0.01
C4-Naphthalenes (a)	657.00	---	0.02	1.53	1.53	0.00	0.16	2.95	2.95	0.00	3.50	38.29	38.29	0.06	3.40	39.81	39.81	0.06
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	1.22	1.22	0.00	0.24	4.43	4.43	0.00	4.70	51.42	51.42	0.06	6.20	72.60	72.60	0.08
Chrysene (a)	844.00	826	0.01	0.40	0.40	0.00	0.80	14.76	14.76	0.02	4.40	48.14	48.14	0.06	4.80	56.21	56.21	0.07
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.00	0.01	0.01	0.00	0.17	3.14	3.14	0.00	0.51	5.58	5.58	0.00	0.57	6.67	6.67	0.01
Fluoranthene (a)	707.00	23870	0.00	0.16	0.16	0.00	1.10	20.30	20.30	0.03	5.00	54.70	54.70	0.08	5.40	63.23	63.23	0.09
Fluorene (a)	538.00	26000	0.00	0.01	0.01	0.00	0.05	0.98	0.98	0.00	0.35	3.83	3.83	0.01	0.44	5.15	5.15	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.02	0.02	0.00	0.48	8.86	8.86	0.01	1.50	16.41	16.41	0.01	1.70	19.91	19.91	0.02
Naphthalene (a)	385.00	61700	0.00	0.04	0.04	0.00	0.08	1.38	1.38	0.00	0.37	4.05	4.05	0.01	0.36	4.22	4.22	0.01
Perylene (a)	967.00	431	0.02	1.45	1.45	0.00	0.18	3.32	3.32	0.00	0.71	7.77	7.77	0.01	0.80	9.37	9.37	0.01
Phenanthrene (a)	596.00	34300	0.00	0.10	0.10	0.00	0.44	8.12	8.12	0.01	2.30	25.16	25.16	0.04	2.60	30.44	30.44	0.05
Pyrene (a)	697.00	9,090.00	0.00	0.21	0.21	0.00	0.78	14.39	14.39	0.02	4.30	47.05	47.05	0.07	4.90	57.38	57.38	0.08
	---	**ESBTU FCVi**	---	---	---	0.02	---	---	---	0.24	---	---	---	0.96	---	---	---	1.17

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-27**				**CI13-27**				**CI13-28**				**CI13-28**			
		Field Sample ID	**CI13-27A-0305**				**CI13-27A-0507**				**CI13-28-SURF**				**CI13-28-0001**			
		Sample Depth	**3-5**				**5-7**				**0-0.5**				**0-1**			
		Sample Date	**09/30/2013**				**09/30/2013**				**09/30/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	6.41	0.0641	---	---	3.04	0.0304	---	---	7.04	0.0704	---	---	2.43	0.0243	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.95	14.82	14.82	0.03	0.23	7.40	7.40	0.02	0.04	0.55	0.55	0.00	0.00	0.09	0.09	0.00
2-Methylnaphthalene	447.00	154800	0.95	14.82	14.82	0.03	0.23	7.40	7.40	0.02	0.07	0.94	0.94	0.00	0.00	0.09	0.09	0.00
Acenaphthene (a)	491.00	33400	1.80	28.08	28.08	0.06	0.28	9.21	9.21	0.02	0.05	0.70	0.70	0.00	0.00	0.03	0.03	0.00
Acenaphthylene (a)	452.00	24000	0.65	10.14	10.14	0.02	0.15	4.93	4.93	0.01	0.06	0.82	0.82	0.00	0.00	0.02	0.02	0.00
Anthracene (a)	594.00	1300	4.60	71.76	71.76	0.12	0.76	25.00	25.00	0.04	0.12	1.63	1.63	0.00	0.00	0.07	0.07	0.00
Benzo(a)anthracene (a)	841.00	4153	8.90	138.85	138.85	0.17	2.00	65.79	65.79	0.08	0.87	12.36	12.36	0.01	0.01	0.35	0.35	0.00
Benzo(a)pyrene (a)	965.00	3840	7.40	115.44	115.44	0.12	1.80	59.21	59.21	0.06	1.00	14.20	14.20	0.01	0.01	0.30	0.30	0.00
Benzo(b)fluoranthene (a)	979.00	2169	5.10	79.56	79.56	0.08	1.20	39.47	39.47	0.04	1.10	15.63	15.63	0.02	0.01	0.49	0.49	0.00
Benzo(e)pyrene (a)	967.00	4300	4.50	70.20	70.20	0.07	1.20	39.47	39.47	0.04	0.74	10.51	10.51	0.01	0.01	0.36	0.36	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	3.70	57.72	57.72	0.05	0.99	32.57	32.57	0.03	0.78	11.08	11.08	0.01	0.00	0.19	0.19	0.00
Benzo(k)fluoranthene (a)	981.00	1220	4.70	73.32	73.32	0.07	1.10	36.18	36.18	0.04	0.82	11.65	11.65	0.01	0.01	0.41	0.41	0.00
C1 Chrysenes (a)	929.00	---	9.30	145.09	145.09	0.16	2.20	72.37	72.37	0.08	0.67	9.52	9.52	0.01	0.01	0.53	0.53	0.00
C1 Fluorenes (a)	611.00	---	1.20	18.72	18.72	0.03	0.21	6.91	6.91	0.01	0.03	0.38	0.38	0.00	0.00	0.07	0.07	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	18.00	280.81	280.81	0.36	3.70	121.71	121.71	0.16	0.92	13.07	13.07	0.02	0.02	0.62	0.62	0.00
C1-Naphthalenes (a)	444.00	---	1.20	18.72	18.72	0.04	0.17	5.59	5.59	0.01	0.08	1.11	1.11	0.00	0.00	0.12	0.12	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	18.00	280.81	280.81	0.42	3.50	115.13	115.13	0.17	0.47	6.68	6.68	0.01	0.02	0.99	0.99	0.00
C2 Chrysenes (a)	1008.00	---	6.50	101.40	101.40	0.10	1.60	52.63	52.63	0.05	0.47	6.68	6.68	0.01	0.02	0.95	0.95	0.00
C2 Fluorenes (a)	686.00	---	1.50	23.40	23.40	0.03	0.29	9.54	9.54	0.01	0.04	0.55	0.55	0.00	0.00	0.12	0.12	0.00
C2-Fluoranthenes/Pyrenes	---	---	9.60	149.77	149.77	---	2.20	72.37	72.37	---	0.52	7.39	7.39	---	0.01	0.53	0.53	---
C2-Naphthalenes (a)	510.00	---	9.00	140.41	140.41	0.28	1.40	46.05	46.05	0.09	0.22	3.13	3.13	0.01	0.01	0.49	0.49	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	12.00	187.21	187.21	0.25	2.60	85.53	85.53	0.11	0.35	4.97	4.97	0.01	0.02	0.99	0.99	0.00
C3 Chrysenes (a)	1112.00	---	3.00	46.80	46.80	0.04	0.59	19.41	19.41	0.02	0.22	3.13	3.13	0.00	0.01	0.40	0.40	0.00
C3 Fluorenes (a)	769.00	---	2.70	42.12	42.12	0.05	0.57	18.75	18.75	0.02	0.06	0.91	0.91	0.00	0.01	0.33	0.33	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	4.80	74.88	74.88	0.08	1.20	39.47	39.47	0.04	0.29	4.12	4.12	0.00	0.01	0.53	0.53	0.00
C3-Naphthalenes (a)	581.00	---	7.80	121.68	121.68	0.21	1.40	46.05	46.05	0.08	0.20	2.84	2.84	0.00	0.03	1.28	1.28	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	9.60	149.77	149.77	0.18	2.10	69.08	69.08	0.08	0.35	4.97	4.97	0.01	0.02	0.99	0.99	0.00
C4 Chrysenes (a)	1214.00	---	1.20	18.72	18.72	0.02	0.28	9.21	9.21	0.01	0.06	0.89	0.89	0.00	0.00	0.19	0.19	0.00
C4-Naphthalenes (a)	657.00	---	3.80	59.28	59.28	0.09	0.75	24.67	24.67	0.04	0.19	2.70	2.70	0.00	0.03	1.32	1.32	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	6.50	101.40	101.40	0.11	1.40	46.05	46.05	0.05	0.20	2.84	2.84	0.00	0.01	0.58	0.58	0.00
Chrysene (a)	844.00	826	8.80	137.29	137.29	0.16	2.10	69.08	69.08	0.08	1.00	14.20	14.20	0.02	0.01	0.58	0.58	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.88	13.73	13.73	0.01	0.22	7.24	7.24	0.01	0.23	3.27	3.27	0.00	0.00	0.05	0.05	0.00
Fluoranthene (a)	707.00	23870	12.00	187.21	187.21	0.26	2.40	78.95	78.95	0.11	1.40	19.89	19.89	0.03	0.02	0.70	0.70	0.00
Fluorene (a)	538.00	26000	2.10	32.76	32.76	0.06	0.38	12.50	12.50	0.02	0.07	0.99	0.99	0.00	0.00	0.10	0.10	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	2.90	45.24	45.24	0.04	0.75	24.67	24.67	0.02	0.68	9.66	9.66	0.01	0.00	0.14	0.14	0.00
Naphthalene (a)	385.00	61700	0.95	14.82	14.82	0.04	0.23	7.40	7.40	0.02	0.12	1.63	1.63	0.00	0.00	0.07	0.07	0.00
Perylene (a)	967.00	431	1.30	20.28	20.28	0.02	0.38	12.50	12.50	0.01	0.25	3.55	3.55	0.00	0.03	1.32	1.32	0.00
Phenanthrene (a)	596.00	34300	12.00	187.21	187.21	0.31	2.20	72.37	72.37	0.12	0.56	7.95	7.95	0.01	0.01	0.37	0.37	0.00
Pyrene (a)	697.00	9,090.00	13.00	202.81	202.81	0.29	2.70	88.82	88.82	0.13	1.10	15.63	15.63	0.02	0.01	0.40	0.40	0.00
	---	**ESBTU FCVi**	---	---	---	3.42	---	---	---	1.51	---	---	---	0.23	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-28**				**CI13-28**				**CI13-28**				**CI13-28**			
		Field Sample ID	**CI13-28-0103**				**CI13-28-0305**				**CI13-28-0507**				**CI13-28-0709**			
		Sample Depth	**1-3**				**3-5**				**5-7**				**7-9**			
		Sample Date	**09/30/2013**				**09/30/2013**				**09/30/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	2.78	0.0278	---	---	2.43	0.0243	---	---	1.98	0.0198	---	---	2.74	0.0274	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.10	0.10	0.00	0.00	0.09	0.09	0.00	0.00	0.13	0.13	0.00	0.00	0.08	0.08	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.12	0.12	0.00	0.00	0.08	0.08	0.00	0.00	0.12	0.12	0.00	0.00	0.07	0.07	0.00
Acenaphthene (a)	491.00	33400	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.00	0.01	0.01	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.00	0.09	0.09	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00
Anthracene (a)	594.00	1300	0.00	0.05	0.05	0.00	0.00	0.04	0.04	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00
Benzo(a)anthracene (a)	841.00	4153	0.01	0.18	0.18	0.00	0.00	0.16	0.16	0.00	0.00	0.07	0.07	0.00	0.00	0.03	0.03	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.18	0.18	0.00	0.00	0.16	0.16	0.00	0.00	0.04	0.04	0.00	0.00	0.02	0.02	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.01	0.35	0.35	0.00	0.01	0.31	0.31	0.00	0.00	0.21	0.21	0.00	0.00	0.12	0.12	0.00
Benzo(e)pyrene (a)	967.00	4300	0.01	0.22	0.22	0.00	0.01	0.21	0.21	0.00	0.00	0.18	0.18	0.00	0.00	0.10	0.10	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.11	0.11	0.00	0.00	0.12	0.12	0.00	0.00	0.11	0.11	0.00	0.00	0.06	0.06	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.01	0.20	0.20	0.00	0.00	0.16	0.16	0.00	0.00	0.08	0.08	0.00	0.00	0.04	0.04	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.40	0.40	0.00	0.01	0.45	0.45	0.00	0.01	0.50	0.50	0.00	0.01	0.30	0.30	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.06	0.06	0.00	0.00	0.08	0.08	0.00	0.00	0.11	0.11	0.00	0.00	0.05	0.05	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.40	0.40	0.00	0.01	0.45	0.45	0.00	0.01	0.51	0.51	0.00	0.01	0.26	0.26	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.14	0.14	0.00	0.00	0.12	0.12	0.00	0.00	0.18	0.18	0.00	0.00	0.10	0.10	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.02	0.79	0.79	0.00	0.02	0.95	0.95	0.00	0.02	1.21	1.21	0.00	0.02	0.66	0.66	0.00
C2 Chrysenes (a)	1008.00	---	0.03	0.90	0.90	0.00	0.02	0.91	0.91	0.00	0.03	1.57	1.57	0.00	0.02	0.77	0.77	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.15	0.15	0.00	0.00	0.06	0.06	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.43	0.43	---	0.01	0.49	0.49	---	0.01	0.66	0.66	---	0.01	0.32	0.32	---
C2-Naphthalenes (a)	510.00	---	0.02	0.54	0.54	0.00	0.01	0.49	0.49	0.00	0.01	0.71	0.71	0.00	0.01	0.44	0.44	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.02	0.83	0.83	0.00	0.03	1.07	1.07	0.00	0.03	1.41	1.41	0.00	0.02	0.69	0.69	0.00
C3 Chrysenes (a)	1112.00	---	0.01	0.40	0.40	0.00	0.01	0.41	0.41	0.00	0.01	0.61	0.61	0.00	0.01	0.31	0.31	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.28	0.28	0.00	0.01	0.31	0.31	0.00	0.01	0.44	0.44	0.00	0.01	0.19	0.19	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.43	0.43	0.00	0.01	0.53	0.53	0.00	0.01	0.71	0.71	0.00	0.01	0.40	0.40	0.00
C3-Naphthalenes (a)	581.00	---	0.04	1.26	1.26	0.00	0.04	1.44	1.44	0.00	0.04	1.92	1.92	0.00	0.03	1.13	1.13	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.03	0.90	0.90	0.00	0.03	1.19	1.19	0.00	0.03	1.57	1.57	0.00	0.02	0.80	0.80	0.00
C4 Chrysenes (a)	1214.00	---	0.01	0.21	0.21	0.00	0.00	0.19	0.19	0.00	0.01	0.31	0.31	0.00	0.00	0.11	0.11	0.00
C4-Naphthalenes (a)	657.00	---	0.03	1.22	1.22	0.00	0.04	1.52	1.52	0.00	0.04	2.17	2.17	0.00	0.03	1.02	1.02	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	0.54	0.54	0.00	0.02	0.70	0.70	0.00	0.02	0.91	0.91	0.00	0.01	0.47	0.47	0.00
Chrysene (a)	844.00	826	0.01	0.35	0.35	0.00	0.01	0.36	0.36	0.00	0.01	0.38	0.38	0.00	0.01	0.20	0.20	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00
Fluoranthene (a)	707.00	23870	0.01	0.40	0.40	0.00	0.01	0.36	0.36	0.00	0.01	0.30	0.30	0.00	0.00	0.17	0.17	0.00
Fluorene (a)	538.00	26000	0.00	0.10	0.10	0.00	0.00	0.10	0.10	0.00	0.00	0.14	0.14	0.00	0.00	0.08	0.08	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.07	0.07	0.00	0.00	0.07	0.07	0.00	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00
Naphthalene (a)	385.00	61700	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00	0.00	0.09	0.09	0.00	0.00	0.05	0.05	0.00
Perylene (a)	967.00	431	0.04	1.29	1.29	0.00	0.03	1.23	1.23	0.00	0.03	1.67	1.67	0.00	0.03	0.91	0.91	0.00
Phenanthrene (a)	596.00	34300	0.01	0.36	0.36	0.00	0.01	0.30	0.30	0.00	0.01	0.40	0.40	0.00	0.01	0.24	0.24	0.00
Pyrene (a)	697.00	9,090.00	0.01	0.26	0.26	0.00	0.01	0.23	0.23	0.00	0.00	0.18	0.18	0.00	0.00	0.09	0.09	0.00
	---	**ESBTU FCVi**	---	---	---	0.01	---	---	---	0.01	---	---	---	0.01	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-28				CI13-29				CI13-29				CI13-29			
		Field Sample ID	CI13-28-0911				CI13-29A-SURF				CI13-29A-0001				CI13-29A-0103			
		Sample Depth	9-11				0-0.5				0-1				1-3			
		Sample Date	09/30/2013				09/30/2013				09/30/2013				09/30/2013			
	Coc, PAHi, FCVi[a]	Coc, PAHi, Maxi[a]	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc$*$	ESBTU FCVi
Total Organic Carbon**	--	--	1.65	0.0165	---	---	3.65	0.0365	---	---	1.17	0.0117	---	---	1.15	0.0115	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.10	0.10	0.00	0.05	1.32	1.32	0.00	0.00	0.30	0.30	0.00	0.00	0.18	0.18	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.10	0.10	0.00	0.06	1.70	1.70	0.00	0.00	0.30	0.30	0.00	0.00	0.18	0.18	0.00
Acenaphthene (a)	491.00	33400	0.00	0.04	0.04	0.00	0.08	2.30	2.30	0.00	0.00	0.15	0.15	0.00	0.00	0.05	0.05	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.02	0.02	0.00	0.22	6.03	6.03	0.01	0.00	0.14	0.14	0.00	0.00	0.07	0.07	0.00
Anthracene (a)	594.00	1300	0.00	0.05	0.05	0.00	0.86	23.56	23.56	0.04	0.01	0.74	0.74	0.00	0.00	0.11	0.11	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.07	0.07	0.00	2.60	71.23	71.23	0.08	0.02	1.97	1.97	0.00	0.01	0.58	0.58	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.06	0.06	0.00	2.60	71.23	71.23	0.07	0.02	1.71	1.71	0.00	0.01	0.56	0.56	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.20	0.20	0.00	2.30	63.01	63.01	0.06	0.02	2.05	2.05	0.00	0.01	0.56	0.56	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00	0.18	0.18	0.00	1.60	43.84	43.84	0.05	0.02	1.28	1.28	0.00	0.01	0.51	0.51	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.08	0.08	0.00	1.50	41.10	41.10	0.04	0.02	1.28	1.28	0.00	0.01	0.61	0.61	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.08	0.08	0.00	1.90	52.05	52.05	0.05	0.02	1.28	1.28	0.00	0.00	0.30	0.30	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.50	0.50	0.00	1.40	38.36	38.36	0.04	0.02	1.71	1.71	0.00	0.01	1.13	1.13	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.12	0.12	0.00	0.36	9.86	9.86	0.02	0.00	0.18	0.18	0.00	0.00	0.09	0.09	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.53	0.53	0.00	2.60	71.23	71.23	0.09	0.03	2.39	2.39	0.00	0.02	1.39	1.39	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.14	0.14	0.00	0.10	2.68	2.68	0.01	0.00	0.18	0.18	0.00	0.00	0.10	0.10	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.03	1.64	1.64	0.00	1.20	32.88	32.88	0.05	0.03	2.82	2.82	0.00	0.02	1.91	1.91	0.00
C2 Chrysenes (a)	1008.00	---	0.02	1.39	1.39	0.00	0.83	22.74	22.74	0.02	0.03	2.14	2.14	0.00	0.02	1.57	1.57	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.18	0.18	0.00	0.36	9.86	9.86	0.01	0.00	0.36	0.36	0.00	0.00	0.23	0.23	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.67	0.67	---	1.10	30.14	30.14	---	0.02	1.97	1.97	---	0.02	1.39	1.39	---
C2-Naphthalenes (a)	510.00	---	0.01	0.85	0.85	0.00	0.31	8.49	8.49	0.02	0.01	0.85	0.85	0.00	0.01	0.87	0.87	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.03	1.76	1.76	0.00	0.74	20.27	20.27	0.03	0.13	11.11	11.11	0.01	0.17	14.78	14.78	0.02
C3 Chrysenes (a)	1112.00	---	0.01	0.67	0.67	0.00	0.27	7.40	7.40	0.01	0.02	1.28	1.28	0.00	0.01	1.13	1.13	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.50	0.50	0.00	0.12	3.29	3.29	0.00	0.01	0.94	0.94	0.00	0.01	0.80	0.80	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.85	0.85	0.00	0.46	12.60	12.60	0.01	0.02	1.62	1.62	0.00	0.02	1.48	1.48	0.00
C3-Naphthalenes (a)	581.00	---	0.05	2.79	2.79	0.00	0.31	8.49	8.49	0.01	0.02	1.88	1.88	0.00	0.03	2.35	2.35	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.03	2.06	2.06	0.00	0.49	13.42	13.42	0.02	0.05	4.44	4.44	0.01	0.06	4.96	4.96	0.01
C4 Chrysenes (a)	1214.00	---	0.00	0.24	0.24	0.00	0.36	9.86	9.86	0.01	0.00	0.34	0.34	0.00	0.00	0.34	0.34	0.00
C4-Naphthalenes (a)	657.00	---	0.05	2.91	2.91	0.00	0.17	4.66	4.66	0.01	0.04	3.25	3.25	0.00	0.04	3.13	3.13	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	1.21	1.21	0.00	0.22	6.03	6.03	0.01	0.03	2.39	2.39	0.00	0.02	2.09	2.09	0.00
Chrysene (a)	844.00	826	0.01	0.40	0.40	0.00	2.70	73.97	73.97	0.09	0.03	2.39	2.39	0.00	0.01	1.04	1.04	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2389	0.00	0.01	0.01	0.00	0.44	12.05	12.05	0.01	0.00	0.32	0.32	0.00	0.00	0.09	0.09	0.00
Fluoranthene (a)	707.00	23870	0.00	0.29	0.29	0.00	3.70	101.37	101.37	0.14	0.05	4.10	4.10	0.01	0.01	0.96	0.96	0.00
Fluorene (a)	538.00	26000	0.00	0.13	0.13	0.00	0.23	6.30	6.30	0.01	0.00	0.28	0.28	0.00	0.00	0.04	0.04	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.03	0.03	0.00	1.30	35.62	35.62	0.03	0.01	1.03	1.03	0.00	0.00	0.30	0.30	0.00
Naphthalene (a)	385.00	61700	0.00	0.06	0.06	0.00	0.36	9.86	9.86	0.03	0.00	0.30	0.30	0.00	0.00	0.18	0.18	0.00
Perylene (a)	967.00	431	0.02	0.97	0.97	0.00	0.57	15.62	15.62	0.02	0.03	2.31	2.31	0.00	0.02	1.30	1.30	0.00
Phenanthrene (a)	596.00	34300	0.01	0.44	0.44	0.00	1.60	43.84	43.84	0.07	0.02	1.54	1.54	0.00	0.01	0.50	0.50	0.00
Pyrene (a)	697.00	9,090.00	0.00	0.20	0.20	0.00	2.90	79.45	79.45	0.11	0.03	2.48	2.48	0.00	0.01	0.87	0.87	0.00
	---	**ESBTU FCVi**	---	---	---	0.01	---	---	---	1.16	---	---	---	0.06	---	---	---	0.04

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-30**				**CI13-30**				**CI13-31**				**CI13-31**				**CI13-31**			
		Field Sample ID	**CI13-30-SURF**				**CI13-30-0001**				**CI13-31-SURF**				**CI13-31-SURF-FD**				**CI13-31-0001**			
		Sample Depth	**0-0.5**				**0-1**				**0-0.5**				**0-0.5**				**0-1**			
		Sample Date	**09/30/2013**				**09/25/2013**				**09/27/2013**				**09/27/2013**				**09/29/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	4.39	0.0439	---	---	2.04	0.0204	---	---	3.39	0.0339	---	---	3.06	0.0306	---	---	1.78	0.0178	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																						
1-Methylnaphthalene	446.00	165700	0.09	1.94	1.94	0.00	0.02	1.08	1.08	0.00	0.03	0.86	0.86	0.00	0.03	0.85	0.85	0.00	0.00	0.16	0.16	0.00
2-Methylnaphthalene	447.00	154800	0.09	1.94	1.94	0.00	0.11	5.15	5.15	0.01	0.14	3.98	3.98	0.01	0.09	2.94	2.94	0.01	0.00	0.25	0.25	0.00
Acenaphthene (a)	491.00	33400	0.04	0.93	0.93	0.00	0.07	3.19	3.19	0.01	0.04	1.30	1.30	0.00	0.04	1.44	1.44	0.00	0.00	0.16	0.16	0.00
Acenaphthylene (a)	452.00	24000	0.05	1.07	1.07	0.00	0.06	2.70	2.70	0.01	0.07	2.18	2.18	0.00	0.08	2.58	2.58	0.01	0.00	0.14	0.14	0.00
Anthracene (a)	594.00	1300	0.22	5.01	5.01	0.01	0.35	17.16	17.16	0.03	0.30	8.85	8.85	0.01	0.17	5.56	5.56	0.01	0.01	0.49	0.49	0.00
Benzo(a)anthracene (a)	841.00	4153	0.73	16.63	16.63	0.02	1.10	53.92	53.92	0.06	0.99	29.20	29.20	0.03	1.00	32.68	32.68	0.04	0.05	2.98	2.98	0.00
Benzo(a)pyrene (a)	965.00	3840	0.73	16.63	16.63	0.02	1.10	53.92	53.92	0.06	1.20	35.40	35.40	0.04	1.20	39.22	39.22	0.04	0.06	3.43	3.43	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.65	14.81	14.81	0.02	0.83	40.69	40.69	0.04	1.10	32.45	32.45	0.03	1.20	39.22	39.22	0.04	0.06	3.37	3.37	0.00
Benzo(e)pyrene (a)	967.00	4300	0.46	10.48	10.48	0.01	0.62	30.39	30.39	0.03	0.79	23.30	23.30	0.02	0.87	28.43	28.43	0.03	0.04	2.47	2.47	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.42	9.57	9.57	0.01	0.35	17.16	17.16	0.02	0.69	20.35	20.35	0.02	0.81	26.47	26.47	0.02	0.03	1.85	1.85	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.56	12.76	12.76	0.01	0.94	46.08	46.08	0.05	0.83	24.48	24.48	0.03	0.87	28.43	28.43	0.03	0.05	2.75	2.75	0.00
C1 Chrysenes (a)	929.00	---	0.50	11.39	11.39	0.01	0.70	34.31	34.31	0.04	0.78	23.01	23.01	0.02	0.88	28.76	28.76	0.03	0.05	2.64	2.64	0.00
C1 Fluorenes (a)	611.00	---	0.03	0.62	0.62	0.00	0.04	1.81	1.81	0.00	0.14	3.98	3.98	0.01	0.03	0.92	0.92	0.00	0.00	0.18	0.18	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.77	17.54	17.54	0.02	1.30	63.73	63.73	0.08	1.00	29.50	29.50	0.04	1.10	35.95	35.95	0.05	0.06	3.60	3.60	0.00
C1-Naphthalenes (a)	444.00	---	0.05	1.03	1.03	0.00	0.03	1.57	1.57	0.00	0.06	1.65	1.65	0.00	0.06	1.83	1.83	0.00	0.00	0.27	0.27	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.40	9.11	9.11	0.01	0.64	31.37	31.37	0.05	0.49	14.45	14.45	0.02	0.50	16.34	16.34	0.02	0.05	2.70	2.70	0.00
C2 Chrysenes (a)	1008.00	---	0.32	7.29	7.29	0.01	0.48	23.53	23.53	0.02	0.51	15.04	15.04	0.01	0.57	18.63	18.63	0.02	0.04	2.25	2.25	0.00
C2 Fluorenes (a)	686.00	---	0.03	0.71	0.71	0.00	0.06	3.14	3.14	0.00	0.04	1.30	1.30	0.00	0.06	2.03	2.03	0.00	0.01	0.35	0.35	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.41	9.34	9.34	---	0.61	29.90	29.90	---	0.61	17.99	17.99	---	0.71	23.20	23.20	---	0.04	2.42	2.42	---
C2-Naphthalenes (a)	510.00	---	0.13	2.96	2.96	0.01	0.12	5.88	5.88	0.01	0.17	5.01	5.01	0.01	0.15	4.90	4.90	0.01	0.02	1.01	1.01	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.33	7.52	7.52	0.01	0.51	25.00	25.00	0.03	0.39	11.50	11.50	0.02	0.45	14.71	14.71	0.02	0.05	2.92	2.92	0.00
C3 Chrysenes (a)	1112.00	---	0.13	2.96	2.96	0.00	0.14	6.86	6.86	0.01	0.26	7.67	7.67	0.01	0.27	8.82	8.82	0.01	0.02	0.96	0.96	0.00
C3 Fluorenes (a)	769.00	---	0.09	2.00	2.00	0.00	0.11	5.39	5.39	0.01	0.10	2.95	2.95	0.00	0.08	2.61	2.61	0.00	0.01	0.73	0.73	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.20	4.56	4.56	0.00	0.30	14.71	14.71	0.02	0.32	9.44	9.44	0.01	0.39	12.75	12.75	0.01	0.03	1.74	1.74	0.00
C3-Naphthalenes (a)	581.00	---	0.14	3.19	3.19	0.01	0.24	11.76	11.76	0.02	0.18	5.31	5.31	0.01	0.16	5.23	5.23	0.01	0.03	1.91	1.91	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.23	5.24	5.24	0.01	0.46	22.55	22.55	0.03	0.37	10.91	10.91	0.01	0.45	14.71	14.71	0.02	0.05	2.87	2.87	0.00
C4 Chrysenes (a)	1214.00	---	0.09	1.94	1.94	0.00	0.04	1.76	1.76	0.00	0.07	1.95	1.95	0.00	0.07	2.32	2.32	0.00	0.01	0.34	0.34	0.00
C4-Naphthalenes (a)	657.00	---	0.11	2.51	2.51	0.00	0.14	6.86	6.86	0.01	0.11	3.24	3.24	0.00	0.13	4.25	4.25	0.01	0.04	2.36	2.36	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.13	2.96	2.96	0.00	0.26	12.75	12.75	0.01	0.22	6.49	6.49	0.01	0.25	8.17	8.17	0.01	0.03	1.63	1.63	0.00
Chrysene (a)	844.00	826	0.77	17.54	17.54	0.02	1.10	53.92	53.92	0.06	1.10	32.45	32.45	0.04	1.10	35.95	35.95	0.04	0.06	3.26	3.26	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.14	3.19	3.19	0.00	0.11	5.15	5.15	0.00	0.21	6.19	6.19	0.01	0.24	7.84	7.84	0.01	0.01	0.62	0.62	0.00
Fluoranthene (a)	707.00	23,870.00	1.10	25.06	25.06	0.04	1.60	78.43	78.43	0.11	1.40	41.30	41.30	0.06	1.30	42.48	42.48	0.06	0.07	4.16	4.16	0.01
Fluorene (a)	538.00	26,000.00	0.07	1.69	1.69	0.00	0.12	5.88	5.88	0.01	0.09	2.68	2.68	0.00	0.06	1.86	1.86	0.00	0.01	0.31	0.31	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.41	9.34	9.34	0.01	0.34	16.67	16.67	0.01	0.60	17.70	17.70	0.02	0.70	22.88	22.88	0.02	0.03	1.69	1.69	0.00
Naphthalene (a)	385.00	61,700.00	0.18	4.10	4.10	0.01	0.11	5.15	5.15	0.01	0.14	3.98	3.98	0.01	0.09	2.94	2.94	0.01	0.01	0.47	0.47	0.00
Perylene (a)	967.00	431.00	0.17	3.87	3.87	0.00	0.27	13.24	13.24	0.01	0.28	8.26	8.26	0.01	0.28	9.15	9.15	0.01	0.04	1.97	1.97	0.00
Phenanthrene (a)	596	34300	0.41	9.34	9.34	0.02	0.46	22.55	22.55	0.04	0.51	15.04	15.04	0.03	0.44	14.38	14.38	0.02	0.03	1.69	1.69	0.00
Pyrene (a)	697.00	9,090.00	0.71	16.17	16.17	0.02	1.20	58.82	58.82	0.08	1.00	29.50	29.50	0.04	1.00	32.68	32.68	0.05	0.06	3.09	3.09	0.00
	---	**ESBTU FCVi**	**---**	**---**	**---**	0.28	---	---	---	0.87	---	---	---	0.51	---	---	---	0.57	---	---	---	0.06

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-31**				**CI13-31**				**CI13-31**				**CI13-32**				**CI13-32**			
		Field Sample ID	**CI13-31-0103**				**CI13-31-0305**				**CI13-31-0507**				**CI13-32-SURF**				**CI13-32-0001**			
		Sample Depth	**1-3**				**3-5**				**5-7**				**0-0.5**				**0-1**			
		Sample Date	**09/29/2013**				**09/29/2013**				**09/29/2013**				**09/27/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	2.69	0.0269	---	---	4.48	0.0448	---	---	3.13	0.0313	---	---	2.52	0.0252	---	---	1.18	0.0118	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																						
1-Methylnaphthalene	446.00	165700	0.00	0.05	0.05	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00	0.02	0.79	0.79	0.00	0.00	0.10	0.10	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.04	0.04	0.00	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.09	3.37	3.37	0.01	0.00	0.15	0.15	0.00
Acenaphthene (a)	491.00	33400	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.03	1.27	1.27	0.00	0.00	0.17	0.17	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.06	2.42	2.42	0.01	0.00	0.30	0.30	0.00
Anthracene (a)	594.00	1300	0.00	0.03	0.03	0.00	0.00	0.05	0.05	0.00	0.00	0.07	0.07	0.00	0.11	4.37	4.37	0.01	0.02	1.82	1.82	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.16	0.16	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00	0.70	27.78	27.78	0.03	0.13	11.02	11.02	0.01
Benzo(a)pyrene (a)	965.00	3840	0.00	0.14	0.14	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.87	34.52	34.52	0.04	0.07	6.27	6.27	0.01
Benzo(b)fluoranthene (a)	979.00	2169	0.01	0.28	0.28	0.00	0.00	0.08	0.08	0.00	0.00	0.09	0.09	0.00	0.88	34.92	34.92	0.04	0.10	8.31	8.31	0.01
Benzo(e)pyrene (a)	967.00	4300	0.00	0.18	0.18	0.00	0.00	0.07	0.07	0.00	0.00	0.10	0.10	0.00	0.67	26.59	26.59	0.03	0.10	8.47	8.47	0.01
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.11	0.11	0.00	0.00	0.09	0.09	0.00	0.00	0.12	0.12	0.00	0.50	19.84	19.84	0.02	0.04	3.39	3.39	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.16	0.16	0.00	0.00	0.03	0.03	0.00	0.00	0.03	0.03	0.00	0.64	25.40	25.40	0.03	0.05	4.58	4.58	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.36	0.36	0.00	0.01	0.21	0.21	0.00	0.01	0.28	0.28	0.00	0.70	27.78	27.78	0.03	0.25	21.19	21.19	0.02
C1 Fluorenes (a)	611.00	---	0.00	0.05	0.05	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00	0.02	0.83	0.83	0.00	0.04	3.14	3.14	0.01
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.37	0.37	0.00	0.01	0.20	0.20	0.00	0.01	0.27	0.27	0.00	0.88	34.92	34.92	0.05	0.41	34.75	34.75	0.05
C1-Naphthalenes (a)	444.00	---	0.00	0.06	0.06	0.00	0.00	0.04	0.04	0.00	0.00	0.05	0.05	0.00	0.04	1.39	1.39	0.00	0.02	1.82	1.82	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.02	0.59	0.59	0.00	0.01	0.29	0.29	0.00	0.01	0.35	0.35	0.00	0.33	13.10	13.10	0.02	0.45	38.14	38.14	0.06
C2 Chrysenes (a)	1008.00	---	0.02	0.67	0.67	0.00	0.02	0.40	0.40	0.00	0.02	0.54	0.54	0.00	0.54	21.43	21.43	0.02	0.18	15.25	15.25	0.02
C2 Fluorenes (a)	686.00	---	0.00	0.10	0.10	0.00	0.00	0.06	0.06	0.00	0.00	0.08	0.08	0.00	0.05	1.79	1.79	0.00	0.07	6.10	6.10	0.01
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.37	0.37	---	0.01	0.27	0.27	---	0.01	0.35	0.35	---	0.61	24.21	24.21	---	0.30	25.42	25.42	---
C2-Naphthalenes (a)	510.00	---	0.01	0.29	0.29	0.00	0.01	0.15	0.15	0.00	0.01	0.23	0.23	0.00	0.11	4.37	4.37	0.01	0.02	1.44	1.44	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.02	0.74	0.74	0.00	0.02	0.45	0.45	0.00	0.03	0.93	0.93	0.00	0.31	12.30	12.30	0.02	0.30	25.42	25.42	0.03
C3 Chrysenes (a)	1112.00	---	0.01	0.35	0.35	0.00	0.01	0.22	0.22	0.00	0.01	0.28	0.28	0.00	0.25	9.92	9.92	0.01	0.05	4.15	4.15	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.21	0.21	0.00	0.01	0.15	0.15	0.00	0.01	0.25	0.25	0.00	0.11	4.37	4.37	0.01	0.10	8.47	8.47	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.45	0.45	0.00	0.01	0.27	0.27	0.00	0.01	0.38	0.38	0.00	0.34	13.49	13.49	0.01	0.15	12.71	12.71	0.01
C3-Naphthalenes (a)	581.00	---	0.02	0.71	0.71	0.00	0.01	0.29	0.29	0.00	0.01	0.38	0.38	0.00	0.12	4.76	4.76	0.01	0.08	6.95	6.95	0.01
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.02	0.82	0.82	0.00	0.03	0.58	0.58	0.00	0.03	0.96	0.96	0.00	0.36	14.29	14.29	0.02	0.18	15.25	15.25	0.02
C4 Chrysenes (a)	1214.00	---	0.00	0.14	0.14	0.00	0.00	0.10	0.10	0.00	0.00	0.11	0.11	0.00	0.08	3.02	3.02	0.00	0.03	2.12	2.12	0.00
C4-Naphthalenes (a)	657.00	---	0.02	0.86	0.86	0.00	0.02	0.49	0.49	0.00	0.02	0.67	0.67	0.00	0.08	2.98	2.98	0.00	0.08	6.44	6.44	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	0.52	0.52	0.00	0.02	0.38	0.38	0.00	0.02	0.48	0.48	0.00	0.20	7.94	7.94	0.01	0.09	7.97	7.97	0.01
Chrysene (a)	844.00	826	0.01	0.29	0.29	0.00	0.01	0.15	0.15	0.00	0.01	0.19	0.19	0.00	0.85	33.73	33.73	0.04	0.21	17.80	17.80	0.02
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.15	5.95	5.95	0.01	0.01	1.10	1.10	0.00
Fluoranthene (a)	707.00	23,870.00	0.01	0.29	0.29	0.00	0.00	0.05	0.05	0.00	0.00	0.07	0.07	0.00	0.85	33.73	33.73	0.05	0.15	12.71	12.71	0.02
Fluorene (a)	538.00	26,000.00	0.00	0.06	0.06	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.04	1.43	1.43	0.00	0.01	0.53	0.53	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.07	0.07	0.00	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.43	17.06	17.06	0.02	0.03	2.71	2.71	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.03	0.03	0.00	0.00	0.05	0.05	0.00	0.00	0.07	0.07	0.00	0.09	3.37	3.37	0.01	0.02	1.82	1.82	0.00
Perylene (a)	967.00	431.00	0.04	1.38	1.38	0.00	0.04	0.94	0.94	0.00	0.03	0.80	0.80	0.00	0.20	7.94	7.94	0.01	0.05	3.81	3.81	0.00
Phenanthrene (a)	596	34300	0.01	0.23	0.23	0.00	0.00	0.05	0.05	0.00	0.00	0.07	0.07	0.00	0.27	10.71	10.71	0.02	0.16	13.56	13.56	0.02
Pyrene (a)	697.00	9,090.00	0.01	0.22	0.22	0.00	0.00	0.07	0.07	0.00	0.00	0.08	0.08	0.00	0.75	29.76	29.76	0.04	0.25	21.19	21.19	0.03
	---	**ESBTU FCVi**	---	---	---	0.01	---	---	---	0.00	---	---	---	0.01	---	---	---	0.50	---	---	---	0.34

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-32**				**CI13-33**				**CI13-33**				**CI13-33**			
		Field Sample ID	**CI13-32-0103**				**CI13-33-SURF**				**CI13-33-0001**				**CI13-33-0103**			
		Sample Depth	**1-3**				**0-0.5**				**0-1**				**1-3**			
		Sample Date	**09/30/2013**				**09/27/2013**				**09/30/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.64	0.0164	---	---	8.35	0.0835	---	---	6.33	0.0633	---	---	7.27	0.0727	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.01	0.01	0.00	0.07	0.84	0.84	0.00	0.05	0.73	0.73	0.00	0.00	0.06	0.06	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.02	0.02	0.00	0.36	4.25	4.25	0.01	0.08	1.25	1.25	0.00	0.00	0.06	0.06	0.00
Acenaphthene (a)	491.00	33400	0.00	0.12	0.12	0.00	0.14	1.68	1.68	0.00	0.10	1.52	1.52	0.00	0.00	0.04	0.04	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.14	1.68	1.68	0.00	0.10	1.58	1.58	0.00	0.00	0.01	0.01	0.00
Anthracene (a)	594.00	1300	0.00	0.12	0.12	0.00	0.36	4.31	4.31	0.01	0.31	4.90	4.90	0.01	0.01	0.08	0.08	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.13	0.13	0.00	2.30	27.54	27.54	0.03	1.70	26.86	26.86	0.03	0.02	0.21	0.21	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.07	0.07	0.00	2.70	32.34	32.34	0.03	2.20	34.76	34.76	0.04	0.01	0.19	0.19	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.15	0.15	0.00	2.80	33.53	33.53	0.03	2.20	34.76	34.76	0.04	0.02	0.29	0.29	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00	0.18	0.18	0.00	1.90	22.75	22.75	0.02	1.40	22.12	22.12	0.02	0.02	0.22	0.22	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.13	0.13	0.00	1.60	19.16	19.16	0.02	1.30	20.54	20.54	0.02	0.01	0.18	0.18	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.07	0.07	0.00	2.00	23.95	23.95	0.02	1.50	23.70	23.70	0.02	0.01	0.17	0.17	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.34	0.34	0.00	1.50	17.96	17.96	0.02	1.30	20.54	20.54	0.02	0.03	0.40	0.40	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.03	0.03	0.00	0.36	4.25	4.25	0.01	0.04	0.63	0.63	0.00	0.00	0.03	0.03	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.41	0.41	0.00	2.00	23.95	23.95	0.03	1.80	28.44	28.44	0.04	0.03	0.40	0.40	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.12	0.12	0.00	0.13	1.56	1.56	0.00	0.09	1.34	1.34	0.00	0.01	0.08	0.08	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.00	0.30	0.30	0.00	0.83	9.94	9.94	0.01	0.71	11.22	11.22	0.02	0.03	0.45	0.45	0.00
C2 Chrysenes (a)	1008.00	---	0.01	0.35	0.35	0.00	1.30	15.57	15.57	0.02	1.00	15.80	15.80	0.02	0.04	0.55	0.55	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.05	0.05	0.00	0.08	0.92	0.92	0.00	0.09	1.34	1.34	0.00	0.00	0.06	0.06	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.34	0.34	---	1.20	14.37	14.37	---	1.10	17.38	17.38	---	0.03	0.40	0.40	---
C2-Naphthalenes (a)	510.00	---	0.00	0.05	0.05	0.00	0.33	3.95	3.95	0.01	0.25	3.95	3.95	0.01	0.02	0.28	0.28	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.01	0.31	0.31	0.00	0.60	7.19	7.19	0.01	0.63	9.95	9.95	0.01	0.04	0.51	0.51	0.00
C3 Chrysenes (a)	1112.00	---	0.00	0.17	0.17	0.00	0.58	6.95	6.95	0.01	0.32	5.06	5.06	0.00	0.02	0.30	0.30	0.00
C3 Fluorenes (a)	769.00	---	0.00	0.12	0.12	0.00	0.17	2.04	2.04	0.00	0.22	3.48	3.48	0.00	0.01	0.17	0.17	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.00	0.24	0.24	0.00	0.57	6.83	6.83	0.01	0.58	9.16	9.16	0.01	0.03	0.36	0.36	0.00
C3-Naphthalenes (a)	581.00	---	0.00	0.10	0.10	0.00	0.33	3.95	3.95	0.01	0.29	4.58	4.58	0.01	0.03	0.41	0.41	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.00	0.23	0.23	0.00	0.60	7.19	7.19	0.01	0.74	11.69	11.69	0.01	0.05	0.62	0.62	0.00
C4 Chrysenes (a)	1214.00	---	0.00	0.05	0.05	0.00	0.25	2.99	2.99	0.00	0.10	1.58	1.58	0.00	0.01	0.08	0.08	0.00
C4-Naphthalenes (a)	657.00	---	0.00	0.12	0.12	0.00	0.19	2.28	2.28	0.00	0.27	4.27	4.27	0.01	0.03	0.36	0.36	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.00	0.18	0.18	0.00	0.41	4.91	4.91	0.01	0.46	7.27	7.27	0.01	0.03	0.41	0.41	0.00
Chrysene (a)	844.00	826	0.01	0.30	0.30	0.00	2.60	31.14	31.14	0.04	1.90	30.02	30.02	0.04	0.02	0.33	0.33	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.02	0.02	0.00	0.50	5.99	5.99	0.01	0.42	6.64	6.64	0.01	0.00	0.04	0.04	0.00
Fluoranthene (a)	707.00	23,870.00	0.00	0.12	0.12	0.00	2.70	32.34	32.34	0.05	2.10	33.18	33.18	0.05	0.03	0.36	0.36	0.00
Fluorene (a)	538.00	26,000.00	0.00	0.01	0.01	0.00	0.13	1.56	1.56	0.00	0.10	1.58	1.58	0.00	0.00	0.05	0.05	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.05	0.05	0.00	1.40	16.77	16.77	0.02	1.20	18.96	18.96	0.02	0.01	0.11	0.11	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.12	0.12	0.00	0.36	4.25	4.25	0.01	0.15	2.29	2.29	0.01	0.01	0.08	0.08	0.00
Perylene (a)	967.00	431.00	0.01	0.35	0.35	0.00	0.63	7.54	7.54	0.01	0.50	7.90	7.90	0.01	0.06	0.83	0.83	0.00
Phenanthrene (a)	596	34300	0.00	0.12	0.12	0.00	0.93	11.14	11.14	0.02	0.76	12.01	12.01	0.02	0.02	0.25	0.25	0.00
Pyrene (a)	697.00	9,090.00	0.00	0.26	0.26	0.00	2.10	25.15	25.15	0.04	1.80	28.44	28.44	0.04	0.02	0.29	0.29	0.00
	---	**ESBTU FCVi**	---	---	---	0.01	---	---	---	0.44	---	---	---	0.46	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-33				CI13-34				CI13-34				CI13-34				CI13-34			
		Field Sample ID	CI13-33-0305				CI13-34-SURF				CI13-34-0001				CI13-34-0103				CI13-34-0305			
		Sample Depth	3-5				0-0.5				0-1				1-3				3-5			
		Sample Date	09/30/2013				09/27/2013				09/29/2013				09/29/2013				09/29/2013			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	4.09	0.0409	---	---	8.61	0.0861	---	---	6.95	0.0695	---	---	17.1	0.171	---	---	2.56	0.0256	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																						
1-Methylnaphthalene	446.00	165700	0.00	0.03	0.03	0.00	0.06	0.71	0.71	0.00	0.06	0.82	0.82	0.00	0.00	0.02	0.02	0.00	0.00	0.05	0.05	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.02	0.02	0.00	0.22	2.56	2.56	0.01	0.09	1.35	1.35	0.00	0.00	0.02	0.02	0.00	0.00	0.05	0.05	0.00
Acenaphthene (a)	491.00	33400	0.00	0.01	0.01	0.00	0.10	1.16	1.16	0.00	0.11	1.58	1.58	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.17	1.97	1.97	0.00	0.10	1.44	1.44	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00
Anthracene (a)	594.00	1300	0.00	0.05	0.05	0.00	0.36	4.18	4.18	0.01	0.33	4.75	4.75	0.01	0.00	0.02	0.02	0.00	0.00	0.04	0.04	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.06	0.06	0.00	2.20	25.55	25.55	0.03	2.10	30.22	30.22	0.04	0.02	0.09	0.09	0.00	0.01	0.20	0.20	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.07	0.07	0.00	2.80	32.52	32.52	0.03	2.50	35.97	35.97	0.04	0.02	0.12	0.12	0.00	0.00	0.18	0.18	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.09	0.09	0.00	2.80	32.52	32.52	0.03	2.40	34.53	34.53	0.04	0.02	0.14	0.14	0.00	0.01	0.26	0.26	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00	0.08	0.08	0.00	1.90	22.07	22.07	0.02	1.60	23.02	23.02	0.02	0.02	0.09	0.09	0.00	0.01	0.21	0.21	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.09	0.09	0.00	1.50	17.42	17.42	0.02	1.40	20.14	20.14	0.02	0.01	0.05	0.05	0.00	0.00	0.14	0.14	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.05	0.05	0.00	2.00	23.23	23.23	0.02	1.80	25.90	25.90	0.03	0.02	0.10	0.10	0.00	0.00	0.19	0.19	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.17	0.17	0.00	1.70	19.74	19.74	0.02	1.70	24.46	24.46	0.03	0.02	0.12	0.12	0.00	0.01	0.39	0.39	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.01	0.01	0.00	0.04	0.51	0.51	0.00	0.05	0.65	0.65	0.00	0.00	0.01	0.01	0.00	0.00	0.05	0.05	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.15	0.15	0.00	2.10	24.39	24.39	0.03	2.00	28.78	28.78	0.04	0.03	0.15	0.15	0.00	0.01	0.43	0.43	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.03	0.03	0.00	0.11	1.28	1.28	0.00	0.10	1.41	1.41	0.00	0.00	0.02	0.02	0.00	0.00	0.07	0.07	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.01	0.17	0.17	0.00	0.86	9.99	9.99	0.01	0.95	13.67	13.67	0.02	0.03	0.16	0.16	0.00	0.02	0.63	0.63	0.00
C2 Chrysenes (a)	1008.00	---	0.01	0.24	0.24	0.00	1.30	15.10	15.10	0.02	1.30	18.71	18.71	0.02	0.03	0.16	0.16	0.00	0.02	0.66	0.66	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.03	0.03	0.00	0.08	0.93	0.93	0.00	0.08	1.21	1.21	0.00	0.00	0.02	0.02	0.00	0.00	0.11	0.11	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.18	0.18	---	1.20	13.94	13.94	---	1.30	18.71	18.71	---	0.02	0.12	0.12	---	0.01	0.39	0.39	---
C2-Naphthalenes (a)	510.00	---	0.01	0.12	0.12	0.00	0.30	3.48	3.48	0.01	0.28	4.03	4.03	0.01	0.01	0.08	0.08	0.00	0.01	0.30	0.30	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.01	0.27	0.27	0.00	0.67	7.78	7.78	0.01	0.75	10.79	10.79	0.01	0.03	0.16	0.16	0.00	0.02	0.82	0.82	0.00
C3 Chrysenes (a)	1112.00	---	0.01	0.14	0.14	0.00	0.62	7.20	7.20	0.01	0.46	6.62	6.62	0.01	0.02	0.09	0.09	0.00	0.01	0.34	0.34	0.00
C3 Fluorenes (a)	769.00	---	0.00	0.10	0.10	0.00	0.18	2.09	2.09	0.00	0.21	3.02	3.02	0.00	0.01	0.05	0.05	0.00	0.01	0.23	0.23	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.18	0.18	0.00	0.62	7.20	7.20	0.01	0.90	12.95	12.95	0.01	0.02	0.11	0.11	0.00	0.01	0.47	0.47	0.00
C3-Naphthalenes (a)	581.00	---	0.01	0.21	0.21	0.00	0.31	3.60	3.60	0.01	0.32	4.60	4.60	0.01	0.03	0.19	0.19	0.00	0.02	0.74	0.74	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.01	0.32	0.32	0.00	0.62	7.20	7.20	0.01	0.61	8.78	8.78	0.01	0.03	0.19	0.19	0.00	0.02	0.94	0.94	0.00
C4 Chrysenes (a)	1214.00	---	0.00	0.04	0.04	0.00	0.15	1.74	1.74	0.00	0.17	2.45	2.45	0.00	0.01	0.03	0.03	0.00	0.00	0.16	0.16	0.00
C4-Naphthalenes (a)	657.00	---	0.01	0.24	0.24	0.00	0.17	1.97	1.97	0.00	0.22	3.17	3.17	0.00	0.04	0.20	0.20	0.00	0.03	1.13	1.13	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	0.24	0.24	0.00	0.38	4.41	4.41	0.00	0.39	5.61	5.61	0.01	0.02	0.12	0.12	0.00	0.02	0.59	0.59	0.00
Chrysene (a)	844.00	826	0.01	0.13	0.13	0.00	2.40	27.87	27.87	0.03	2.10	30.22	30.22	0.04	0.02	0.13	0.13	0.00	0.01	0.34	0.34	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.02	0.02	0.00	0.47	5.46	5.46	0.00	0.43	6.19	6.19	0.01	0.00	0.01	0.01	0.00	0.00	0.03	0.03	0.00
Fluoranthene (a)	707.00	23,870.00	0.00	0.05	0.05	0.00	2.80	32.52	32.52	0.05	2.80	40.29	40.29	0.06	0.02	0.11	0.11	0.00	0.01	0.28	0.28	0.00
Fluorene (a)	538.00	26,000.00	0.00	0.01	0.01	0.00	0.11	1.28	1.28	0.00	0.11	1.58	1.58	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.03	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.04	0.04	0.00	1.40	16.26	16.26	0.01	1.30	18.71	18.71	0.02	0.01	0.04	0.04	0.00	0.00	0.08	0.08	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.05	0.05	0.00	0.22	2.56	2.56	0.01	0.21	3.02	3.02	0.01	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00
Perylene (a)	967.00	431.00	0.02	0.42	0.42	0.00	0.63	7.32	7.32	0.01	0.63	9.06	9.06	0.01	0.03	0.19	0.19	0.00	0.02	0.78	0.78	0.00
Phenanthrene (a)	596	34300	0.00	0.05	0.05	0.00	0.95	11.03	11.03	0.02	0.93	13.38	13.38	0.02	0.01	0.06	0.06	0.00	0.00	0.09	0.09	0.00
Pyrene (a)	697.00	9,090.00	0.00	0.05	0.05	0.00	2.10	24.39	24.39	0.04	1.80	25.90	25.90	0.04	0.02	0.09	0.09	0.00	0.01	0.24	0.24	0.00
	---	**ESBTU FCVi**	---	---	---	0.00	---	---	---	0.42	---	---	---	0.48	---	---	---	0.00	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-34**				**CI13-34**				**CI13-35**				**CI13-35**			
		Field Sample ID	**CI13-34-0507**				**CI13-34-0709**				**CI13-35-SURF**				**CI13-35-0001**			
		Sample Depth	**5-7**				**7-9**				**0-0.5**				**0-1**			
		Sample Date	**09/29/2013**				**09/29/2013**				**09/26/2013**				**09/26/2013**			
	Coc, PAHi, FCVi[a] µ**g/g oc**	**Coc, PAHi, Maxi[a]** µ**g/g oc**	**Conc** µ**g/g Dry wt**	**Coc** µ**g/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc** µ**g/g Dry wt**	**Coc** µ**g/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc** µ**g/g Dry wt**	**Coc** µ**g/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc** µ**g/g Dry wt**	**Coc** µ**g/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.94	0.0194	---	---	3.17	0.0317	---	---	6.42	0.0642	---	---	3.69	0.0369	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.09	0.09	0.00	0.00	0.05	0.05	0.00	0.01	0.09	0.09	0.00	0.01	0.33	0.33	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.08	0.08	0.00	0.00	0.05	0.05	0.00	0.02	0.27	0.27	0.00	0.01	0.33	0.33	0.00
Acenaphthene (a)	491.00	33400	0.00	0.03	0.03	0.00	0.00	0.03	0.03	0.00	0.01	0.14	0.14	0.00	0.01	0.33	0.33	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.14	0.14	0.00	0.01	0.33	0.33	0.00
Anthracene (a)	594.00	1300	0.00	0.07	0.07	0.00	0.00	0.03	0.03	0.00	0.03	0.44	0.44	0.00	0.01	0.33	0.33	0.00
Benzo(a)anthracene (a)	841.00	4153	0.01	0.26	0.26	0.00	0.01	0.22	0.22	0.00	0.17	2.65	2.65	0.00	0.00	0.02	0.02	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.18	0.18	0.00	0.01	0.21	0.21	0.00	0.18	2.80	2.80	0.00	0.01	0.33	0.33	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.01	0.35	0.35	0.00	0.01	0.26	0.26	0.00	0.18	2.80	2.80	0.00	0.00	0.02	0.02	0.00
Benzo(e)pyrene (a)	967.00	4300	0.01	0.27	0.27	0.00	0.01	0.22	0.22	0.00	0.14	2.18	2.18	0.00	0.01	0.33	0.33	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.13	0.13	0.00	0.00	0.12	0.12	0.00	0.09	1.36	1.36	0.00	0.01	0.33	0.33	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.20	0.20	0.00	0.01	0.18	0.18	0.00	0.16	2.49	2.49	0.00	0.01	0.33	0.33	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.62	0.62	0.00	0.01	0.41	0.41	0.00	0.16	2.49	2.49	0.00	0.01	0.33	0.33	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.08	0.08	0.00	0.00	0.03	0.03	0.00	0.01	0.09	0.09	0.00	0.01	0.33	0.33	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.67	0.67	0.00	0.01	0.44	0.44	0.00	0.21	3.27	3.27	0.00	0.00	0.08	0.08	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00	0.01	0.16	0.16	0.00	0.01	0.33	0.33	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.02	1.08	1.08	0.00	0.02	0.69	0.69	0.00	0.11	1.71	1.71	0.00	0.01	0.33	0.33	0.00
C2 Chrysenes (a)	1008.00	---	0.02	1.08	1.08	0.00	0.03	0.98	0.98	0.00	0.13	2.02	2.02	0.00	0.01	0.33	0.33	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.15	0.15	0.00	0.00	0.14	0.14	0.00	0.02	0.26	0.26	0.00	0.01	0.33	0.33	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.67	0.67	---	0.02	0.63	0.63	---	0.13	2.02	2.02	---	0.01	0.33	0.33	---
C2-Naphthalenes (a)	510.00	---	0.01	0.43	0.43	0.00	0.01	0.44	0.44	0.00	0.04	0.56	0.56	0.00	0.01	0.33	0.33	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.02	1.24	1.24	0.00	0.06	1.74	1.74	0.00	0.09	1.46	1.46	0.00	0.01	0.33	0.33	0.00
C3 Chrysenes (a)	1112.00	---	0.01	0.57	0.57	0.00	0.02	0.47	0.47	0.00	0.06	0.92	0.92	0.00	0.01	0.33	0.33	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.35	0.35	0.00	0.01	0.38	0.38	0.00	0.03	0.45	0.45	0.00	0.01	0.33	0.33	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.72	0.72	0.00	0.02	0.66	0.66	0.00	0.07	1.11	1.11	0.00	0.01	0.33	0.33	0.00
C3-Naphthalenes (a)	581.00	---	0.02	0.98	0.98	0.00	0.04	1.17	1.17	0.00	0.06	0.93	0.93	0.00	0.01	0.33	0.33	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.03	1.44	1.44	0.00	0.05	1.45	1.45	0.00	0.10	1.53	1.53	0.00	0.01	0.33	0.33	0.00
C4 Chrysenes (a)	1214.00	---	0.00	0.23	0.23	0.00	0.01	0.21	0.21	0.00	0.02	0.34	0.34	0.00	0.01	0.33	0.33	0.00
C4-Naphthalenes (a)	657.00	---	0.03	1.34	1.34	0.00	0.05	1.64	1.64	0.00	0.04	0.56	0.56	0.00	0.01	0.33	0.33	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	0.93	0.93	0.00	0.03	0.88	0.88	0.00	0.06	0.95	0.95	0.00	0.01	0.33	0.33	0.00
Chrysene (a)	844.00	826	0.01	0.49	0.49	0.00	0.01	0.38	0.38	0.00	0.19	2.96	2.96	0.00	0.00	0.04	0.04	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.03	0.45	0.45	0.00	0.01	0.33	0.33	0.00
Fluoranthene (a)	707.00	23,870.00	0.01	0.42	0.42	0.00	0.01	0.25	0.25	0.00	0.24	3.74	3.74	0.01	0.00	0.06	0.06	0.00
Fluorene (a)	538.00	26,000.00	0.00	0.04	0.04	0.00	0.00	0.03	0.03	0.00	0.01	0.20	0.20	0.00	0.01	0.33	0.33	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.06	0.06	0.00	0.00	0.07	0.07	0.00	0.08	1.31	1.31	0.00	0.01	0.33	0.33	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.05	0.05	0.00	0.00	0.04	0.04	0.00	0.02	0.27	0.27	0.00	0.01	0.33	0.33	0.00
Perylene (a)	967.00	431.00	0.03	1.55	1.55	0.00	0.01	0.44	0.44	0.00	0.05	0.72	0.72	0.00	0.16	4.34	4.34	0.00
Phenanthrene (a)	596	34300	0.01	0.38	0.38	0.00	0.01	0.21	0.21	0.00	0.09	1.36	1.36	0.00	0.01	0.33	0.33	0.00
Pyrene (a)	697.00	9,090.00	0.01	0.36	0.36	0.00	0.01	0.25	0.25	0.00	0.20	3.12	3.12	0.00	0.00	0.07	0.07	0.00
	---	**ESBTU FCVi**	---	---	---	0.01	---	---	---	0.01	---	---	---	0.05	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-35				CI13-36				CI13-36				CI13-36				CI13-36		
		Field Sample ID	CI13-35-0103				CI13-36-SURF				CI13-36-0001				CI13-36-0103				CI13-36-0305		
		Sample Depth	1-3				0-0.5				0-1				1-3				3-5		
		Sample Date	09/26/2013				09/25/2013				09/26/2013				09/26/2013				09/26/2013		
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]
Total Organic Carbon**	--	--	6.46	0.0646	---	---	3.94	0.0394	---	---	7.09	0.0709	---	---	5.52	0.0552	---	---	4.89	0.0489	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																					
1-Methylnaphthalene	446.00	165700	0.00	0.03	0.03	0.00	0.04	0.91	0.91	0.00	0.01	0.07	0.07	0.00	0.00	0.06	0.06	0.00	0.00	0.05	0.05
2-Methylnaphthalene	447.00	154800	0.00	0.03	0.03	0.00	0.13	3.17	3.17	0.01	0.02	0.23	0.23	0.00	0.00	0.07	0.07	0.00	0.01	0.11	0.11
Acenaphthene (a)	491.00	33400	0.00	0.03	0.03	0.00	0.05	1.24	1.24	0.00	0.01	0.17	0.17	0.00	0.00	0.03	0.03	0.00	0.00	0.01	0.01
Acenaphthylene (a)	452.00	24000	0.00	0.03	0.03	0.00	0.06	1.45	1.45	0.00	0.01	0.11	0.11	0.00	0.00	0.04	0.04	0.00	0.00	0.01	0.01
Anthracene (a)	594.00	1300	0.00	0.03	0.03	0.00	0.15	3.81	3.81	0.01	0.02	0.25	0.25	0.00	0.00	0.06	0.06	0.00	0.00	0.01	0.01
Benzo(a)anthracene (a)	841.00	4153	0.00	0.00	0.00	0.00	1.20	30.46	30.46	0.04	0.14	1.97	1.97	0.00	0.03	0.49	0.49	0.00	0.00	0.08	0.08
Benzo(a)pyrene (a)	965.00	3840	0.00	0.03	0.03	0.00	1.40	35.53	35.53	0.04	0.14	1.97	1.97	0.00	0.03	0.47	0.47	0.00	0.00	0.08	0.08
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.01	0.01	0.00	1.40	35.53	35.53	0.04	0.13	1.83	1.83	0.00	0.03	0.51	0.51	0.00	0.01	0.14	0.14
Benzo(e)pyrene (a)	967.00	4300	0.00	0.01	0.01	0.00	1.00	25.38	25.38	0.03	0.11	1.55	1.55	0.00	0.02	0.40	0.40	0.00	0.01	0.11	0.11
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.01	0.01	0.00	0.70	17.77	17.77	0.02	0.08	1.06	1.06	0.00	0.02	0.27	0.27	0.00	0.00	0.09	0.09
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.00	0.00	0.00	1.30	32.99	32.99	0.03	0.12	1.69	1.69	0.00	0.03	0.45	0.45	0.00	0.00	0.09	0.09
C1 Chrysenes (a)	929.00	---	0.00	0.01	0.01	0.00	1.20	30.46	30.46	0.03	0.17	2.40	2.40	0.00	0.04	0.69	0.69	0.00	0.02	0.33	0.33
C1 Fluorenes (a)	611.00	---	0.00	0.03	0.03	0.00	0.13	3.17	3.17	0.01	0.01	0.12	0.12	0.00	0.00	0.04	0.04	0.00	0.00	0.03	0.03
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.00	0.01	0.01	0.00	1.30	32.99	32.99	0.04	0.25	3.53	3.53	0.00	0.04	0.80	0.80	0.00	0.02	0.37	0.37
C1-Naphthalenes (a)	444.00	---	0.00	0.03	0.03	0.00	0.07	1.68	1.68	0.00	0.01	0.11	0.11	0.00	0.00	0.08	0.08	0.00	0.00	0.06	0.06
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.00	0.01	0.01	0.00	0.53	13.45	13.45	0.02	0.14	1.97	1.97	0.00	0.03	0.49	0.49	0.00	0.02	0.37	0.37
C2 Chrysenes (a)	1008.00	---	0.00	0.03	0.03	0.00	1.30	32.99	32.99	0.03	0.14	1.97	1.97	0.00	0.04	0.65	0.65	0.00	0.02	0.45	0.45
C2 Fluorenes (a)	686.00	---	0.00	0.03	0.03	0.00	0.06	1.40	1.40	0.00	0.02	0.21	0.21	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07
C2-Fluoranthenes/Pyrenes	---	---	0.00	0.03	0.03	---	0.92	23.35	23.35	---	0.16	2.26	2.26	---	0.03	0.54	0.54	---	0.01	0.29	0.29
C2-Naphthalenes (a)	510.00	---	0.00	0.01	0.01	0.00	0.19	4.82	4.82	0.01	0.04	0.49	0.49	0.00	0.02	0.27	0.27	0.00	0.01	0.20	0.20
C2-Phenanthrenes/Anthracenes (a)	746	---	0.00	0.03	0.03	0.00	0.54	13.71	13.71	0.02	0.12	1.69	1.69	0.00	0.03	0.49	0.49	0.00	0.02	0.43	0.43
C3 Chrysenes (a)	1112.00	---	0.00	0.03	0.03	0.00	0.49	12.44	12.44	0.01	0.06	0.90	0.90	0.00	0.02	0.34	0.34	0.00	0.01	0.20	0.20
C3 Fluorenes (a)	769.00	---	0.00	0.03	0.03	0.00	0.16	4.06	4.06	0.01	0.03	0.44	0.44	0.00	0.01	0.16	0.16	0.00	0.01	0.11	0.11
C3-Fluoranthenes/Pyrenes	949.00	---	0.00	0.03	0.03	0.00	0.62	15.74	15.74	0.02	0.11	1.55	1.55	0.00	0.02	0.38	0.38	0.00	0.02	0.41	0.41
C3-Naphthalenes (a)	581.00	---	0.00	0.01	0.01	0.00	0.23	5.84	5.84	0.01	0.07	0.92	0.92	0.00	0.03	0.53	0.53	0.00	0.02	0.45	0.45
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.00	0.03	0.03	0.00	0.64	16.24	16.24	0.02	0.12	1.69	1.69	0.00	0.03	0.60	0.60	0.00	0.02	0.49	0.49
C4 Chrysenes (a)	1214.00	---	0.00	0.03	0.03	0.00	0.09	2.34	2.34	0.00	0.03	0.35	0.35	0.00	0.01	0.11	0.11	0.00	0.00	0.08	0.08
C4-Naphthalenes (a)	657.00	---	0.00	0.03	0.03	0.00	0.17	4.31	4.31	0.01	0.05	0.69	0.69	0.00	0.02	0.42	0.42	0.00	0.02	0.43	0.43
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.00	0.03	0.03	0.00	0.44	11.17	11.17	0.01	0.08	1.10	1.10	0.00	0.03	0.49	0.49	0.00	0.02	0.43	0.43
Chrysene (a)	844.00	826	0.00	0.01	0.01	0.00	1.30	32.99	32.99	0.04	0.16	2.26	2.26	0.00	0.03	0.58	0.58	0.00	0.01	0.20	0.20
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.03	0.03	0.00	0.21	5.33	5.33	0.00	0.02	0.31	0.31	0.00	0.00	0.08	0.08	0.00	0.00	0.02	0.02
Fluoranthene (a)	707.00	23,870.00	0.00	0.01	0.01	0.00	1.60	40.61	40.61	0.06	0.22	3.10	3.10	0.00	0.03	0.58	0.58	0.00	0.01	0.19	0.19
Fluorene (a)	538.00	26,000.00	0.00	0.03	0.03	0.00	0.07	1.78	1.78	0.00	0.01	0.13	0.13	0.00	0.00	0.05	0.05	0.00	0.00	0.03	0.03
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.00	0.00	0.00	0.60	15.23	15.23	0.01	0.06	0.90	0.90	0.00	0.01	0.24	0.24	0.00	0.00	0.05	0.05
Naphthalene (a)	385.00	61,700.00	0.00	0.03	0.03	0.00	0.13	3.17	3.17	0.01	0.02	0.23	0.23	0.00	0.00	0.07	0.07	0.00	0.01	0.11	0.11
Perylene (a)	967.00	431.00	0.01	0.11	0.11	0.00	0.35	8.88	8.88	0.01	0.09	1.30	1.30	0.00	0.04	0.80	0.80	0.00	0.06	1.17	1.17
Phenanthrene (a)	596	34300	0.00	0.03	0.03	0.00	0.51	12.94	12.94	0.02	0.06	0.90	0.90	0.00	0.01	0.24	0.24	0.00	0.01	0.11	0.11
Pyrene (a)	697.00	9,090.00	0.00	0.01	0.01	0.00	1.20	30.46	30.46	0.04	0.19	2.68	2.68	0.00	0.03	0.45	0.45	0.00	0.01	0.14	0.14
	---	**ESBTU FCVi**	---	---	---	0.00	---	---	---	0.52	---	---	---	0.04	---	---	---	0.01	---	---	---

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	
		Field Sample ID	
		Sample Depth	
		Sample Date	
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi**[a]	
	µg/g oc	**µg/g oc**	**ESBTU FCVi**
Total Organic Carbon**	--	--	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)			
1-Methylnaphthalene	446.00	165700	0.00
2-Methylnaphthalene	447.00	154800	0.00
Acenaphthene (a)	491.00	33400	0.00
Acenaphthylene (a)	452.00	24000	0.00
Anthracene (a)	594.00	1300	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00
C1 Chrysenes (a)	929.00	---	0.00
C1 Fluorenes (a)	611.00	---	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.00
C1-Naphthalenes (a)	444.00	---	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.00
C2 Chrysenes (a)	1008.00	---	0.00
C2 Fluorenes (a)	686.00	---	0.00
C2-Fluoranthenes/Pyrenes	---	---	---
C2-Naphthalenes (a)	510.00	---	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.00
C3 Chrysenes (a)	1112.00	---	0.00
C3 Fluorenes (a)	769.00	---	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.00
C3-Naphthalenes (a)	581.00	---	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.00
C4 Chrysenes (a)	1214.00	---	0.00
C4-Naphthalenes (a)	657.00	---	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.00
Chrysene (a)	844.00	826	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00
Fluoranthene (a)	707.00	23,870.00	0.00
Fluorene (a)	538.00	26,000.00	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00
Naphthalene (a)	385.00	61,700.00	0.00
Perylene (a)	967.00	431.00	0.00
Phenanthrene (a)	596	34300	0.00
Pyrene (a)	697.00	9,090.00	0.00
	---	**ESBTU FCVi**	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-36**				**CI13-36**				**CI13-36**				**CI13-36**			
		Field Sample ID	**CI13-36-0507**				**CI13-36-0709**				**CI13-36-0709-FD**				**CI13-36-0911**			
		Sample Depth	**5-7**				**7-9**				**7-9**				**9-11**			
		Sample Date	**09/26/2013**				**09/26/2013**				**09/27/2013**				**09/26/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	9.97	0.0997	---	---	2.67	0.0267	---	---	3.85	0.0385	---	---	3.19	0.0319	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.02	0.02	0.00	0.00	0.07	0.07	0.00	0.00	0.10	0.10	0.00	0.00	0.08	0.08	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.03	0.03	0.00	0.00	0.07	0.07	0.00	0.00	0.08	0.08	0.00	0.00	0.08	0.08	0.00
Acenaphthene (a)	491.00	33400	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.08	0.08	0.00	0.00	0.08	0.08	0.00
Anthracene (a)	594.00	1300	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00	0.00	0.05	0.05	0.00	0.00	0.08	0.08	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.00	0.03	0.03	0.00	0.00	0.06	0.06	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.01	0.05	0.05	0.00	0.00	0.12	0.12	0.00	0.01	0.14	0.14	0.00	0.01	0.17	0.17	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00	0.04	0.04	0.00	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00	0.00	0.14	0.14	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.03	0.03	0.00	0.00	0.08	0.08	0.00	0.00	0.11	0.11	0.00	0.00	0.12	0.12	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.02	0.02	0.00	0.00	0.04	0.04	0.00	0.00	0.05	0.05	0.00	0.00	0.07	0.07	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.10	0.10	0.00	0.01	0.32	0.32	0.00	0.02	0.39	0.39	0.00	0.01	0.38	0.38	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.01	0.01	0.00	0.00	0.06	0.06	0.00	0.00	0.07	0.07	0.00	0.00	0.06	0.06	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.12	0.12	0.00	0.01	0.31	0.31	0.00	0.02	0.42	0.42	0.00	0.01	0.38	0.38	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.03	0.03	0.00	0.00	0.09	0.09	0.00	0.00	0.12	0.12	0.00	0.00	0.10	0.10	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.02	0.15	0.15	0.00	0.02	0.67	0.67	0.00	0.03	0.78	0.78	0.00	0.02	0.72	0.72	0.00
C2 Chrysenes (a)	1008.00	---	0.02	0.19	0.19	0.00	0.02	0.67	0.67	0.00	0.03	0.75	0.75	0.00	0.02	0.66	0.66	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.03	0.03	0.00	0.00	0.11	0.11	0.00	0.00	0.12	0.12	0.00	0.00	0.12	0.12	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.12	0.12	---	0.01	0.37	0.37	---	0.02	0.47	0.47	---	0.01	0.44	0.44	---
C2-Naphthalenes (a)	510.00	---	0.01	0.09	0.09	0.00	0.01	0.35	0.35	0.00	0.02	0.47	0.47	0.00	0.01	0.41	0.41	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.02	0.18	0.18	0.00	0.02	0.71	0.71	0.00	0.03	0.81	0.81	0.00	0.03	0.82	0.82	0.00
C3 Chrysenes (a)	1112.00	---	0.01	0.09	0.09	0.00	0.01	0.31	0.31	0.00	0.02	0.39	0.39	0.00	0.01	0.34	0.34	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.06	0.06	0.00	0.01	0.23	0.23	0.00	0.01	0.29	0.29	0.00	0.01	0.24	0.24	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.02	0.15	0.15	0.00	0.01	0.41	0.41	0.00	0.02	0.57	0.57	0.00	0.02	0.50	0.50	0.00
C3-Naphthalenes (a)	581.00	---	0.02	0.21	0.21	0.00	0.02	0.90	0.90	0.00	0.04	1.06	1.06	0.00	0.03	1.07	1.07	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.02	0.17	0.17	0.00	0.02	0.75	0.75	0.00	0.04	1.04	1.04	0.00	0.03	0.94	0.94	0.00
C4 Chrysenes (a)	1214.00	---	0.00	0.03	0.03	0.00	0.00	0.16	0.16	0.00	0.01	0.17	0.17	0.00	0.01	0.16	0.16	0.00
C4-Naphthalenes (a)	657.00	---	0.02	0.19	0.19	0.00	0.03	0.97	0.97	0.00	0.05	1.25	1.25	0.00	0.04	1.22	1.22	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	0.18	0.18	0.00	0.01	0.49	0.49	0.00	0.03	0.65	0.65	0.00	0.02	0.66	0.66	0.00
Chrysene (a)	844.00	826	0.01	0.08	0.08	0.00	0.01	0.22	0.22	0.00	0.01	0.26	0.26	0.00	0.01	0.27	0.27	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.03	0.00
Fluoranthene (a)	707.00	23,870.00	0.01	0.06	0.06	0.00	0.00	0.07	0.07	0.00	0.00	0.08	0.08	0.00	0.00	0.08	0.08	0.00
Fluorene (a)	538.00	26,000.00	0.00	0.01	0.01	0.00	0.00	0.06	0.06	0.00	0.00	0.06	0.06	0.00	0.00	0.07	0.07	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.00	0.05	0.05	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.03	0.03	0.00	0.00	0.07	0.07	0.00	0.00	0.08	0.08	0.00	0.00	0.08	0.08	0.00
Perylene (a)	967.00	431.00	0.04	0.37	0.37	0.00	0.04	1.31	1.31	0.00	0.06	1.64	1.64	0.00	0.06	1.85	1.85	0.00
Phenanthrene (a)	596	34300	0.00	0.03	0.03	0.00	0.00	0.07	0.07	0.00	0.01	0.20	0.20	0.00	0.01	0.23	0.23	0.00
Pyrene (a)	697.00	9,090.00	0.00	0.05	0.05	0.00	0.00	0.10	0.10	0.00	0.01	0.13	0.13	0.00	0.00	0.15	0.15	0.00
	---	**ESBTU FCVi**	---	---	---	0.00	---	---	---	0.01	---	---	---	0.01	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-36**				**CI13-36**				**CI13-36**				**CI13-36**			
		Field Sample ID	**CI13-36-0911-FD**				**CI13-36-1113**				**CI13-36-1113-FD**				**CI13-36-1315**			
		Sample Depth	**9-11**				**11-13**				**11-13**				**13-15**			
		Sample Date	**09/27/2013**				**09/27/2013**				**09/27/2013**				**09/27/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	3.85	0.0385	---	---	3.14	0.0314	---	---	3.57	0.0357	---	---	2.68	0.0268	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.06	0.06	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.09	0.09	0.00	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07	0.00
Acenaphthene (a)	491.00	33400	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.07	0.07	0.00
Anthracene (a)	594.00	1300	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.04	0.04	0.00	0.00	0.04	0.04	0.00	0.00	0.04	0.04	0.00	0.00	0.03	0.03	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.10	0.10	0.00	0.00	0.10	0.10	0.00	0.00	0.12	0.12	0.00	0.00	0.08	0.08	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00	0.10	0.10	0.00	0.00	0.11	0.11	0.00	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.09	0.09	0.00	0.00	0.10	0.10	0.00	0.00	0.09	0.09	0.00	0.00	0.07	0.07	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.04	0.04	0.00	0.00	0.04	0.04	0.00	0.00	0.04	0.04	0.00	0.00	0.03	0.03	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.31	0.31	0.00	0.01	0.38	0.38	0.00	0.01	0.34	0.34	0.00	0.01	0.27	0.27	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.00	0.06	0.06	0.00	0.00	0.03	0.03	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.02	0.39	0.39	0.00	0.01	0.41	0.41	0.00	0.01	0.34	0.34	0.00	0.01	0.25	0.25	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.08	0.08	0.00	0.00	0.09	0.09	0.00	0.00	0.09	0.09	0.00	0.00	0.06	0.06	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.02	0.60	0.60	0.00	0.02	0.70	0.70	0.00	0.02	0.64	0.64	0.00	0.01	0.41	0.41	0.00
C2 Chrysenes (a)	1008.00	---	0.02	0.60	0.60	0.00	0.02	0.64	0.64	0.00	0.02	0.59	0.59	0.00	0.01	0.49	0.49	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.10	0.10	0.00	0.00	0.11	0.11	0.00	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.02	0.42	0.42	---	0.02	0.48	0.48	---	0.01	0.39	0.39	---	0.01	0.31	0.31	---
C2-Naphthalenes (a)	510.00	---	0.01	0.31	0.31	0.00	0.01	0.38	0.38	0.00	0.01	0.36	0.36	0.00	0.01	0.23	0.23	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.02	0.62	0.62	0.00	0.02	0.73	0.73	0.00	0.03	0.70	0.70	0.00	0.02	0.60	0.60	0.00
C3 Chrysenes (a)	1112.00	---	0.01	0.29	0.29	0.00	0.01	0.27	0.27	0.00	0.01	0.36	0.36	0.00	0.01	0.28	0.28	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.22	0.22	0.00	0.01	0.23	0.23	0.00	0.01	0.20	0.20	0.00	0.00	0.16	0.16	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.02	0.42	0.42	0.00	0.02	0.51	0.51	0.00	0.02	0.48	0.48	0.00	0.01	0.37	0.37	0.00
C3-Naphthalenes (a)	581.00	---	0.03	0.78	0.78	0.00	0.03	0.92	0.92	0.00	0.03	0.84	0.84	0.00	0.01	0.45	0.45	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.04	1.01	1.01	0.00	0.03	1.08	1.08	0.00	0.03	0.87	0.87	0.00	0.02	0.82	0.82	0.00
C4 Chrysenes (a)	1214.00	---	0.01	0.13	0.13	0.00	0.00	0.11	0.11	0.00	0.01	0.15	0.15	0.00	0.00	0.11	0.11	0.00
C4-Naphthalenes (a)	657.00	---	0.04	0.94	0.94	0.00	0.03	1.08	1.08	0.00	0.04	0.98	0.98	0.00	0.02	0.67	0.67	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	0.62	0.62	0.00	0.02	0.67	0.67	0.00	0.02	0.53	0.53	0.00	0.01	0.45	0.45	0.00
Chrysene (a)	844.00	826	0.01	0.21	0.21	0.00	0.01	0.22	0.22	0.00	0.01	0.21	0.21	0.00	0.00	0.16	0.16	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00
Fluoranthene (a)	707.00	23,870.00	0.00	0.09	0.09	0.00	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07	0.00
Fluorene (a)	538.00	26,000.00	0.00	0.05	0.05	0.00	0.00	0.04	0.04	0.00	0.00	0.04	0.04	0.00	0.00	0.03	0.03	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.02	0.02	0.00	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.09	0.09	0.00	0.00	0.11	0.11	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07	0.00
Perylene (a)	967.00	431.00	0.06	1.53	1.53	0.00	0.06	1.75	1.75	0.00	0.06	1.57	1.57	0.00	0.03	0.97	0.97	0.00
Phenanthrene (a)	596	34300	0.00	0.09	0.09	0.00	0.00	0.11	0.11	0.00	0.01	0.19	0.19	0.00	0.00	0.07	0.07	0.00
Pyrene (a)	697.00	9,090.00	0.00	0.12	0.12	0.00	0.00	0.14	0.14	0.00	0.00	0.11	0.11	0.00	0.00	0.09	0.09	0.00
	---	**ESBTU FCVi**	---	---	---	0.01	---	---	---	0.01	---	---	---	0.01	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-36				CI13-37				CI13-37				CI13-37			
		Field Sample ID	CI13-36-1315-FD				CI13-37-SURF				CI13-37-0001				CI13-37-0103			
		Sample Depth	13-15				0-0.5				0-1				1-3			
		Sample Date	09/27/2013				09/27/2013				09/30/2013				09/30/2013			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	1.81	0.0181	---	---	7.79	0.0779	---	---	6.36	0.0636	---	---	1.17	0.0117	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.07	0.07	0.00	0.05	0.67	0.67	0.00	0.02	0.27	0.27	0.00	0.00	0.02	0.02	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.11	0.11	0.00	0.32	4.04	4.04	0.01	0.03	0.46	0.46	0.00	0.00	0.02	0.02	0.00
Acenaphthene (a)	491.00	33400	0.00	0.03	0.03	0.00	0.09	1.14	1.14	0.00	0.02	0.38	0.38	0.00	0.00	0.19	0.19	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.01	0.01	0.00	0.19	2.44	2.44	0.01	0.08	1.23	1.23	0.00	0.00	0.10	0.10	0.00
Anthracene (a)	594.00	1300	0.00	0.02	0.02	0.00	0.32	4.11	4.11	0.01	0.11	1.65	1.65	0.00	0.00	0.19	0.19	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.04	0.04	0.00	2.40	30.81	30.81	0.04	0.86	13.52	13.52	0.02	0.01	0.81	0.81	0.00
Benzo(a)pyrene (a)	965.00	3840	0.00	0.03	0.03	0.00	3.00	38.51	38.51	0.04	0.97	15.25	15.25	0.02	0.01	1.11	1.11	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.12	0.12	0.00	2.80	35.94	35.94	0.04	0.96	15.09	15.09	0.02	0.01	1.20	1.20	0.00
Benzo(e)pyrene (a)	967.00	4300	0.00	0.13	0.13	0.00	2.00	25.67	25.67	0.03	0.80	12.58	12.58	0.01	0.01	0.78	0.78	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.10	0.10	0.00	1.80	23.11	23.11	0.02	0.63	9.91	9.91	0.01	0.01	0.84	0.84	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.05	0.05	0.00	2.10	26.96	26.96	0.03	0.63	9.91	9.91	0.01	0.01	0.73	0.73	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.41	0.41	0.00	2.00	25.67	25.67	0.03	1.10	17.30	17.30	0.02	0.01	0.59	0.59	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.05	0.05	0.00	0.32	4.04	4.04	0.01	0.03	0.50	0.50	0.00	0.00	0.19	0.19	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.39	0.39	0.00	2.50	32.09	32.09	0.04	1.40	22.01	22.01	0.03	0.01	0.63	0.63	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.09	0.09	0.00	0.11	1.41	1.41	0.00	0.03	0.50	0.50	0.00	0.00	0.19	0.19	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.01	0.66	0.66	0.00	0.96	12.32	12.32	0.02	0.47	7.39	7.39	0.01	0.00	0.19	0.19	0.00
C2 Chrysenes (a)	1008.00	---	0.01	0.77	0.77	0.00	1.50	19.26	19.26	0.02	0.86	13.52	13.52	0.01	0.01	0.44	0.44	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.12	0.12	0.00	0.10	1.25	1.25	0.00	0.08	1.26	1.26	0.00	0.00	0.05	0.05	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.47	0.47	---	1.60	20.54	20.54	---	1.00	15.72	15.72	---	0.00	0.38	0.38	---
C2-Naphthalenes (a)	510.00	---	0.01	0.39	0.39	0.00	0.31	3.98	3.98	0.01	0.12	1.89	1.89	0.00	0.00	0.09	0.09	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.02	0.99	0.99	0.00	0.80	10.27	10.27	0.01	0.57	8.96	8.96	0.01	0.00	0.21	0.21	0.00
C3 Chrysenes (a)	1112.00	---	0.01	0.46	0.46	0.00	0.62	7.96	7.96	0.01	0.35	5.50	5.50	0.00	0.00	0.18	0.18	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.30	0.30	0.00	0.21	2.70	2.70	0.00	0.20	3.14	3.14	0.00	0.00	0.19	0.19	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.55	0.55	0.00	0.75	9.63	9.63	0.01	0.57	8.96	8.96	0.01	0.00	0.23	0.23	0.00
C3-Naphthalenes (a)	581.00	---	0.02	0.83	0.83	0.00	0.27	3.47	3.47	0.01	0.19	2.99	2.99	0.01	0.00	0.12	0.12	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.02	1.16	1.16	0.00	0.70	8.99	8.99	0.01	0.67	10.53	10.53	0.01	0.00	0.26	0.26	0.00
C4 Chrysenes (a)	1214.00	---	0.00	0.18	0.18	0.00	0.18	2.31	2.31	0.00	0.10	1.57	1.57	0.00	0.00	0.19	0.19	0.00
C4-Naphthalenes (a)	657.00	---	0.02	1.16	1.16	0.00	0.18	2.31	2.31	0.00	0.18	2.83	2.83	0.00	0.00	0.09	0.09	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	0.77	0.77	0.00	0.42	5.39	5.39	0.01	0.42	6.60	6.60	0.01	0.00	0.13	0.13	0.00
Chrysene (a)	844.00	826	0.00	0.26	0.26	0.00	2.70	34.66	34.66	0.04	1.10	17.30	17.30	0.02	0.01	1.03	1.03	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.01	0.01	0.00	0.55	7.06	7.06	0.01	0.20	3.14	3.14	0.00	0.00	0.21	0.21	0.00
Fluoranthene (a)	707.00	23,870.00	0.00	0.11	0.11	0.00	2.70	34.66	34.66	0.05	0.91	14.31	14.31	0.02	0.01	0.54	0.54	0.00
Fluorene (a)	538.00	26,000.00	0.00	0.04	0.04	0.00	0.09	1.19	1.19	0.00	0.04	0.58	0.58	0.00	0.00	0.02	0.02	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.03	0.03	0.00	1.50	19.26	19.26	0.02	0.51	8.02	8.02	0.01	0.01	0.74	0.74	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.11	0.11	0.00	0.32	4.04	4.04	0.01	0.11	1.65	1.65	0.00	0.00	0.19	0.19	0.00
Perylene (a)	967.00	431.00	0.03	1.66	1.66	0.00	0.65	8.34	8.34	0.01	0.23	3.62	3.62	0.00	0.00	0.39	0.39	0.00
Phenanthrene (a)	596	34300	0.00	0.11	0.11	0.00	0.78	10.01	10.01	0.02	0.24	3.77	3.77	0.01	0.00	0.19	0.19	0.00
Pyrene (a)	697.00	9,090.00	0.00	0.14	0.14	0.00	2.20	28.24	28.24	0.04	0.89	13.99	13.99	0.02	0.01	0.45	0.45	0.00
	---	**ESBTU FCVi**	---	---	---	0.01	---	---	---	0.50	---	---	---	0.25	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-38				CI13-38				CI13-38				CI13-38			
		Field Sample ID	CI13-38-SURF				CI13-38-SURF-FD				CI13-38-0001				CI13-38-0001-FD			
		Sample Depth	0-0.5				0-0.5				0-1				0-1			
		Sample Date	09/27/2013				09/27/2013				09/30/2013				09/30/2013			
	Coc, PAHi, FCVi[a] μg/g oc	Coc, PAHi, Maxi[a] μg/g oc	Conc μg/g Dry wt	Coc μg/g oc	Final Coc[b]	ESBTU FCVi	Conc μg/g Dry wt	Coc μg/g oc	Final Coc[b]	ESBTU FCVi	Conc μg/g Dry wt	Coc μg/g oc	Final Coc[b]	ESBTU FCVi	Conc μg/g Dry wt	Coc μg/g oc	Final Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	7.38	0.0738	---	---	6.72	0.0672	---	---	8.74	0.0874	---	---	7.67	0.0767	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (μg/kg)																		
1-Methylnaphthalene	446.00	165700	0.02	0.31	0.31	0.00	0.03	0.40	0.40	0.00	0.04	0.48	0.48	0.00	0.04	0.51	0.51	0.00
2-Methylnaphthalene	447.00	154800	0.10	1.36	1.36	0.00	0.11	1.64	1.64	0.00	0.07	0.78	0.78	0.00	0.06	0.83	0.83	0.00
Acenaphthene (a)	491.00	33400	0.03	0.42	0.42	0.00	0.05	0.67	0.67	0.00	0.06	0.69	0.69	0.00	0.07	0.87	0.87	0.00
Acenaphthylene (a)	452.00	24000	0.05	0.64	0.64	0.00	0.07	1.04	1.04	0.00	0.10	1.14	1.14	0.00	0.10	1.30	1.30	0.00
Anthracene (a)	594.00	1300	0.10	1.36	1.36	0.00	0.13	1.93	1.93	0.00	0.17	1.89	1.89	0.00	0.17	2.15	2.15	0.00
Benzo(a)anthracene (a)	841.00	4153	0.67	9.08	9.08	0.01	0.93	13.84	13.84	0.02	1.30	14.87	14.87	0.02	1.20	15.65	15.65	0.02
Benzo(a)pyrene (a)	965.00	3840	0.88	11.92	11.92	0.01	1.20	17.86	17.86	0.02	1.70	19.45	19.45	0.02	1.60	20.86	20.86	0.02
Benzo(b)fluoranthene (a)	979.00	2169	0.94	12.74	12.74	0.01	1.20	17.86	17.86	0.02	1.80	20.59	20.59	0.02	1.70	22.16	22.16	0.02
Benzo(e)pyrene (a)	967.00	4300	0.70	9.49	9.49	0.01	0.91	13.54	13.54	0.01	1.30	14.87	14.87	0.02	1.30	16.95	16.95	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.57	7.72	7.72	0.01	0.81	12.05	12.05	0.01	1.10	12.59	12.59	0.01	0.98	12.78	12.78	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.71	9.62	9.62	0.01	0.92	13.69	13.69	0.01	1.30	14.87	14.87	0.02	1.30	16.95	16.95	0.02
C1 Chrysenes (a)	929.00	---	0.64	8.67	8.67	0.01	0.78	11.61	11.61	0.01	1.50	17.16	17.16	0.02	1.50	19.56	19.56	0.02
C1 Fluorenes (a)	611.00	---	0.10	1.36	1.36	0.00	0.11	1.64	1.64	0.00	0.04	0.48	0.48	0.00	0.05	0.59	0.59	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.77	10.43	10.43	0.01	0.97	14.43	14.43	0.02	1.70	19.45	19.45	0.03	1.60	20.86	20.86	0.03
C1-Naphthalenes (a)	444.00	---	0.04	0.60	0.60	0.00	0.05	0.76	0.76	0.00	0.08	0.93	0.93	0.00	0.07	0.95	0.95	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.33	4.47	4.47	0.01	0.40	5.95	5.95	0.01	0.62	7.09	7.09	0.01	0.74	9.65	9.65	0.01
C2 Chrysenes (a)	1008.00	---	0.54	7.32	7.32	0.01	0.65	9.67	9.67	0.01	1.30	14.87	14.87	0.01	1.40	18.25	18.25	0.02
C2 Fluorenes (a)	686.00	---	0.03	0.42	0.42	0.00	0.04	0.60	0.60	0.00	0.09	1.02	1.02	0.00	0.12	1.56	1.56	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.49	6.64	6.64	---	0.63	9.38	9.38	---	1.20	13.73	13.73	---	1.30	16.95	16.95	---
C2-Naphthalenes (a)	510.00	---	0.11	1.49	1.49	0.00	0.14	2.08	2.08	0.00	0.28	3.20	3.20	0.01	0.26	3.39	3.39	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	0.25	3.39	3.39	0.00	0.32	4.76	4.76	0.01	0.65	7.44	7.44	0.01	0.81	10.56	10.56	0.01
C3 Chrysenes (a)	1112.00	---	0.31	4.20	4.20	0.00	0.33	4.91	4.91	0.00	0.63	7.21	7.21	0.01	0.69	9.00	9.00	0.01
C3 Fluorenes (a)	769.00	---	0.08	1.10	1.10	0.00	0.10	1.47	1.47	0.00	0.25	2.86	2.86	0.00	0.37	4.82	4.82	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.27	3.66	3.66	0.00	0.33	4.91	4.91	0.01	0.76	8.70	8.70	0.01	0.88	11.47	11.47	0.01
C3-Naphthalenes (a)	581.00	---	0.11	1.49	1.49	0.00	0.14	2.08	2.08	0.00	0.30	3.43	3.43	0.01	0.34	4.43	4.43	0.01
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.28	3.79	3.79	0.00	0.31	4.61	4.61	0.01	0.87	9.95	9.95	0.01	1.10	14.34	14.34	0.02
C4 Chrysenes (a)	1214.00	---	0.11	1.49	1.49	0.00	0.08	1.25	1.25	0.00	0.16	1.83	1.83	0.00	0.25	3.26	3.26	0.00
C4-Naphthalenes (a)	657.00	---	0.08	1.03	1.03	0.00	0.08	1.22	1.22	0.00	0.20	2.29	2.29	0.00	0.32	4.17	4.17	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.16	2.17	2.17	0.00	0.22	3.27	3.27	0.00	0.65	7.44	7.44	0.01	0.83	10.82	10.82	0.01
Chrysene (a)	844.00	826	0.88	11.92	11.92	0.01	1.10	16.37	16.37	0.02	1.70	19.45	19.45	0.02	1.60	20.86	20.86	0.02
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.17	2.30	2.30	0.00	0.25	3.72	3.72	0.00	0.33	3.78	3.78	0.00	0.28	3.65	3.65	0.00
Fluoranthene (a)	707.00	23,870.00	1.00	13.55	13.55	0.02	1.30	19.35	19.35	0.03	1.80	20.59	20.59	0.03	1.90	24.77	24.77	0.04
Fluorene (a)	538.00	26,000.00	0.04	0.57	0.57	0.00	0.05	0.79	0.79	0.00	0.07	0.85	0.85	0.00	0.07	0.87	0.87	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.49	6.64	6.64	0.01	0.70	10.42	10.42	0.01	0.95	10.87	10.87	0.01	0.90	11.73	11.73	0.01
Naphthalene (a)	385.00	61,700.00	0.10	1.36	1.36	0.00	0.11	1.64	1.64	0.00	0.17	1.89	1.89	0.00	0.17	2.15	2.15	0.01
Perylene (a)	967.00	431.00	0.21	2.85	2.85	0.00	0.28	4.17	4.17	0.00	0.42	4.81	4.81	0.00	0.37	4.82	4.82	0.00
Phenanthrene (a)	596	34300	0.33	4.47	4.47	0.01	0.41	6.10	6.10	0.01	0.54	6.18	6.18	0.01	0.59	7.69	7.69	0.01
Pyrene (a)	697.00	9,090.00	0.82	11.11	11.11	0.02	0.97	14.43	14.43	0.02	1.60	18.31	18.31	0.03	1.50	19.56	19.56	0.03
	---	**ESBTU FCVi**	---	---	---	0.18	---	---	---	0.25	---	---	---	0.29	---	---	---	0.34

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
μg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-38**				**CI13-38**				**CI13-38**				**CI13-38**				**CI13-39**			
		Field Sample ID	**CI13-38-0103**				**CI13-38-0103-FD**				**CI13-38-0305**				**CI13-38-0507**				**CI13-39-SURF**			
		Sample Depth	**1-3**				**1-3**				**3-5**				**5-7**				**0-0.5**			
		Sample Date	**09/30/2013**				**09/30/2013**				**09/30/2013**				**09/30/2013**				**09/26/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	5.35	0.0535	---	---	7.26	0.0726	---	---	1.35	0.0135	---	---	5.11	0.0511	---	---	3.32	0.0332	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																						
1-Methylnaphthalene	446.00	165700	0.00	0.05	0.05	0.00	0.00	0.06	0.06	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.69	0.69	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.07	0.07	0.00	0.01	0.07	0.07	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.06	1.81	1.81	0.00
Acenaphthene (a)	491.00	33400	0.00	0.04	0.04	0.00	0.00	0.05	0.05	0.00	0.00	0.02	0.02	0.00	0.00	0.04	0.04	0.00	0.03	0.84	0.84	0.00
Acenaphthylene (a)	452.00	24000	0.01	0.16	0.16	0.00	0.01	0.09	0.09	0.00	0.00	0.02	0.02	0.00	0.00	0.04	0.04	0.00	0.02	0.69	0.69	0.00
Anthracene (a)	594.00	1300	0.01	0.21	0.21	0.00	0.01	0.17	0.17	0.00	0.00	0.16	0.16	0.00	0.00	0.04	0.04	0.00	0.07	1.99	1.99	0.00
Benzo(a)anthracene (a)	841.00	4153	0.10	1.87	1.87	0.00	0.08	1.09	1.09	0.00	0.01	0.43	0.43	0.00	0.00	0.02	0.02	0.00	0.51	15.36	15.36	0.02
Benzo(a)pyrene (a)	965.00	3840	0.12	2.24	2.24	0.00	0.08	1.16	1.16	0.00	0.00	0.36	0.36	0.00	0.00	0.01	0.01	0.00	0.58	17.47	17.47	0.02
Benzo(b)fluoranthene (a)	979.00	2169	0.09	1.76	1.76	0.00	0.09	1.17	1.17	0.00	0.01	0.44	0.44	0.00	0.00	0.05	0.05	0.00	0.63	18.98	18.98	0.02
Benzo(e)pyrene (a)	967.00	4300	0.09	1.61	1.61	0.00	0.07	1.01	1.01	0.00	0.00	0.36	0.36	0.00	0.00	0.07	0.07	0.00	0.51	15.36	15.36	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.08	1.51	1.51	0.00	0.06	0.85	0.85	0.00	0.00	0.33	0.33	0.00	0.00	0.07	0.07	0.00	0.25	7.53	7.53	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.08	1.53	1.53	0.00	0.07	0.99	0.99	0.00	0.00	0.36	0.36	0.00	0.00	0.01	0.01	0.00	0.56	16.87	16.87	0.02
C1 Chrysenes (a)	929.00	---	0.12	2.24	2.24	0.00	0.11	1.52	1.52	0.00	0.01	0.42	0.42	0.00	0.01	0.12	0.12	0.00	0.74	22.29	22.29	0.02
C1 Fluorenes (a)	611.00	---	0.00	0.05	0.05	0.00	0.00	0.05	0.05	0.00	0.00	0.16	0.16	0.00	0.00	0.04	0.04	0.00	0.02	0.60	0.60	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.15	2.80	2.80	0.00	0.12	1.65	1.65	0.00	0.01	0.48	0.48	0.00	0.00	0.08	0.08	0.00	0.70	21.08	21.08	0.03
C1-Naphthalenes (a)	444.00	---	0.00	0.09	0.09	0.00	0.01	0.10	0.10	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00	0.04	1.23	1.23	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.05	0.97	0.97	0.00	0.05	0.74	0.74	0.00	0.00	0.27	0.27	0.00	0.01	0.10	0.10	0.00	0.39	11.75	11.75	0.02
C2 Chrysenes (a)	1008.00	---	0.09	1.66	1.66	0.00	0.10	1.31	1.31	0.00	0.01	0.41	0.41	0.00	0.01	0.22	0.22	0.00	0.69	20.78	20.78	0.02
C2 Fluorenes (a)	686.00	---	0.01	0.17	0.17	0.00	0.01	0.15	0.15	0.00	0.00	0.04	0.04	0.00	0.00	0.04	0.04	0.00	0.05	1.57	1.57	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.11	2.06	2.06	---	0.10	1.38	1.38	---	0.01	0.39	0.39	---	0.01	0.10	0.10	---	0.64	19.28	19.28	---
C2-Naphthalenes (a)	510.00	---	0.02	0.34	0.34	0.00	0.03	0.34	0.34	0.00	0.00	0.11	0.11	0.00	0.00	0.05	0.05	0.00	0.13	3.92	3.92	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	0.08	1.53	1.53	0.00	0.07	1.02	1.02	0.00	0.01	0.37	0.37	0.00	0.01	0.18	0.18	0.00	0.41	12.35	12.35	0.02
C3 Chrysenes (a)	1112.00	---	0.04	0.67	0.67	0.00	0.04	0.55	0.55	0.00	0.00	0.14	0.14	0.00	0.01	0.15	0.15	0.00	0.39	11.75	11.75	0.01
C3 Fluorenes (a)	769.00	---	0.03	0.64	0.64	0.00	0.03	0.44	0.44	0.00	0.00	0.13	0.13	0.00	0.00	0.04	0.04	0.00	0.14	4.22	4.22	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.06	1.16	1.16	0.00	0.07	0.99	0.99	0.00	0.00	0.26	0.26	0.00	0.01	0.12	0.12	0.00	0.47	14.16	14.16	0.01
C3-Naphthalenes (a)	581.00	---	0.03	0.49	0.49	0.00	0.03	0.37	0.37	0.00	0.00	0.12	0.12	0.00	0.00	0.07	0.07	0.00	0.16	4.82	4.82	0.01
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.10	1.87	1.87	0.00	0.09	1.28	1.28	0.00	0.00	0.35	0.35	0.00	0.02	0.29	0.29	0.00	0.45	13.55	13.55	0.02
C4 Chrysenes (a)	1214.00	---	0.02	0.32	0.32	0.00	0.02	0.23	0.23	0.00	0.00	0.16	0.16	0.00	0.00	0.04	0.04	0.00	0.16	4.82	4.82	0.00
C4-Naphthalenes (a)	657.00	---	0.03	0.58	0.58	0.00	0.04	0.51	0.51	0.00	0.00	0.16	0.16	0.00	0.00	0.04	0.04	0.00	0.13	3.92	3.92	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.06	1.20	1.20	0.00	0.06	0.80	0.80	0.00	0.00	0.21	0.21	0.00	0.01	0.17	0.17	0.00	0.34	10.24	10.24	0.01
Chrysene (a)	844.00	826	0.12	2.24	2.24	0.00	0.10	1.34	1.34	0.00	0.01	0.54	0.54	0.00	0.01	0.14	0.14	0.00	0.66	19.88	19.88	0.02
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.02	0.41	0.41	0.00	0.02	0.22	0.22	0.00	0.00	0.08	0.08	0.00	0.00	0.01	0.01	0.00	0.09	2.68	2.68	0.00
Fluoranthene (a)	707.00	23,870.00	0.09	1.70	1.70	0.00	0.11	1.52	1.52	0.00	0.01	0.89	0.89	0.00	0.00	0.04	0.04	0.00	0.80	24.10	24.10	0.03
Fluorene (a)	538.00	26,000.00	0.00	0.06	0.06	0.00	0.00	0.07	0.07	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04	0.00	0.04	1.08	1.08	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.07	1.23	1.23	0.00	0.05	0.72	0.72	0.00	0.00	0.27	0.27	0.00	0.00	0.01	0.01	0.00	0.24	7.23	7.23	0.01
Naphthalene (a)	385.00	61,700.00	0.01	0.21	0.21	0.00	0.01	0.17	0.17	0.00	0.00	0.16	0.16	0.00	0.00	0.04	0.04	0.00	0.06	1.81	1.81	0.00
Perylene (a)	967.00	431.00	0.09	1.64	1.64	0.00	0.12	1.65	1.65	0.00	0.02	1.70	1.70	0.00	0.02	0.31	0.31	0.00	0.14	4.22	4.22	0.00
Phenanthrene (a)	596	34300	0.02	0.43	0.43	0.00	0.03	0.41	0.41	0.00	0.00	0.36	0.36	0.00	0.00	0.04	0.04	0.00	0.26	7.83	7.83	0.01
Pyrene (a)	697.00	9,090.00	0.09	1.59	1.59	0.00	0.10	1.35	1.35	0.00	0.01	0.64	0.64	0.00	0.00	0.05	0.05	0.00	0.59	17.77	17.77	0.03
	---	**ESBTU FCVi**	---	---	---	0.04	---	---	---	0.02	---	---	---	0.01	---	---	---	0.00	---	---	---	0.32

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-39				CI13-39				CI13-39				CI13-39			
		Field Sample ID	CI13-39-0001				CI13-39-0103				CI13-39-0305				CI13-39-0507			
		Sample Depth	0-1				1-3				3-5				5-7			
		Sample Date	09/26/2013				09/26/2013				09/26/2013				09/26/2013			
	Coc, PAHi, FCVi^{a} µg/g oc	Coc, PAHi, Maxi^{a} µg/g oc	Conc µg/g Dry wt	Coc µg/g oc	Final Coc^{b}	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc^{b}	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc^{b}	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc^{b}	ESBTU FCVi
Total Organic Carbon**	--	--	8.69	0.0869	---	---	9.3	0.093	---	---	10.2	0.102	---	---	11.4	0.114	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.04	0.43	0.43	0.00	0.05	0.52	0.52	0.00	0.07	0.71	0.71	0.00	0.01	0.10	0.10	0.00
2-Methylnaphthalene	447.00	154800	0.08	0.86	0.86	0.00	0.12	1.24	1.24	0.00	0.34	3.33	3.33	0.01	0.06	0.48	0.48	0.00
Acenaphthene (a)	491.00	33400	0.05	0.55	0.55	0.00	0.05	0.57	0.57	0.00	0.10	0.93	0.93	0.00	0.02	0.13	0.13	0.00
Acenaphthylene (a)	452.00	24000	0.04	0.43	0.43	0.00	0.06	0.62	0.62	0.00	0.08	0.78	0.78	0.00	0.02	0.15	0.15	0.00
Anthracene (a)	594.00	1300	0.10	1.15	1.15	0.00	0.13	1.40	1.40	0.00	0.20	1.96	1.96	0.00	0.04	0.33	0.33	0.00
Benzo(a)anthracene (a)	841.00	4153	0.66	7.59	7.59	0.01	0.86	9.25	9.25	0.01	3.60	35.29	35.29	0.04	0.52	4.56	4.56	0.01
Benzo(a)pyrene (a)	965.00	3840	0.76	8.75	8.75	0.01	1.00	10.75	10.75	0.01	2.10	20.59	20.59	0.02	0.37	3.25	3.25	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.91	10.47	10.47	0.01	1.10	11.83	11.83	0.01	2.50	24.51	24.51	0.03	0.40	3.51	3.51	0.00
Benzo(e)pyrene (a)	967.00	4300	0.67	7.71	7.71	0.01	0.83	8.92	8.92	0.01	3.10	30.39	30.39	0.03	0.45	3.95	3.95	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.30	3.45	3.45	0.00	0.38	4.09	4.09	0.00	1.20	11.76	11.76	0.01	0.16	1.40	1.40	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.72	8.29	8.29	0.01	0.78	8.39	8.39	0.01	1.30	12.75	12.75	0.01	0.22	1.93	1.93	0.00
C1 Chrysenes (a)	929.00	---	0.97	11.16	11.16	0.01	1.10	11.83	11.83	0.01	9.70	95.10	95.10	0.10	1.20	10.53	10.53	0.01
C1 Fluorenes (a)	611.00	---	0.03	0.37	0.37	0.00	0.04	0.46	0.46	0.00	0.35	3.43	3.43	0.01	0.04	0.39	0.39	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.94	10.82	10.82	0.01	1.20	12.90	12.90	0.02	8.20	80.39	80.39	0.10	1.20	10.53	10.53	0.01
C1-Naphthalenes (a)	444.00	---	0.07	0.78	0.78	0.00	0.09	0.94	0.94	0.00	0.14	1.37	1.37	0.00	0.02	0.18	0.18	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.52	5.98	5.98	0.01	0.67	7.20	7.20	0.01	2.20	21.57	21.57	0.03	0.21	1.84	1.84	0.00
C2 Chrysenes (a)	1008.00	---	1.10	12.66	12.66	0.01	1.30	13.98	13.98	0.01	9.70	95.10	95.10	0.09	1.30	11.40	11.40	0.01
C2 Fluorenes (a)	686.00	---	0.07	0.81	0.81	0.00	0.12	1.29	1.29	0.00	1.30	12.75	12.75	0.02	0.14	1.23	1.23	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.80	9.21	9.21	---	1.10	11.83	11.83	---	8.50	83.33	83.33	---	1.20	10.53	10.53	---
C2-Naphthalenes (a)	510.00	---	0.22	2.53	2.53	0.00	0.32	3.44	3.44	0.01	0.71	6.96	6.96	0.01	0.09	0.79	0.79	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.51	5.87	5.87	0.01	0.86	9.25	9.25	0.01	5.70	55.88	55.88	0.07	0.43	3.77	3.77	0.01
C3 Chrysenes (a)	1112.00	---	0.51	5.87	5.87	0.01	0.56	6.02	6.02	0.01	3.70	36.27	36.27	0.03	0.53	4.65	4.65	0.00
C3 Fluorenes (a)	769.00	---	0.18	2.07	2.07	0.00	0.38	4.09	4.09	0.01	3.40	33.33	33.33	0.04	0.41	3.60	3.60	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.57	6.56	6.56	0.01	0.91	9.78	9.78	0.01	6.10	59.80	59.80	0.06	0.96	8.42	8.42	0.01
C3-Naphthalenes (a)	581.00	---	0.29	3.34	3.34	0.01	0.46	4.95	4.95	0.01	2.00	19.61	19.61	0.03	0.28	2.46	2.46	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.65	7.48	7.48	0.01	1.20	12.90	12.90	0.02	8.30	81.37	81.37	0.10	1.00	8.77	8.77	0.01
C4 Chrysenes (a)	1214.00	---	0.26	2.99	2.99	0.00	0.25	2.69	2.69	0.00	1.10	10.78	10.78	0.01	0.20	1.75	1.75	0.00
C4-Naphthalenes (a)	657.00	---	0.19	2.19	2.19	0.00	0.47	5.05	5.05	0.01	4.30	42.16	42.16	0.06	0.44	3.86	3.86	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.50	5.75	5.75	0.01	0.92	9.89	9.89	0.01	6.30	61.76	61.76	0.07	1.00	8.77	8.77	0.01
Chrysene (a)	844.00	826	0.87	10.01	10.01	0.01	1.10	11.83	11.83	0.01	5.40	52.94	52.94	0.06	0.58	5.09	5.09	0.01
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.11	1.27	1.27	0.00	0.14	1.51	1.51	0.00	0.44	4.31	4.31	0.00	0.06	0.54	0.54	0.00
Fluoranthene (a)	707.00	23,870.00	1.10	12.66	12.66	0.02	1.30	13.98	13.98	0.02	2.60	25.49	25.49	0.04	0.23	2.02	2.02	0.00
Fluorene (a)	538.00	26,000.00	0.06	0.70	0.70	0.00	0.08	0.89	0.89	0.00	0.15	1.47	1.47	0.00	0.04	0.33	0.33	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.29	3.34	3.34	0.00	0.36	3.87	3.87	0.00	0.66	6.47	6.47	0.01	0.11	0.96	0.96	0.00
Naphthalene (a)	385.00	61,700.00	0.08	0.86	0.86	0.00	0.12	1.24	1.24	0.00	0.34	3.33	3.33	0.01	0.06	0.48	0.48	0.00
Perylene (a)	967.00	431.00	0.20	2.30	2.30	0.00	0.25	2.69	2.69	0.00	0.38	3.73	3.73	0.00	0.07	0.65	0.65	0.00
Phenanthrene (a)	596	34300	0.38	4.37	4.37	0.01	0.48	5.16	5.16	0.01	0.34	3.33	3.33	0.01	0.06	0.48	0.48	0.00
Pyrene (a)	697.00	9,090.00	0.82	9.44	9.44	0.01	0.98	10.54	10.54	0.02	3.70	36.27	36.27	0.05	0.60	5.26	5.26	0.01
	---	**ESBTU FCVi**	---	---	---	0.16	---	---	---	0.20	---	---	---	0.78	---	---	---	0.09

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-40				CI13-40				CI13-40				CI13-40			
		Field Sample ID	CI13-40-SURF				CI13-40-0001				CI13-40-0103				CI13-40-0305			
		Sample Depth	0-0.5				0-1				1-3				3-5			
		Sample Date	09/26/2013				09/27/2013				09/27/2013				09/27/2013			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	7.14	0.0714	---	---	6.93	0.0693	---	---	7.83	0.0783	---	---	3.36	0.0336	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.02	0.34	0.34	0.00	0.02	0.35	0.35	0.00	0.01	0.11	0.11	0.00	0.00	0.01	0.01	0.00
2-Methylnaphthalene	447.00	154800	0.15	2.03	2.03	0.00	0.09	1.23	1.23	0.00	0.06	0.77	0.77	0.00	0.00	0.07	0.07	0.00
Acenaphthene (a)	491.00	33400	0.03	0.41	0.41	0.00	0.04	0.58	0.58	0.00	0.01	0.08	0.08	0.00	0.00	0.01	0.01	0.00
Acenaphthylene (a)	452.00	24000	0.02	0.28	0.28	0.00	0.02	0.32	0.32	0.00	0.01	0.15	0.15	0.00	0.00	0.00	0.00	0.00
Anthracene (a)	594.00	1300	0.08	1.11	1.11	0.00	0.09	1.26	1.26	0.00	0.02	0.29	0.29	0.00	0.00	0.01	0.01	0.00
Benzo(a)anthracene (a)	841.00	4153	0.69	9.66	9.66	0.01	0.71	10.25	10.25	0.01	0.48	6.13	6.13	0.01	0.00	0.13	0.13	0.00
Benzo(a)pyrene (a)	965.00	3840	0.78	10.92	10.92	0.01	0.78	11.26	11.26	0.01	0.28	3.58	3.58	0.00	0.00	0.09	0.09	0.00
Benzo(b)fluoranthene (a)	979.00	2169	1.10	15.41	15.41	0.02	1.10	15.87	15.87	0.02	0.38	4.85	4.85	0.00	0.00	0.15	0.15	0.00
Benzo(e)pyrene (a)	967.00	4300	0.79	11.06	11.06	0.01	0.72	10.39	10.39	0.01	0.40	5.11	5.11	0.01	0.00	0.15	0.15	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.55	7.70	7.70	0.01	0.46	6.64	6.64	0.01	0.14	1.79	1.79	0.00	0.00	0.06	0.06	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.85	11.90	11.90	0.01	0.73	10.53	10.53	0.01	0.22	2.81	2.81	0.00	0.00	0.10	0.10	0.00
C1 Chrysenes (a)	929.00	---	0.96	13.45	13.45	0.01	0.96	13.85	13.85	0.01	1.10	14.05	14.05	0.02	0.01	0.33	0.33	0.00
C1 Fluorenes (a)	611.00	---	0.15	2.03	2.03	0.00	0.03	0.39	0.39	0.00	0.04	0.56	0.56	0.00	0.00	0.07	0.07	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.95	13.31	13.31	0.02	1.00	14.43	14.43	0.02	1.20	15.33	15.33	0.02	0.01	0.30	0.30	0.00
C1-Naphthalenes (a)	444.00	---	0.04	0.59	0.59	0.00	0.05	0.65	0.65	0.00	0.02	0.19	0.19	0.00	0.00	0.07	0.07	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.45	6.30	6.30	0.01	0.48	6.93	6.93	0.01	0.21	2.68	2.68	0.00	0.00	0.10	0.10	0.00
C2 Chrysenes (a)	1008.00	---	0.88	12.32	12.32	0.01	0.89	12.84	12.84	0.01	0.93	11.88	11.88	0.01	0.01	0.33	0.33	0.00
C2 Fluorenes (a)	686.00	---	0.05	0.76	0.76	0.00	0.07	0.94	0.94	0.00	0.13	1.66	1.66	0.00	0.00	0.03	0.03	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.72	10.08	10.08	---	0.76	10.97	10.97	---	1.20	15.33	15.33	---	0.01	0.30	0.30	---
C2-Naphthalenes (a)	510.00	---	0.14	1.96	1.96	0.00	0.17	2.45	2.45	0.00	0.06	0.78	0.78	0.00	0.00	0.04	0.04	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.41	5.74	5.74	0.01	0.46	6.64	6.64	0.01	0.30	3.83	3.83	0.01	0.00	0.14	0.14	0.00
C3 Chrysenes (a)	1112.00	---	0.51	7.14	7.14	0.01	0.50	7.22	7.22	0.01	0.40	5.11	5.11	0.00	0.01	0.16	0.16	0.00
C3 Fluorenes (a)	769.00	---	0.16	2.24	2.24	0.00	0.18	2.60	2.60	0.00	0.36	4.60	4.60	0.01	0.00	0.08	0.08	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.49	6.86	6.86	0.01	0.54	7.79	7.79	0.01	0.90	11.49	11.49	0.01	0.01	0.21	0.21	0.00
C3-Naphthalenes (a)	581.00	---	0.15	2.10	2.10	0.00	0.20	2.89	2.89	0.00	0.12	1.53	1.53	0.00	0.00	0.08	0.08	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.42	5.88	5.88	0.01	0.53	7.65	7.65	0.01	0.69	8.81	8.81	0.01	0.01	0.24	0.24	0.00
C4 Chrysenes (a)	1214.00	---	0.20	2.80	2.80	0.00	0.20	2.89	2.89	0.00	0.15	1.92	1.92	0.00	0.00	0.05	0.05	0.00
C4-Naphthalenes (a)	657.00	---	0.13	1.82	1.82	0.00	0.16	2.31	2.31	0.00	0.23	2.94	2.94	0.00	0.00	0.09	0.09	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.30	4.20	4.20	0.00	0.39	5.63	5.63	0.01	0.67	8.56	8.56	0.01	0.01	0.22	0.22	0.00
Chrysene (a)	844.00	826	1.00	14.01	14.01	0.02	0.97	14.00	14.00	0.02	0.58	7.41	7.41	0.01	0.01	0.20	0.20	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.16	2.24	2.24	0.00	0.15	2.16	2.16	0.00	0.06	0.73	0.73	0.00	0.00	0.02	0.02	0.00
Fluoranthene (a)	707.00	23,870.00	1.50	21.01	21.01	0.03	1.30	18.76	18.76	0.03	0.44	5.62	5.62	0.01	0.01	0.18	0.18	0.00
Fluorene (a)	538.00	26,000.00	0.05	0.64	0.64	0.00	0.05	0.74	0.74	0.00	0.01	0.15	0.15	0.00	0.00	0.01	0.01	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.50	7.00	7.00	0.01	0.43	6.20	6.20	0.01	0.12	1.53	1.53	0.00	0.00	0.04	0.04	0.00
Naphthalene (a)	385.00	61,700.00	0.15	2.03	2.03	0.01	0.09	1.23	1.23	0.00	0.06	0.77	0.77	0.00	0.00	0.07	0.07	0.00
Perylene (a)	967.00	431.00	0.21	2.94	2.94	0.00	0.21	3.03	3.03	0.00	0.08	0.97	0.97	0.00	0.01	0.39	0.39	0.00
Phenanthrene (a)	596	34300	0.39	5.46	5.46	0.01	0.37	5.34	5.34	0.01	0.06	0.77	0.77	0.00	0.00	0.07	0.07	0.00
Pyrene (a)	697.00	9,090.00	0.98	13.73	13.73	0.02	0.99	14.29	14.29	0.02	0.64	8.17	8.17	0.01	0.01	0.23	0.23	0.00
	---	**ESBTU FCVi**	---	---	---	0.22	---	---	---	0.22	---	---	---	0.12	---	---	---	0.00

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-40**				**CI13-41**				**CI13-41**				**CI13-41**			
		Field Sample ID	**CI13-40-0507**				**CI13-41-SURF**				**CI13-41-SURF-FD**				**CI13-41-0001**			
		Sample Depth	**5-7**				**0-0.5**				**0-0.5**				**0-1**			
		Sample Date	**09/27/2013**				**09/26/2013**				**09/26/2013**				**09/27/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	3.05	0.0305	---	---	6.26	0.0626	---	---	6.69	0.0669	---	---	5.35	0.0535	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.01	0.01	0.00	0.02	0.24	0.24	0.00	0.02	0.25	0.25	0.00	0.03	0.54	0.54	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.07	0.07	0.00	0.11	1.68	1.68	0.00	0.14	2.09	2.09	0.00	0.09	1.59	1.59	0.00
Acenaphthene (a)	491.00	33400	0.00	0.01	0.01	0.00	0.03	0.40	0.40	0.00	0.03	0.42	0.42	0.00	0.02	0.39	0.39	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.00	0.00	0.00	0.02	0.30	0.30	0.00	0.03	0.42	0.42	0.00	0.03	0.56	0.56	0.00
Anthracene (a)	594.00	1300	0.00	0.01	0.01	0.00	0.06	0.94	0.94	0.00	0.22	3.29	3.29	0.01	0.06	1.07	1.07	0.00
Benzo(a)anthracene (a)	841.00	4153	0.00	0.08	0.08	0.00	0.63	10.06	10.06	0.01	0.93	13.90	13.90	0.02	0.77	14.39	14.39	0.02
Benzo(a)pyrene (a)	965.00	3840	0.00	0.06	0.06	0.00	0.74	11.82	11.82	0.01	0.99	14.80	14.80	0.02	0.74	13.83	13.83	0.01
Benzo(b)fluoranthene (a)	979.00	2169	0.00	0.11	0.11	0.00	1.10	17.57	17.57	0.02	1.20	17.94	17.94	0.02	0.89	16.64	16.64	0.02
Benzo(e)pyrene (a)	967.00	4300	0.00	0.10	0.10	0.00	0.83	13.26	13.26	0.01	0.95	14.20	14.20	0.01	0.92	17.20	17.20	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.04	0.04	0.00	0.54	8.63	8.63	0.01	0.60	8.97	8.97	0.01	0.37	6.92	6.92	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.07	0.07	0.00	0.92	14.70	14.70	0.02	0.98	14.65	14.65	0.01	0.55	10.28	10.28	0.01
C1 Chrysenes (a)	929.00	---	0.01	0.23	0.23	0.00	0.94	15.02	15.02	0.02	1.10	16.44	16.44	0.02	1.70	31.78	31.78	0.03
C1 Fluorenes (a)	611.00	---	0.00	0.07	0.07	0.00	0.11	1.68	1.68	0.00	0.14	2.09	2.09	0.00	0.04	0.80	0.80	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.01	0.18	0.18	0.00	0.95	15.18	15.18	0.02	1.20	17.94	17.94	0.02	1.60	29.91	29.91	0.04
C1-Naphthalenes (a)	444.00	---	0.00	0.07	0.07	0.00	0.03	0.43	0.43	0.00	0.03	0.46	0.46	0.00	0.05	0.90	0.90	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.00	0.10	0.10	0.00	0.34	5.43	5.43	0.01	0.43	6.43	6.43	0.01	0.57	10.65	10.65	0.02
C2 Chrysenes (a)	1008.00	---	0.01	0.28	0.28	0.00	0.94	15.02	15.02	0.01	0.89	13.30	13.30	0.01	1.50	28.04	28.04	0.03
C2 Fluorenes (a)	686.00	---	0.00	0.03	0.03	0.00	0.04	0.65	0.65	0.00	0.04	0.64	0.64	0.00	0.14	2.62	2.62	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.01	0.18	0.18	---	0.73	11.66	11.66	---	0.83	12.41	12.41	---	1.40	26.17	26.17	---
C2-Naphthalenes (a)	510.00	---	0.00	0.06	0.06	0.00	0.10	1.60	1.60	0.00	0.10	1.49	1.49	0.00	0.22	4.11	4.11	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	0.00	0.13	0.13	0.00	0.34	5.43	5.43	0.01	0.39	5.83	5.83	0.01	0.82	15.33	15.33	0.02
C3 Chrysenes (a)	1112.00	---	0.01	0.23	0.23	0.00	0.51	8.15	8.15	0.01	0.56	8.37	8.37	0.01	0.72	13.46	13.46	0.01
C3 Fluorenes (a)	769.00	---	0.00	0.05	0.05	0.00	0.14	2.24	2.24	0.00	0.14	2.09	2.09	0.00	0.37	6.92	6.92	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.19	0.19	0.00	0.47	7.51	7.51	0.01	0.56	8.37	8.37	0.01	1.00	18.69	18.69	0.02
C3-Naphthalenes (a)	581.00	---	0.00	0.09	0.09	0.00	0.12	1.92	1.92	0.00	0.12	1.79	1.79	0.00	0.41	7.66	7.66	0.01
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.01	0.22	0.22	0.00	0.35	5.59	5.59	0.01	0.38	5.68	5.68	0.01	1.20	22.43	22.43	0.03
C4 Chrysenes (a)	1214.00	---	0.00	0.08	0.08	0.00	0.19	3.04	3.04	0.00	0.24	3.59	3.59	0.00	0.21	3.93	3.93	0.00
C4-Naphthalenes (a)	657.00	---	0.00	0.10	0.10	0.00	0.10	1.60	1.60	0.00	0.11	1.64	1.64	0.00	0.43	8.04	8.04	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	0.21	0.21	0.00	0.25	3.99	3.99	0.00	0.31	4.63	4.63	0.01	0.80	14.95	14.95	0.02
Chrysene (a)	844.00	826	0.00	0.14	0.14	0.00	0.98	15.65	15.65	0.02	1.30	19.43	19.43	0.02	1.20	22.43	22.43	0.03
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.01	0.01	0.00	0.16	2.56	2.56	0.00	0.18	2.69	2.69	0.00	0.14	2.62	2.62	0.00
Fluoranthene (a)	707.00	23,870.00	0.00	0.07	0.07	0.00	1.50	23.96	23.96	0.03	1.80	26.91	26.91	0.04	0.94	17.57	17.57	0.02
Fluorene (a)	538.00	26,000.00	0.00	0.01	0.01	0.00	0.04	0.56	0.56	0.00	0.05	0.75	0.75	0.00	0.03	0.62	0.62	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.02	0.02	0.00	0.48	7.67	7.67	0.01	0.55	8.22	8.22	0.01	0.28	5.23	5.23	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.07	0.07	0.00	0.11	1.68	1.68	0.00	0.14	2.09	2.09	0.01	0.09	1.59	1.59	0.00
Perylene (a)	967.00	431.00	0.03	1.08	1.08	0.00	0.20	3.19	3.19	0.00	0.26	3.89	3.89	0.00	0.17	3.18	3.18	0.00
Phenanthrene (a)	596	34300	0.00	0.07	0.07	0.00	0.31	4.95	4.95	0.01	0.43	6.43	6.43	0.01	0.25	4.67	4.67	0.01
Pyrene (a)	697.00	9,090.00	0.00	0.12	0.12	0.00	0.96	15.34	15.34	0.02	1.10	16.44	16.44	0.02	1.10	20.56	20.56	0.03
	---	**ESBTU FCVi**	---	---	---	0.00	---	---	---	0.24	---	---	---	0.27	---	---	---	0.32

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-41**				**CI13-41**				**CI13-42**				**CI13-42**			
		Field Sample ID	**CI13-41-0103**				**CI13-41-0305**				**CI13-42-SURF**				**CI13-42-0001**			
		Sample Depth	**1-3**				**3-5**				**0-0.5**				**0-1**			
		Sample Date	**09/27/2013**				**09/27/2013**				**09/26/2013**				**09/27/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	7.4	0.074	---	---	0.475	0.00475	---	---	9.06	0.0906	---	---	8.1	0.081	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.03	0.28	0.28	0.00	0.61	7.53	7.53	0.02
2-Methylnaphthalene	447.00	154800	0.02	0.20	0.20	0.00	0.00	0.42	0.42	0.00	0.06	0.66	0.66	0.00	0.38	4.69	4.69	0.01
Acenaphthene (a)	491.00	33400	0.00	0.01	0.01	0.00	0.00	0.04	0.04	0.00	0.03	0.29	0.29	0.00	0.20	2.47	2.47	0.01
Acenaphthylene (a)	452.00	24000	0.00	0.04	0.04	0.00	0.00	0.42	0.42	0.00	0.02	0.23	0.23	0.00	0.08	1.00	1.00	0.00
Anthracene (a)	594.00	1300	0.00	0.05	0.05	0.00	0.00	0.04	0.04	0.00	0.07	0.73	0.73	0.00	0.45	5.56	5.56	0.01
Benzo(a)anthracene (a)	841.00	4153	0.08	1.12	1.12	0.00	0.00	0.44	0.44	0.00	0.45	4.97	4.97	0.01	3.50	43.21	43.21	0.05
Benzo(a)pyrene (a)	965.00	3840	0.07	0.89	0.89	0.00	0.00	0.40	0.40	0.00	0.49	5.41	5.41	0.01	2.10	25.93	25.93	0.03
Benzo(b)fluoranthene (a)	979.00	2169	0.09	1.23	1.23	0.00	0.00	0.72	0.72	0.00	0.58	6.40	6.40	0.01	2.10	25.93	25.93	0.03
Benzo(e)pyrene (a)	967.00	4300	0.11	1.49	1.49	0.00	0.00	0.88	0.88	0.00	0.43	4.75	4.75	0.00	2.70	33.33	33.33	0.03
Benzo(g,h,i)perylene (a)	1095.00	648	0.06	0.74	0.74	0.00	0.00	0.57	0.57	0.00	0.31	3.42	3.42	0.00	1.20	14.81	14.81	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.04	0.58	0.58	0.00	0.00	0.36	0.36	0.00	0.37	4.08	4.08	0.00	1.30	16.05	16.05	0.02
C1 Chrysenes (a)	929.00	---	0.24	3.24	3.24	0.00	0.01	1.28	1.28	0.00	0.56	6.18	6.18	0.01	7.90	97.53	97.53	0.10
C1 Fluorenes (a)	611.00	---	0.01	0.09	0.09	0.00	0.00	0.42	0.42	0.00	0.02	0.18	0.18	0.00	0.76	9.38	9.38	0.02
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.21	2.84	2.84	0.00	0.00	1.01	1.01	0.00	0.53	5.85	5.85	0.01	11.00	135.80	135.80	0.18
C1-Naphthalenes (a)	444.00	---	0.02	0.20	0.20	0.00	0.00	0.42	0.42	0.00	0.05	0.50	0.50	0.00	0.52	6.42	6.42	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.08	1.07	1.07	0.00	0.00	0.40	0.40	0.00	0.30	3.31	3.31	0.00	12.00	148.15	148.15	0.22
C2 Chrysenes (a)	1008.00	---	0.24	3.24	3.24	0.00	0.01	1.68	1.68	0.00	0.50	5.52	5.52	0.01	7.20	88.89	88.89	0.09
C2 Fluorenes (a)	686.00	---	0.02	0.26	0.26	0.00	0.00	0.10	0.10	0.00	0.04	0.39	0.39	0.00	1.80	22.22	22.22	0.03
C2-Fluoranthenes/Pyrenes	---	---	0.23	3.11	3.11	---	0.00	0.99	0.99	---	0.43	4.75	4.75	---	9.80	120.99	120.99	---
C2-Naphthalenes (a)	510.00	---	0.01	0.19	0.19	0.00	0.00	0.29	0.29	0.00	0.14	1.55	1.55	0.00	2.30	28.40	28.40	0.06
C2-Phenanthrenes/Anthracenes (a)	746	---	0.13	1.76	1.76	0.00	0.00	0.63	0.63	0.00	0.30	3.31	3.31	0.00	11.00	135.80	135.80	0.18
C3 Chrysenes (a)	1112.00	---	0.12	1.62	1.62	0.00	0.00	0.86	0.86	0.00	0.32	3.53	3.53	0.00	2.90	35.80	35.80	0.03
C3 Fluorenes (a)	769.00	---	0.06	0.82	0.82	0.00	0.00	0.27	0.27	0.00	0.10	1.10	1.10	0.00	4.40	54.32	54.32	0.07
C3-Fluoranthenes/Pyrenes	949.00	---	0.16	2.16	2.16	0.00	0.00	0.95	0.95	0.00	0.30	3.31	3.31	0.00	6.40	79.01	79.01	0.08
C3-Naphthalenes (a)	581.00	---	0.04	0.50	0.50	0.00	0.00	0.40	0.40	0.00	0.16	1.77	1.77	0.00	4.20	51.85	51.85	0.09
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.16	2.16	2.16	0.00	0.01	1.05	1.05	0.00	0.32	3.53	3.53	0.00	12.00	148.15	148.15	0.18
C4 Chrysenes (a)	1214.00	---	0.04	0.50	0.50	0.00	0.00	0.29	0.29	0.00	0.11	1.21	1.21	0.00	1.10	13.58	13.58	0.01
C4-Naphthalenes (a)	657.00	---	0.05	0.69	0.69	0.00	0.00	0.46	0.46	0.00	0.11	1.21	1.21	0.00	4.20	51.85	51.85	0.08
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.14	1.89	1.89	0.00	0.00	0.67	0.67	0.00	0.24	2.65	2.65	0.00	6.80	83.95	83.95	0.09
Chrysene (a)	844.00	826	0.15	2.03	2.03	0.00	0.00	0.93	0.93	0.00	0.54	5.96	5.96	0.01	4.70	58.02	58.02	0.07
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.02	0.27	0.27	0.00	0.00	0.13	0.13	0.00	0.10	1.05	1.05	0.00	0.46	5.68	5.68	0.01
Fluoranthene (a)	707.00	23,870.00	0.09	1.18	1.18	0.00	0.00	0.63	0.63	0.00	0.66	7.28	7.28	0.01	2.80	34.57	34.57	0.05
Fluorene (a)	538.00	26,000.00	0.00	0.04	0.04	0.00	0.00	0.04	0.04	0.00	0.03	0.36	0.36	0.00	0.73	9.01	9.01	0.02
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.04	0.47	0.47	0.00	0.00	0.27	0.27	0.00	0.27	2.98	2.98	0.00	0.89	10.99	10.99	0.01
Naphthalene (a)	385.00	61,700.00	0.02	0.20	0.20	0.00	0.00	0.42	0.42	0.00	0.06	0.66	0.66	0.00	0.38	4.69	4.69	0.01
Perylene (a)	967.00	431.00	0.07	0.95	0.95	0.00	0.01	1.24	1.24	0.00	0.13	1.43	1.43	0.00	0.36	4.44	4.44	0.00
Phenanthrene (a)	596	34300	0.02	0.20	0.20	0.00	0.00	0.42	0.42	0.00	0.26	2.87	2.87	0.00	6.20	76.54	76.54	0.13
Pyrene (a)	697.00	9,090.00	0.11	1.49	1.49	0.00	0.00	0.84	0.84	0.00	0.50	5.52	5.52	0.01	4.70	58.02	58.02	0.08
	---	**ESBTU FCVi**	---	---	---	0.03	---	---	---	0.02	---	---	---	0.10	---	---	---	1.53

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-42**				**CI13-42**				**CI13-43**				**CI13-43**			
		Field Sample ID	**CI13-42-0103**				**CI13-42-0305**				**CI13-43-SURF**				**CI13-43-0001**			
		Sample Depth	**1-3**				**3-5**				**0-0.5**				**0-1**			
		Sample Date	**09/27/2013**				**09/27/2013**				**09/26/2013**				**09/29/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a]** µg/g oc	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**	**Conc** µg/g Dry wt	**Coc** µg/g oc	**Final** Coc[b]	**ESBTU FCVi**
Total Organic Carbon**	--	--	7.75	0.0775	---	---	0.565	0.00565	---	---	11.1	0.111	---	---	5.35	0.0535	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	18.00	232.26	232.26	0.52	0.06	11.15	11.15	0.03	0.02	0.15	0.15	0.00	0.03	0.47	0.47	0.00
2-Methylnaphthalene	447.00	154800	18.00	232.26	232.26	0.52	0.22	38.94	38.94	0.09	0.10	0.86	0.86	0.00	0.04	0.65	0.65	0.00
Acenaphthene (a)	491.00	33400	1.40	18.06	18.06	0.04	0.02	2.65	2.65	0.01	0.03	0.25	0.25	0.00	0.06	1.03	1.03	0.00
Acenaphthylene (a)	452.00	24000	18.00	232.26	232.26	0.51	0.22	38.94	38.94	0.09	0.02	0.19	0.19	0.00	0.02	0.41	0.41	0.00
Anthracene (a)	594.00	1300	15.00	193.55	193.55	0.33	0.20	35.40	35.40	0.06	0.08	0.75	0.75	0.00	0.12	2.24	2.24	0.00
Benzo(a)anthracene (a)	841.00	4153	18.00	232.26	232.26	0.28	0.36	63.72	63.72	0.08	0.73	6.58	6.58	0.01	1.20	22.43	22.43	0.03
Benzo(a)pyrene (a)	965.00	3840	18.00	232.26	232.26	0.24	0.10	17.70	17.70	0.02	0.85	7.66	7.66	0.01	1.20	22.43	22.43	0.02
Benzo(b)fluoranthene (a)	979.00	2169	18.00	232.26	232.26	0.24	0.10	17.70	17.70	0.02	1.20	10.81	10.81	0.01	1.70	31.78	31.78	0.03
Benzo(e)pyrene (a)	967.00	4300	18.00	232.26	232.26	0.24	0.19	33.63	33.63	0.03	0.86	7.75	7.75	0.01	1.40	26.17	26.17	0.03
Benzo(g,h,i)perylene (a)	1095.00	648	2.60	33.55	33.55	0.03	0.04	7.26	7.26	0.01	0.42	3.78	3.78	0.00	0.86	16.07	16.07	0.01
Benzo(k)fluoranthene (a)	981.00	1220	18.00	232.26	232.26	0.24	0.04	6.37	6.37	0.01	0.95	8.56	8.56	0.01	1.30	24.30	24.30	0.02
C1 Chrysenes (a)	929.00	---	68.00	877.42	877.42	0.94	0.77	136.28	136.28	0.15	0.86	7.75	7.75	0.01	2.20	41.12	41.12	0.04
C1 Fluorenes (a)	611.00	---	19.00	245.16	245.16	0.40	0.22	38.94	38.94	0.06	0.02	0.22	0.22	0.00	0.11	2.06	2.06	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	110.00	1419.35	1419.35	1.84	1.50	265.49	265.49	0.34	1.10	9.91	9.91	0.01	2.30	42.99	42.99	0.06
C1-Naphthalenes (a)	444.00	---	9.20	118.71	118.71	0.27	0.22	38.94	38.94	0.09	0.03	0.28	0.28	0.00	0.04	0.77	0.77	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	380.00	4903.23	4903.23	7.32	4.10	725.66	725.66	1.08	0.56	5.05	5.05	0.01	1.80	33.64	33.64	0.05
C2 Chrysenes (a)	1008.00	---	39.00	503.23	503.23	0.50	0.49	86.73	86.73	0.09	0.80	7.21	7.21	0.01	2.00	37.38	37.38	0.04
C2 Fluorenes (a)	686.00	---	27.00	348.39	348.39	0.51	0.32	56.64	56.64	0.08	0.06	0.52	0.52	0.00	0.24	4.49	4.49	0.01
C2-Fluoranthenes/Pyrenes	---	---	74.00	954.84	954.84	---	0.99	175.22	175.22	---	0.89	8.02	8.02	---	1.90	35.51	35.51	---
C2-Naphthalenes (a)	510.00	---	53.00	683.87	683.87	1.34	0.47	83.19	83.19	0.16	0.11	0.99	0.99	0.00	0.34	6.36	6.36	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	130.00	1677.42	1677.42	2.25	1.40	247.79	247.79	0.33	0.46	4.14	4.14	0.01	1.60	29.91	29.91	0.04
C3 Chrysenes (a)	1112.00	---	13.00	167.74	167.74	0.15	0.15	26.55	26.55	0.02	0.43	3.87	3.87	0.00	0.81	15.14	15.14	0.01
C3 Fluorenes (a)	769.00	---	33.00	425.81	425.81	0.55	0.41	72.57	72.57	0.09	0.17	1.53	1.53	0.00	0.58	10.84	10.84	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	41.00	529.03	529.03	0.56	0.46	81.42	81.42	0.09	0.53	4.77	4.77	0.01	1.30	24.30	24.30	0.03
C3-Naphthalenes (a)	581.00	---	66.00	851.61	851.61	1.47	0.78	138.05	138.05	0.24	0.16	1.44	1.44	0.00	0.72	13.46	13.46	0.02
C3-Phenanthrenes/Anthracenes (a)	829.00	---	46.00	593.55	593.55	0.72	0.62	109.73	109.73	0.13	0.46	4.14	4.14	0.01	1.50	28.04	28.04	0.03
C4 Chrysenes (a)	1214.00	---	4.00	51.61	51.61	0.04	0.22	38.94	38.94	0.03	0.17	1.53	1.53	0.00	0.24	4.49	4.49	0.00
C4-Naphthalenes (a)	657.00	---	34.00	438.71	438.71	0.67	0.38	67.26	67.26	0.10	0.13	1.17	1.17	0.00	0.69	12.90	12.90	0.02
C4-Phenanthrenes/Anthracenes (a)	913.00	---	18.00	232.26	232.26	0.25	0.31	54.87	54.87	0.06	0.30	2.70	2.70	0.00	0.90	16.82	16.82	0.02
Chrysene (a)	844.00	826	54.00	696.77	696.77	0.83	0.78	138.05	138.05	0.16	1.10	9.91	9.91	0.01	1.90	35.51	35.51	0.04
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	1.50	19.35	19.35	0.02	0.02	3.89	3.89	0.00	0.14	1.26	1.26	0.00	0.24	4.49	4.49	0.00
Fluoranthene (a)	707.00	23,870.00	18.00	232.26	232.26	0.33	0.25	44.25	44.25	0.06	1.70	15.32	15.32	0.02	2.30	42.99	42.99	0.06
Fluorene (a)	538.00	26,000.00	14.00	180.65	180.65	0.34	0.16	28.32	28.32	0.05	0.05	0.44	0.44	0.00	0.11	2.06	2.06	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	1.40	18.06	18.06	0.02	0.03	4.60	4.60	0.00	0.42	3.78	3.78	0.00	0.70	13.08	13.08	0.01
Naphthalene (a)	385.00	61,700.00	18.00	232.26	232.26	0.60	0.22	38.94	38.94	0.10	0.10	0.86	0.86	0.00	0.04	0.73	0.73	0.00
Perylene (a)	967.00	431.00	18.00	232.26	232.26	0.24	0.03	5.66	5.66	0.01	0.21	1.89	1.89	0.00	0.33	6.17	6.17	0.01
Phenanthrene (a)	596	34300	260.00	3354.84	3354.84	5.63	2.90	513.27	513.27	0.86	0.46	4.14	4.14	0.01	0.94	17.57	17.57	0.03
Pyrene (a)	697.00	9,090.00	65.00	838.71	838.71	1.20	0.91	161.06	161.06	0.23	1.20	10.81	10.81	0.02	1.80	33.64	33.64	0.05
	---	**ESBTU FCVi**	---	---	---	25.18	---	---	---	3.99	---	---	---	0.15	---	---	---	0.59

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-43				CI13-43				CI13-43				CI13-44			
		Field Sample ID	CI13-43-0103				CI13-43-0305				CI13-43-0507				CI13-44-SURF			
		Sample Depth	1-3				3-5				5-7				0-0.5			
		Sample Date	09/29/2013				09/29/2013				09/29/2013				09/26/2013			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi	Conc µg/g Dry wt	Coc µg/g oc	Final Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	5.4	0.054	---	---	6.27	0.0627	---	---	3.6	0.036	---	---	3.11	0.0311	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.65	12.04	12.04	0.03	20.00	318.98	318.98	0.72	2.50	69.44	69.44	0.16	0.02	0.71	0.71	0.00
2-Methylnaphthalene	447.00	154800	0.14	2.59	2.59	0.01	37.00	590.11	590.11	1.32	3.90	108.33	108.33	0.24	0.16	4.98	4.98	0.01
Acenaphthene (a)	491.00	33400	0.28	5.19	5.19	0.01	3.40	54.23	54.23	0.11	0.41	11.39	11.39	0.02	0.03	1.06	1.06	0.00
Acenaphthylene (a)	452.00	24000	2.40	44.44	44.44	0.10	39.00	622.01	622.01	1.38	5.00	138.89	138.89	0.31	0.01	0.35	0.35	0.00
Anthracene (a)	594.00	1300	2.30	42.59	42.59	0.07	28.00	446.57	446.57	0.75	2.60	72.22	72.22	0.12	0.18	5.79	5.79	0.01
Benzo(a)anthracene (a)	841.00	4153	9.40	174.07	174.07	0.21	39.00	622.01	622.01	0.74	5.00	138.89	138.89	0.17	1.10	35.37	35.37	0.04
Benzo(a)pyrene (a)	965.00	3840	3.30	61.11	61.11	0.06	19.00	303.03	303.03	0.31	1.90	52.78	52.78	0.05	0.55	17.68	17.68	0.02
Benzo(b)fluoranthene (a)	979.00	2169	4.10	75.93	75.93	0.08	21.00	334.93	334.93	0.34	1.90	52.78	52.78	0.05	0.81	26.05	26.05	0.03
Benzo(e)pyrene (a)	967.00	4300	7.00	129.63	129.63	0.13	39.00	622.01	622.01	0.64	5.00	138.89	138.89	0.14	0.93	29.90	29.90	0.03
Benzo(g,h,i)perylene (a)	1095.00	648	2.10	38.89	38.89	0.04	7.00	111.64	111.64	0.10	0.82	22.78	22.78	0.02	0.34	10.93	10.93	0.01
Benzo(k)fluoranthene (a)	981.00	1220	1.80	33.33	33.33	0.03	8.30	132.38	132.38	0.13	0.89	24.72	24.72	0.03	0.49	15.76	15.76	0.02
C1 Chrysenes (a)	929.00	---	24.00	444.44	444.44	0.48	160.00	2551.83	2551.83	2.75	16.00	444.44	444.44	0.48	2.50	80.39	80.39	0.09
C1 Fluorenes (a)	611.00	---	3.70	68.52	68.52	0.11	43.00	685.81	685.81	1.12	4.50	125.00	125.00	0.20	0.25	8.04	8.04	0.01
C1-Fluoranthenes/Pyrenes (a)	770.00	---	34.00	629.63	629.63	0.82	270.00	4306.22	4306.22	5.59	28.00	777.78	777.78	1.01	3.10	99.68	99.68	0.13
C1-Naphthalenes (a)	444.00	---	0.54	10.00	10.00	0.02	37.00	590.11	590.11	1.33	4.20	116.67	116.67	0.26	0.03	1.06	1.06	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	75.00	1388.89	1388.89	2.07	840.00	13397.13	13397.13	20.00	86.00	2388.89	2388.89	3.57	4.50	144.69	144.69	0.22
C2 Chrysenes (a)	1008.00	---	16.00	296.30	296.30	0.29	110.00	1754.39	1754.39	1.74	9.70	269.44	269.44	0.27	1.90	61.09	61.09	0.06
C2 Fluorenes (a)	686.00	---	6.60	122.22	122.22	0.18	63.00	1004.78	1004.78	1.46	6.50	180.56	180.56	0.26	0.48	15.43	15.43	0.02
C2-Fluoranthenes/Pyrenes	---	---	26.00	481.48	481.48	---	180.00	2870.81	2870.81	---	19.00	527.78	527.78	---	2.60	83.60	83.60	---
C2-Naphthalenes (a)	510.00	---	5.90	109.26	109.26	0.21	200.00	3189.79	3189.79	6.25	24.00	666.67	666.67	1.31	0.48	15.43	15.43	0.03
C2-Phenanthrenes/Anthracenes (a)	746	---	37.00	685.19	685.19	0.92	310.00	4944.18	4944.18	6.63	32.00	888.89	888.89	1.19	2.60	83.60	83.60	0.11
C3 Chrysenes (a)	1112.00	---	5.80	107.41	107.41	0.10	27.00	430.62	430.62	0.39	2.70	75.00	75.00	0.07	0.61	19.61	19.61	0.02
C3 Fluorenes (a)	769.00	---	9.70	179.63	179.63	0.23	75.00	1196.17	1196.17	1.56	8.80	244.44	244.44	0.32	0.79	25.40	25.40	0.03
C3-Fluoranthenes/Pyrenes	949.00	---	17.00	314.81	314.81	0.33	99.00	1578.95	1578.95	1.66	10.00	277.78	277.78	0.29	1.70	54.66	54.66	0.06
C3-Naphthalenes (a)	581.00	---	13.00	240.74	240.74	0.41	150.00	2392.34	2392.34	4.12	20.00	555.56	555.56	0.96	0.91	29.26	29.26	0.05
C3-Phenanthrenes/Anthracenes (a)	829.00	---	17.00	314.81	314.81	0.38	120.00	1913.88	1913.88	2.31	11.00	305.56	305.56	0.37	1.50	48.23	48.23	0.06
C4 Chrysenes (a)	1214.00	---	2.00	37.04	37.04	0.03	11.00	175.44	175.44	0.14	5.00	138.89	138.89	0.11	0.26	8.36	8.36	0.01
C4-Naphthalenes (a)	657.00	---	8.60	159.26	159.26	0.24	81.00	1291.87	1291.87	1.97	9.70	269.44	269.44	0.41	0.65	20.90	20.90	0.03
C4-Phenanthrenes/Anthracenes (a)	913.00	---	8.50	157.41	157.41	0.17	45.00	717.70	717.70	0.79	4.90	136.11	136.11	0.15	0.97	31.19	31.19	0.03
Chrysene (a)	844.00	826	14.00	259.26	259.26	0.31	130.00	2073.37	2073.37	2.51	12.00	333.33	333.33	0.39	1.80	57.88	57.88	0.07
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.84	15.56	15.56	0.01	3.50	55.82	55.82	0.05	0.40	11.11	11.11	0.01	0.12	3.86	3.86	0.00
Fluoranthene (a)	707.00	23,870.00	7.90	146.30	146.30	0.21	39.00	622.01	622.01	0.88	5.00	138.89	138.89	0.20	1.20	38.59	38.59	0.05
Fluorene (a)	538.00	26,000.00	2.20	40.74	40.74	0.08	32.00	510.37	510.37	0.95	3.30	91.67	91.67	0.17	0.16	5.14	5.14	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	1.20	22.22	22.22	0.02	3.40	54.23	54.23	0.05	0.48	13.33	13.33	0.01	0.26	8.36	8.36	0.01
Naphthalene (a)	385.00	61,700.00	2.40	44.44	44.44	0.12	39.00	622.01	622.01	1.62	5.00	138.89	138.89	0.36	0.16	4.98	4.98	0.01
Perylene (a)	967.00	431.00	0.45	8.33	8.33	0.01	39.00	622.01	622.01	1.44	2.60	72.22	72.22	0.07	0.12	3.86	3.86	0.00
Phenanthrene (a)	596	34300	39.00	722.22	722.22	1.21	580.00	9250.40	9250.40	15.52	60.00	1666.67	1666.67	2.80	2.30	73.95	73.95	0.12
Pyrene (a)	697.00	9,090.00	17.00	314.81	314.81	0.45	160.00	2,551.83	2,551.83	3.66	16.00	444.44	444.44	0.64	1.60	51.45	51.45	0.07
	---	**ESBTU FCVi**	---	---	---	8.03	---	---	---	70.65	---	---	---	12.64	---	---	---	1.13

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-44**				**CI13-44**				**CI13-44**				**CI13-44**			
		Field Sample ID	**CI13-44-0001**				**CI13-44-0103**				**CI13-44-0305**				**CI13-44-0507**			
		Sample Depth	**0-1**				**1-3**				**3-5**				**5-7**			
		Sample Date	**09/28/2013**				**09/28/2013**				**09/28/2013**				**09/28/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	4.87	0.0487	---	---	6.92	0.0692	---	---	5.02	0.0502	---	---	4.91	0.0491	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.47	9.55	9.55	0.02	0.92	13.29	13.29	0.03	8.90	177.29	177.29	0.40	0.14	2.85	2.85	0.01
2-Methylnaphthalene	447.00	154800	0.03	0.66	0.66	0.00	4.25	61.42	61.42	0.14	21.00	418.33	418.33	0.94	0.32	6.52	6.52	0.01
Acenaphthene (a)	491.00	33400	0.06	1.23	1.23	0.00	0.40	5.78	5.78	0.01	1.80	35.86	35.86	0.07	0.04	0.71	0.71	0.00
Acenaphthylene (a)	452.00	24000	0.47	9.55	9.55	0.02	4.25	61.42	61.42	0.14	15.50	308.76	308.76	0.68	0.27	5.50	5.50	0.01
Anthracene (a)	594.00	1300	0.49	10.06	10.06	0.02	4.70	67.92	67.92	0.11	14.00	278.88	278.88	0.47	0.29	5.91	5.91	0.01
Benzo(a)anthracene (a)	841.00	4153	3.50	71.87	71.87	0.09	15.00	216.76	216.76	0.26	37.00	737.05	737.05	0.88	0.90	18.33	18.33	0.02
Benzo(a)pyrene (a)	965.00	3840	1.30	26.69	26.69	0.03	4.20	60.69	60.69	0.06	9.30	185.26	185.26	0.19	0.34	6.92	6.92	0.01
Benzo(b)fluoranthene (a)	979.00	2169	1.50	30.80	30.80	0.03	4.50	65.03	65.03	0.07	8.40	167.33	167.33	0.17	0.33	6.72	6.72	0.01
Benzo(e)pyrene (a)	967.00	4300	2.80	57.49	57.49	0.06	8.70	125.72	125.72	0.13	15.50	308.76	308.76	0.32	0.27	5.50	5.50	0.01
Benzo(g,h,i)perylene (a)	1095.00	648	0.65	13.35	13.35	0.01	1.50	21.68	21.68	0.02	4.00	79.68	79.68	0.07	0.12	2.44	2.44	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.76	15.61	15.61	0.02	1.30	18.79	18.79	0.02	3.30	65.74	65.74	0.07	0.23	4.68	4.68	0.00
C1 Chrysenes (a)	929.00	---	8.60	176.59	176.59	0.19	34.00	491.33	491.33	0.53	77.00	1533.86	1533.86	1.65	1.60	32.59	32.59	0.04
C1 Fluorenes (a)	611.00	---	0.90	18.48	18.48	0.03	7.20	104.05	104.05	0.17	21.00	418.33	418.33	0.68	0.39	7.94	7.94	0.01
C1-Fluoranthenes/Pyrenes (a)	770.00	---	15.00	308.01	308.01	0.40	68.00	982.66	982.66	1.28	130.00	2589.64	2589.64	3.36	3.20	65.17	65.17	0.08
C1-Naphthalenes (a)	444.00	---	0.47	9.55	9.55	0.02	4.25	61.42	61.42	0.14	20.00	398.41	398.41	0.90	0.30	6.11	6.11	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	20.00	410.68	410.68	0.61	130.00	1878.61	1878.61	2.80	440.00	8764.94	8764.94	13.08	7.00	142.57	142.57	0.21
C2 Chrysenes (a)	1008.00	---	6.90	141.68	141.68	0.14	23.00	332.37	332.37	0.33	38.00	756.97	756.97	0.75	1.10	22.40	22.40	0.02
C2 Fluorenes (a)	686.00	---	2.00	41.07	41.07	0.06	12.00	173.41	173.41	0.25	31.00	617.53	617.53	0.90	0.60	12.22	12.22	0.02
C2-Fluoranthenes/Pyrenes	---	---	12.00	246.41	246.41	---	49.00	708.09	708.09	---	82.00	1633.47	1633.47	---	2.10	42.77	42.77	---
C2-Naphthalenes (a)	510.00	---	0.93	19.10	19.10	0.04	12.00	173.41	173.41	0.34	100.00	1992.03	1992.03	3.91	1.70	34.62	34.62	0.07
C2-Phenanthrenes/Anthracenes (a)	746	---	10.00	205.34	205.34	0.28	50.00	722.54	722.54	0.97	150.00	2988.05	2988.05	4.01	2.60	52.95	52.95	0.07
C3 Chrysenes (a)	1112.00	---	2.40	49.28	49.28	0.04	6.30	91.04	91.04	0.08	12.00	239.04	239.04	0.21	0.28	5.70	5.70	0.01
C3 Fluorenes (a)	769.00	---	3.50	71.87	71.87	0.09	15.00	216.76	216.76	0.28	37.00	737.05	737.05	0.96	0.76	15.48	15.48	0.02
C3-Fluoranthenes/Pyrenes	949.00	---	6.80	139.63	139.63	0.15	26.00	375.72	375.72	0.40	43.00	856.57	856.57	0.90	1.10	22.40	22.40	0.02
C3-Naphthalenes (a)	581.00	---	3.00	61.60	61.60	0.11	21.00	303.47	303.47	0.52	85.00	1693.23	1693.23	2.91	1.50	30.55	30.55	0.05
C3-Phenanthrenes/Anthracenes (a)	829.00	---	7.70	158.11	158.11	0.19	32.00	462.43	462.43	0.56	52.00	1035.86	1035.86	1.25	1.50	30.55	30.55	0.04
C4 Chrysenes (a)	1214.00	---	0.85	17.45	17.45	0.01	1.90	27.46	27.46	0.02	4.30	85.66	85.66	0.07	0.12	2.44	2.44	0.00
C4-Naphthalenes (a)	657.00	---	2.70	55.44	55.44	0.08	14.00	202.31	202.31	0.31	42.00	836.65	836.65	1.27	1.10	22.40	22.40	0.03
C4-Phenanthrenes/Anthracenes (a)	913.00	---	4.10	84.19	84.19	0.09	14.00	202.31	202.31	0.22	20.00	398.41	398.41	0.44	0.71	14.46	14.46	0.02
Chrysene (a)	844.00	826	6.20	127.31	127.31	0.15	26.00	375.72	375.72	0.45	63.00	1254.98	1254.98	1.52	1.40	28.51	28.51	0.03
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.30	6.16	6.16	0.01	0.90	13.01	13.01	0.01	2.00	39.84	39.84	0.04	0.05	0.92	0.92	0.00
Fluoranthene (a)	707.00	23,870.00	2.20	45.17	45.17	0.06	8.60	124.28	124.28	0.18	15.50	308.76	308.76	0.44	0.83	16.90	16.90	0.02
Fluorene (a)	538.00	26,000.00	0.38	7.80	7.80	0.01	3.90	56.36	56.36	0.10	17.00	338.65	338.65	0.63	0.25	5.09	5.09	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.38	7.80	7.80	0.01	0.92	13.29	13.29	0.01	2.30	45.82	45.82	0.04	0.09	1.79	1.79	0.00
Naphthalene (a)	385.00	61,700.00	0.03	0.62	0.62	0.00	4.25	61.42	61.42	0.16	15.50	308.76	308.76	0.80	0.01	0.29	0.29	0.00
Perylene (a)	967.00	431.00	0.17	3.49	3.49	0.00	0.37	5.35	5.35	0.01	15.50	308.76	308.76	0.32	0.19	3.87	3.87	0.00
Phenanthrene (a)	596	34300	8.20	168.38	168.38	0.28	84.00	1213.87	1213.87	2.04	310.00	6175.30	6175.30	10.36	5.00	101.83	101.83	0.17
Pyrene (a)	697.00	9,090.00	6.80	139.63	139.63	0.20	37.00	534.68	534.68	0.77	78.00	1,553.78	1,553.78	2.23	2.00	40.73	40.73	0.06
	---	**ESBTU FCVi**	---	---	---	2.76	---	---	---	11.07	---	---	---	43.98	---	---	---	0.85

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-45**				**CI13-45**				**CI13-45**				**CI13-45**			
		Field Sample ID	**CI13-45-SURF**				**CI13-45-SURF-FD**				**CI13-45-0001**				**CI13-45-0001-FD**			
		Sample Depth	**0-0.5**				**0-0.5**				**0-1**				**0-1**			
		Sample Date	**09/26/2013**				**09/26/2013**				**09/28/2013**				**09/28/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	9.16	0.0916	---	---	8.1	0.081	---	---	6.99	0.0699	---	---	7.39	0.0739	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.04	0.43	0.43	0.00	0.04	0.53	0.53	0.00	0.09	1.22	1.22	0.00	0.09	1.22	1.22	0.00
2-Methylnaphthalene	447.00	154800	0.14	1.53	1.53	0.00	0.14	1.73	1.73	0.00	0.09	1.22	1.22	0.00	0.09	1.22	1.22	0.00
Acenaphthene (a)	491.00	33400	0.04	0.41	0.41	0.00	0.04	0.53	0.53	0.00	0.03	0.36	0.36	0.00	0.04	0.47	0.47	0.00
Acenaphthylene (a)	452.00	24000	0.04	0.47	0.47	0.00	0.05	0.60	0.60	0.00	0.02	0.26	0.26	0.00	0.03	0.45	0.45	0.00
Anthracene (a)	594.00	1300	0.10	1.05	1.05	0.00	0.13	1.60	1.60	0.00	0.04	0.54	0.54	0.00	0.07	0.89	0.89	0.00
Benzo(a)anthracene (a)	841.00	4153	0.83	9.06	9.06	0.01	0.93	11.48	11.48	0.01	0.58	8.30	8.30	0.01	0.78	10.55	10.55	0.01
Benzo(a)pyrene (a)	965.00	3840	0.86	9.39	9.39	0.01	0.95	11.73	11.73	0.01	0.47	6.72	6.72	0.01	0.67	9.07	9.07	0.01
Benzo(b)fluoranthene (a)	979.00	2169	1.10	12.01	12.01	0.01	1.20	14.81	14.81	0.02	0.61	8.73	8.73	0.01	0.80	10.83	10.83	0.01
Benzo(e)pyrene (a)	967.00	4300	0.85	9.28	9.28	0.01	0.91	11.23	11.23	0.01	0.61	8.73	8.73	0.01	0.83	11.23	11.23	0.01
Benzo(g,h,i)perylene (a)	1095.00	648	0.44	4.80	4.80	0.00	0.53	6.54	6.54	0.01	0.29	4.15	4.15	0.00	0.36	4.87	4.87	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.86	9.39	9.39	0.01	1.00	12.35	12.35	0.01	0.33	4.72	4.72	0.00	0.51	6.90	6.90	0.01
C1 Chrysenes (a)	929.00	---	1.30	14.19	14.19	0.02	1.30	16.05	16.05	0.02	1.30	18.60	18.60	0.02	1.70	23.00	23.00	0.02
C1 Fluorenes (a)	611.00	---	0.06	0.68	0.68	0.00	0.07	0.81	0.81	0.00	0.04	0.62	0.62	0.00	0.06	0.81	0.81	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	1.40	15.28	15.28	0.02	1.60	19.75	19.75	0.03	1.30	18.60	18.60	0.02	1.70	23.00	23.00	0.03
C1-Naphthalenes (a)	444.00	---	0.07	0.78	0.78	0.00	0.08	0.99	0.99	0.00	0.03	0.49	0.49	0.00	0.04	0.60	0.60	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.85	9.28	9.28	0.01	0.96	11.85	11.85	0.02	0.71	10.16	10.16	0.02	1.00	13.53	13.53	0.02
C2 Chrysenes (a)	1008.00	---	1.40	15.28	15.28	0.02	1.50	18.52	18.52	0.02	1.20	17.17	17.17	0.02	1.80	24.36	24.36	0.02
C2 Fluorenes (a)	686.00	---	0.20	2.18	2.18	0.00	0.20	2.47	2.47	0.00	0.15	2.15	2.15	0.00	0.22	2.98	2.98	0.00
C2-Fluoranthenes/Pyrenes	---	---	1.20	13.10	13.10	---	1.40	17.28	17.28	---	1.20	17.17	17.17	---	1.70	23.00	23.00	---
C2-Naphthalenes (a)	510.00	---	0.30	3.28	3.28	0.01	0.34	4.20	4.20	0.01	0.24	3.43	3.43	0.01	0.33	4.47	4.47	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	1.40	15.28	15.28	0.02	1.50	18.52	18.52	0.02	1.20	17.17	17.17	0.02	1.80	24.36	24.36	0.03
C3 Chrysenes (a)	1112.00	---	0.75	8.19	8.19	0.01	0.77	9.51	9.51	0.01	0.41	5.87	5.87	0.01	0.59	7.98	7.98	0.01
C3 Fluorenes (a)	769.00	---	0.71	7.75	7.75	0.01	0.78	9.63	9.63	0.01	0.47	6.72	6.72	0.01	0.72	9.74	9.74	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.90	9.83	9.83	0.01	1.10	13.58	13.58	0.01	0.97	13.88	13.88	0.01	1.30	17.59	17.59	0.02
C3-Naphthalenes (a)	581.00	---	0.57	6.22	6.22	0.01	0.64	7.90	7.90	0.01	0.60	8.58	8.58	0.01	0.89	12.04	12.04	0.02
C3-Phenanthrenes/Anthracenes (a)	829.00	---	1.70	18.56	18.56	0.02	1.90	23.46	23.46	0.03	1.40	20.03	20.03	0.02	2.00	27.06	27.06	0.03
C4 Chrysenes (a)	1214.00	---	0.24	2.62	2.62	0.00	0.24	2.96	2.96	0.00	0.17	2.43	2.43	0.00	0.26	3.52	3.52	0.00
C4-Naphthalenes (a)	657.00	---	0.82	8.95	8.95	0.01	0.85	10.49	10.49	0.02	0.66	9.44	9.44	0.01	0.94	12.72	12.72	0.02
C4-Phenanthrenes/Anthracenes (a)	913.00	---	1.30	14.19	14.19	0.02	1.40	17.28	17.28	0.02	0.93	13.30	13.30	0.01	1.50	20.30	20.30	0.02
Chrysene (a)	844.00	826	1.10	12.01	12.01	0.01	1.30	16.05	16.05	0.02	0.91	13.02	13.02	0.02	1.20	16.24	16.24	0.02
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.15	1.64	1.64	0.00	0.17	2.10	2.10	0.00	0.09	1.34	1.34	0.00	0.13	1.76	1.76	0.00
Fluoranthene (a)	707.00	23,870.00	1.90	20.74	20.74	0.03	2.20	27.16	27.16	0.04	0.87	12.45	12.45	0.02	1.20	16.24	16.24	0.02
Fluorene (a)	538.00	26,000.00	0.09	0.96	0.96	0.00	0.11	1.36	1.36	0.00	0.03	0.39	0.39	0.00	0.03	0.45	0.45	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.39	4.26	4.26	0.00	0.46	5.68	5.68	0.01	0.22	3.15	3.15	0.00	0.28	3.79	3.79	0.00
Naphthalene (a)	385.00	61,700.00	0.14	1.53	1.53	0.00	0.14	1.73	1.73	0.00	0.09	1.22	1.22	0.00	0.09	1.22	1.22	0.00
Perylene (a)	967.00	431.00	0.23	2.51	2.51	0.00	0.26	3.21	3.21	0.00	0.16	2.29	2.29	0.00	0.20	2.71	2.71	0.00
Phenanthrene (a)	596	34300	0.40	4.37	4.37	0.01	0.48	5.93	5.93	0.01	0.28	4.01	4.01	0.01	0.36	4.87	4.87	0.01
Pyrene (a)	697.00	9,090.00	1.20	13.10	13.10	0.02	1.40	17.28	17.28	0.02	0.82	11.73	11.73	0.02	1.10	14.88	14.88	0.02
	---	**ESBTU FCVi**	---	---	---	0.25	---	---	---	0.32	---	---	---	0.23	---	---	---	0.30

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-45**				**CI13-45**				**CI13-45**				**CI13-46**			
		Field Sample ID	**CI13-45-0103**				**CI13-45-0103-FD**				**CI13-45-0305**				**CI13-46-SURF**			
		Sample Depth	**1-3**				**1-3**				**3-5**				**0-0.5**			
		Sample Date	**09/28/2013**				**09/28/2013**				**09/28/2013**				**09/26/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.04	0.0104	---	---	1.04	0.0104	---	---	0.472	0.00472	---	---	2.08	0.0208	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.47	0.47	0.00	0.03	1.59	1.59	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.47	0.47	0.00	0.08	3.61	3.61	0.01
Acenaphthene (a)	491.00	33400	0.00	0.03	0.03	0.00	0.00	0.03	0.03	0.00	0.00	0.47	0.47	0.00	0.10	4.57	4.57	0.01
Acenaphthylene (a)	452.00	24000	0.00	0.03	0.03	0.00	0.00	0.03	0.03	0.00	0.00	0.47	0.47	0.00	0.01	0.28	0.28	0.00
Anthracene (a)	594.00	1300	0.00	0.04	0.04	0.00	0.00	0.05	0.05	0.00	0.00	0.25	0.25	0.00	0.09	4.13	4.13	0.01
Benzo(a)anthracene (a)	841.00	4153	0.01	0.67	0.67	0.00	0.01	0.78	0.78	0.00	0.00	0.47	0.47	0.00	0.35	16.83	16.83	0.02
Benzo(a)pyrene (a)	965.00	3840	0.00	0.44	0.44	0.00	0.01	0.62	0.62	0.00	0.00	0.47	0.47	0.00	0.39	18.75	18.75	0.02
Benzo(b)fluoranthene (a)	979.00	2169	0.01	0.62	0.62	0.00	0.01	0.78	0.78	0.00	0.00	0.47	0.47	0.00	0.63	30.29	30.29	0.03
Benzo(e)pyrene (a)	967.00	4300	0.01	0.79	0.79	0.00	0.01	1.06	1.06	0.00	0.00	0.47	0.47	0.00	0.45	21.63	21.63	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.00	0.30	0.30	0.00	0.00	0.36	0.36	0.00	0.00	0.14	0.14	0.00	0.25	12.02	12.02	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.00	0.42	0.42	0.00	0.01	0.57	0.57	0.00	0.00	0.47	0.47	0.00	0.50	24.04	24.04	0.02
C1 Chrysenes (a)	929.00	---	0.02	1.83	1.83	0.00	0.02	2.12	2.12	0.00	0.01	1.84	1.84	0.00	0.37	17.79	17.79	0.02
C1 Fluorenes (a)	611.00	---	0.00	0.08	0.08	0.00	0.00	0.08	0.08	0.00	0.00	0.30	0.30	0.00	0.03	1.54	1.54	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.02	1.92	1.92	0.00	0.03	2.40	2.40	0.00	0.01	2.75	2.75	0.00	0.59	28.37	28.37	0.04
C1-Naphthalenes (a)	444.00	---	0.00	0.04	0.04	0.00	0.00	0.05	0.05	0.00	0.00	0.47	0.47	0.00	0.05	2.31	2.31	0.01
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.02	1.44	1.44	0.00	0.02	1.54	1.54	0.00	0.04	7.42	7.42	0.01	0.34	16.35	16.35	0.02
C2 Chrysenes (a)	1008.00	---	0.02	1.63	1.63	0.00	0.02	2.12	2.12	0.00	0.01	1.27	1.27	0.00	0.30	14.42	14.42	0.01
C2 Fluorenes (a)	686.00	---	0.00	0.24	0.24	0.00	0.00	0.25	0.25	0.00	0.00	0.55	0.55	0.00	0.05	2.50	2.50	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.02	1.73	1.73	---	0.02	2.12	2.12	---	0.01	1.99	1.99	---	0.39	18.75	18.75	---
C2-Naphthalenes (a)	510.00	---	0.00	0.34	0.34	0.00	0.00	0.37	0.37	0.00	0.00	0.19	0.19	0.00	0.15	7.21	7.21	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	0.02	1.73	1.73	0.00	0.02	1.83	1.83	0.00	0.02	3.18	3.18	0.00	0.24	11.54	11.54	0.02
C3 Chrysenes (a)	1112.00	---	0.01	0.67	0.67	0.00	0.01	0.84	0.84	0.00	0.00	0.34	0.34	0.00	0.13	6.25	6.25	0.01
C3 Fluorenes (a)	769.00	---	0.01	0.65	0.65	0.00	0.01	0.66	0.66	0.00	0.00	0.81	0.81	0.00	0.11	5.29	5.29	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	1.25	1.25	0.00	0.02	1.54	1.54	0.00	0.01	1.21	1.21	0.00	0.21	10.10	10.10	0.01
C3-Naphthalenes (a)	581.00	---	0.01	0.79	0.79	0.00	0.01	0.83	0.83	0.00	0.00	0.61	0.61	0.00	0.21	10.10	10.10	0.02
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.02	1.54	1.54	0.00	0.02	1.83	1.83	0.00	0.01	1.33	1.33	0.00	0.24	11.54	11.54	0.01
C4 Chrysenes (a)	1214.00	---	0.00	0.19	0.19	0.00	0.00	0.27	0.27	0.00	0.00	0.15	0.15	0.00	0.04	1.92	1.92	0.00
C4-Naphthalenes (a)	657.00	---	0.01	0.77	0.77	0.00	0.01	0.77	0.77	0.00	0.00	0.61	0.61	0.00	0.15	7.21	7.21	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.01	1.06	1.06	0.00	0.01	1.25	1.25	0.00	0.00	0.74	0.74	0.00	0.14	6.73	6.73	0.01
Chrysene (a)	844.00	826	0.01	1.25	1.25	0.00	0.02	1.44	1.44	0.00	0.01	1.48	1.48	0.00	0.61	29.33	29.33	0.03
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.11	0.11	0.00	0.00	0.13	0.13	0.00	0.00	0.06	0.06	0.00	0.06	3.08	3.08	0.00
Fluoranthene (a)	707.00	23,870.00	0.01	1.15	1.15	0.00	0.01	1.35	1.35	0.00	0.00	0.47	0.47	0.00	1.10	52.88	52.88	0.07
Fluorene (a)	538.00	26,000.00	0.00	0.04	0.04	0.00	0.00	0.05	0.05	0.00	0.00	0.15	0.15	0.00	0.14	6.73	6.73	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.22	0.22	0.00	0.00	0.28	0.28	0.00	0.00	0.09	0.09	0.00	0.24	11.54	11.54	0.01
Naphthalene (a)	385.00	61,700.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.47	0.47	0.00	0.08	3.61	3.61	0.01
Perylene (a)	967.00	431.00	0.01	1.15	1.15	0.00	0.03	2.40	2.40	0.00	0.00	0.53	0.53	0.00	0.11	5.29	5.29	0.01
Phenanthrene (a)	596	34300	0.01	0.50	0.50	0.00	0.01	0.51	0.51	0.00	0.02	4.45	4.45	0.01	0.35	16.83	16.83	0.03
Pyrene (a)	697.00	9,090.00	0.01	1.15	1.15	0.00	0.01	1.35	1.35	0.00	0.01	1.59	1.59	0.00	0.75	36.06	36.06	0.05
	---	**ESBTU FCVi**	---	---	---	0.02	---	---	---	0.03	---	---	---	0.04	---	---	---	0.49

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-46**				**CI13-46**				**CI13-46**				**CI13-47**			
		Field Sample ID	**CI13-46-0001**				**CI13-46-0103**				**CI13-46-0305**				**CI13-47-SURF**			
		Sample Depth	**0-1**				**1-3**				**3-5**				**0-0.5**			
		Sample Date	**09/27/2013**				**09/27/2013**				**09/27/2013**				**09/26/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	4.66	0.0466	---	---	3.39	0.0339	---	---	3.95	0.0395	---	---	6.77	0.0677	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	1.35	28.97	28.97	0.07	0.01	0.32	0.32	0.00	0.00	0.03	0.03	0.00	0.01	0.16	0.16	0.00
2-Methylnaphthalene	447.00	154800	1.35	28.97	28.97	0.06	0.11	3.24	3.24	0.01	0.01	0.29	0.29	0.00	0.14	2.07	2.07	0.00
Acenaphthene (a)	491.00	33400	0.09	1.93	1.93	0.00	0.06	1.65	1.65	0.00	0.00	0.03	0.03	0.00	0.02	0.35	0.35	0.00
Acenaphthylene (a)	452.00	24000	1.35	28.97	28.97	0.06	0.11	3.24	3.24	0.01	0.01	0.29	0.29	0.00	0.01	0.15	0.15	0.00
Anthracene (a)	594.00	1300	1.20	25.75	25.75	0.04	0.21	6.19	6.19	0.01	0.00	0.10	0.10	0.00	0.06	0.90	0.90	0.00
Benzo(a)anthracene (a)	841.00	4153	4.70	100.86	100.86	0.12	0.61	17.99	17.99	0.02	0.01	0.30	0.30	0.00	0.67	9.90	9.90	0.01
Benzo(a)pyrene (a)	965.00	3840	1.50	32.19	32.19	0.03	0.35	10.32	10.32	0.01	0.01	0.16	0.16	0.00	0.91	13.44	13.44	0.01
Benzo(b)fluoranthene (a)	979.00	2169	1.40	30.04	30.04	0.03	0.40	11.80	11.80	0.01	0.01	0.24	0.24	0.00	1.60	23.63	23.63	0.02
Benzo(e)pyrene (a)	967.00	4300	2.90	62.23	62.23	0.06	0.37	10.91	10.91	0.01	0.01	0.24	0.24	0.00	0.99	14.62	14.62	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.67	14.38	14.38	0.01	0.17	5.01	5.01	0.00	0.01	0.22	0.22	0.00	0.56	8.27	8.27	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.58	12.45	12.45	0.01	0.25	7.37	7.37	0.01	0.00	0.12	0.12	0.00	1.30	19.20	19.20	0.02
C1 Chrysenes (a)	929.00	---	11.00	236.05	236.05	0.25	0.78	23.01	23.01	0.02	0.03	0.73	0.73	0.00	0.56	8.27	8.27	0.01
C1 Fluorenes (a)	611.00	---	1.80	38.63	38.63	0.06	0.17	5.01	5.01	0.01	0.01	0.13	0.13	0.00	0.14	2.07	2.07	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	17.00	364.81	364.81	0.47	1.60	47.20	47.20	0.06	0.05	1.24	1.24	0.00	0.88	13.00	13.00	0.02
C1-Naphthalenes (a)	444.00	---	1.35	28.97	28.97	0.07	0.11	3.24	3.24	0.01	0.01	0.29	0.29	0.00	0.14	2.07	2.07	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	40.00	858.37	858.37	1.28	1.60	47.20	47.20	0.07	0.07	1.75	1.75	0.00	0.25	3.69	3.69	0.01
C2 Chrysenes (a)	1008.00	---	7.00	150.21	150.21	0.15	0.60	17.70	17.70	0.02	0.03	0.76	0.76	0.00	0.54	7.98	7.98	0.01
C2 Fluorenes (a)	686.00	---	3.70	79.40	79.40	0.12	0.28	8.26	8.26	0.01	0.01	0.23	0.23	0.00	0.04	0.55	0.55	0.00
C2-Fluoranthenes/Pyrenes	---	---	12.00	257.51	257.51	---	1.10	32.45	32.45	---	0.04	0.94	0.94	---	0.58	8.57	8.57	---
C2-Naphthalenes (a)	510.00	---	1.40	30.04	30.04	0.06	0.19	5.60	5.60	0.01	0.02	0.38	0.38	0.00	0.06	0.95	0.95	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	18.00	386.27	386.27	0.52	1.00	29.50	29.50	0.04	0.05	1.29	1.29	0.00	0.24	3.55	3.55	0.00
C3 Chrysenes (a)	1112.00	---	2.50	53.65	53.65	0.05	0.21	6.19	6.19	0.01	0.02	0.38	0.38	0.00	0.28	4.14	4.14	0.00
C3 Fluorenes (a)	769.00	---	5.40	115.88	115.88	0.15	0.38	11.21	11.21	0.01	0.02	0.41	0.41	0.00	0.08	1.11	1.11	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	6.30	135.19	135.19	0.14	0.46	13.57	13.57	0.01	0.03	0.66	0.66	0.00	0.31	4.58	4.58	0.00
C3-Naphthalenes (a)	581.00	---	5.30	113.73	113.73	0.20	0.45	13.27	13.27	0.02	0.04	1.04	1.04	0.00	0.11	1.62	1.62	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	7.80	167.38	167.38	0.20	0.65	19.17	19.17	0.02	0.05	1.34	1.34	0.00	0.25	3.69	3.69	0.00
C4 Chrysenes (a)	1214.00	---	0.79	16.95	16.95	0.01	0.08	2.48	2.48	0.00	0.00	0.12	0.12	0.00	0.09	1.37	1.37	0.00
C4-Naphthalenes (a)	657.00	---	3.70	79.40	79.40	0.12	0.39	11.50	11.50	0.02	0.04	0.89	0.89	0.00	0.08	1.24	1.24	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	3.50	75.11	75.11	0.08	0.34	10.03	10.03	0.01	0.03	0.78	0.78	0.00	0.19	2.81	2.81	0.00
Chrysene (a)	844.00	826	8.30	178.11	178.11	0.21	0.86	25.37	25.37	0.03	0.02	0.58	0.58	0.00	1.20	17.73	17.73	0.02
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.38	8.15	8.15	0.01	0.05	1.56	1.56	0.00	0.00	0.05	0.05	0.00	0.14	2.07	2.07	0.00
Fluoranthene (a)	707.00	23,870.00	3.10	66.52	66.52	0.09	1.00	29.50	29.50	0.04	0.02	0.58	0.58	0.00	2.30	33.97	33.97	0.05
Fluorene (a)	538.00	26,000.00	0.72	15.45	15.45	0.03	0.11	3.24	3.24	0.01	0.00	0.11	0.11	0.00	0.04	0.56	0.56	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.34	7.30	7.30	0.01	0.13	3.83	3.83	0.00	0.00	0.11	0.11	0.00	0.55	8.12	8.12	0.01
Naphthalene (a)	385.00	61,700.00	1.35	28.97	28.97	0.08	0.11	3.24	3.24	0.01	0.01	0.29	0.29	0.00	0.14	2.07	2.07	0.01
Perylene (a)	967.00	431.00	1.35	28.97	28.97	0.03	0.17	5.01	5.01	0.01	0.13	3.29	3.29	0.00	0.24	3.55	3.55	0.00
Phenanthrene (a)	596	34300	18.00	386.27	386.27	0.65	1.20	35.40	35.40	0.06	0.03	0.73	0.73	0.00	0.37	5.47	5.47	0.01
Pyrene (a)	697.00	9,090.00	8.70	186.70	186.70	0.27	1.40	41.30	41.30	0.06	0.04	0.89	0.89	0.00	1.30	19.20	19.20	0.03
	---	**ESBTU FCVi**	---	---	---	4.64	---	---	---	0.54	---	---	---	0.02	---	---	---	0.26

5.42

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-47**				**CI13-47**				**CI13-47**				**CI13-47**		
		Field Sample ID	**CI13-47-0001**				**CI13-47-0103**				**CI13-47-0305**				**CI13-47-0507**		
		Sample Depth	**0-1**				**1-3**				**3-5**				**5-7**		
		Sample Date	**09/27/2013**				**09/27/2013**				**09/27/2013**				**09/27/2013**		
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	3.8	0.038	---	---	4.33	0.0433	---	---	9.14	0.0914	---	---	10.4	0.104	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.01	0.22	0.22	0.00	0.00	0.06	0.06	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00
2-Methylnaphthalene	447.00	154800	0.08	2.11	2.11	0.00	0.01	0.30	0.30	0.00	0.01	0.10	0.10	0.00	0.01	0.07	0.07	0.00
Acenaphthene (a)	491.00	33400	0.01	0.24	0.24	0.00	0.00	0.07	0.07	0.00	0.01	0.10	0.10	0.00	0.01	0.07	0.07	0.00
Acenaphthylene (a)	452.00	24000	0.01	0.25	0.25	0.00	0.00	0.11	0.11	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Anthracene (a)	594.00	1300	0.05	1.42	1.42	0.00	0.01	0.21	0.21	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00
Benzo(a)anthracene (a)	841.00	4153	0.56	14.74	14.74	0.02	0.08	1.80	1.80	0.00	0.01	0.08	0.08	0.00	0.00	0.03	0.03	0.00
Benzo(a)pyrene (a)	965.00	3840	0.34	8.95	8.95	0.01	0.08	1.82	1.82	0.00	0.01	0.07	0.07	0.00	0.00	0.04	0.04	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.54	14.21	14.21	0.01	0.08	1.92	1.92	0.00	0.01	0.11	0.11	0.00	0.01	0.07	0.07	0.00
Benzo(e)pyrene (a)	967.00	4300	0.63	16.58	16.58	0.02	0.06	1.45	1.45	0.00	0.01	0.08	0.08	0.00	0.00	0.05	0.05	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.29	7.63	7.63	0.01	0.06	1.39	1.39	0.00	0.01	0.08	0.08	0.00	0.00	0.05	0.05	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.25	6.58	6.58	0.01	0.07	1.57	1.57	0.00	0.01	0.08	0.08	0.00	0.01	0.05	0.05	0.00
C1 Chrysenes (a)	929.00	---	1.50	39.47	39.47	0.04	0.10	2.26	2.26	0.00	0.02	0.16	0.16	0.00	0.01	0.09	0.09	0.00
C1 Fluorenes (a)	611.00	---	0.06	1.58	1.58	0.00	0.01	0.30	0.30	0.00	0.00	0.03	0.03	0.00	0.00	0.01	0.01	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	2.40	63.16	63.16	0.08	0.17	3.93	3.93	0.01	0.03	0.28	0.28	0.00	0.02	0.15	0.15	0.00
C1-Naphthalenes (a)	444.00	---	0.08	2.11	2.11	0.00	0.00	0.09	0.09	0.00	0.01	0.10	0.10	0.00	0.01	0.07	0.07	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.95	25.00	25.00	0.04	0.12	2.77	2.77	0.00	0.02	0.22	0.22	0.00	0.02	0.15	0.15	0.00
C2 Chrysenes (a)	1008.00	---	0.95	25.00	25.00	0.02	0.08	1.94	1.94	0.00	0.02	0.24	0.24	0.00	0.02	0.15	0.15	0.00
C2 Fluorenes (a)	686.00	---	0.22	5.79	5.79	0.01	0.01	0.25	0.25	0.00	0.00	0.04	0.04	0.00	0.00	0.02	0.02	0.00
C2-Fluoranthenes/Pyrenes	---	---	2.00	52.63	52.63	---	0.10	2.31	2.31	---	0.02	0.16	0.16	---	0.01	0.10	0.10	---
C2-Naphthalenes (a)	510.00	---	0.19	5.00	5.00	0.01	0.03	0.79	0.79	0.00	0.02	0.16	0.16	0.00	0.01	0.06	0.06	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	1.30	34.21	34.21	0.05	0.08	1.92	1.92	0.00	0.02	0.20	0.20	0.00	0.01	0.13	0.13	0.00
C3 Chrysenes (a)	1112.00	---	0.34	8.95	8.95	0.01	0.03	0.79	0.79	0.00	0.01	0.10	0.10	0.00	0.01	0.07	0.07	0.00
C3 Fluorenes (a)	769.00	---	0.49	12.89	12.89	0.02	0.03	0.67	0.67	0.00	0.01	0.10	0.10	0.00	0.01	0.06	0.06	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	1.00	26.32	26.32	0.03	0.06	1.29	1.29	0.00	0.01	0.14	0.14	0.00	0.01	0.10	0.10	0.00
C3-Naphthalenes (a)	581.00	---	0.51	13.42	13.42	0.02	0.06	1.48	1.48	0.00	0.03	0.31	0.31	0.00	0.01	0.08	0.08	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	1.10	28.95	28.95	0.03	0.09	1.96	1.96	0.00	0.02	0.23	0.23	0.00	0.01	0.12	0.12	0.00
C4 Chrysenes (a)	1214.00	---	0.11	2.89	2.89	0.00	0.01	0.25	0.25	0.00	0.01	0.10	0.10	0.00	0.01	0.07	0.07	0.00
C4-Naphthalenes (a)	657.00	---	0.43	11.32	11.32	0.02	0.04	0.90	0.90	0.00	0.02	0.19	0.19	0.00	0.01	0.07	0.07	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.59	15.53	15.53	0.02	0.05	1.11	1.11	0.00	0.01	0.14	0.14	0.00	0.01	0.09	0.09	0.00
Chrysene (a)	844.00	826	1.30	34.21	34.21	0.04	0.10	2.24	2.24	0.00	0.01	0.14	0.14	0.00	0.01	0.08	0.08	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.10	2.55	2.55	0.00	0.02	0.37	0.37	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00
Fluoranthene (a)	707.00	23,870.00	0.81	21.32	21.32	0.03	0.17	3.93	3.93	0.01	0.02	0.26	0.26	0.00	0.02	0.15	0.15	0.00
Fluorene (a)	538.00	26,000.00	0.03	0.76	0.76	0.00	0.01	0.13	0.13	0.00	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.22	5.79	5.79	0.01	0.05	1.20	1.20	0.00	0.01	0.06	0.06	0.00	0.00	0.04	0.04	0.00
Naphthalene (a)	385.00	61,700.00	0.08	2.11	2.11	0.01	0.01	0.30	0.30	0.00	0.01	0.10	0.10	0.00	0.01	0.07	0.07	0.00
Perylene (a)	967.00	431.00	0.12	3.16	3.16	0.00	0.13	3.00	3.00	0.00	0.10	1.06	1.06	0.00	0.07	0.68	0.68	0.00
Phenanthrene (a)	596	34300	0.30	7.89	7.89	0.01	0.11	2.54	2.54	0.00	0.01	0.10	0.10	0.00	0.01	0.07	0.07	0.00
Pyrene (a)	697.00	9,090.00	1.30	34.21	34.21	0.05	0.16	3.70	3.70	0.01	0.02	0.23	0.23	0.00	0.01	0.12	0.12	0.00
	---	**ESBTU FCVi**	---	---	---	0.47	---	---	---	0.05	---	---	---	0.00	---	---	---	0.00

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-48**				**CI13-48**				**CI13-48**				**CI13-48**			
		Field Sample ID	**CI13-48-SURF**				**CI13-48-0001**				**CI13-48-0001-FD**				**CI13-48-0103**			
		Sample Depth	**0-0.5**				**0-1**				**0-1**				**1-3**			
		Sample Date	**09/26/2013**				**09/28/2013**				**09/28/2013**				**09/28/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	12.3	0.123	---	---	10	0.1	---	---	12.8	0.128	---	---	7.49	0.0749	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.03	0.25	0.25	0.00	0.13	1.25	1.25	0.00	0.15	1.17	1.17	0.00	0.17	2.27	2.27	0.01
2-Methylnaphthalene	447.00	154800	0.19	1.50	1.50	0.00	0.13	1.25	1.25	0.00	0.15	1.17	1.17	0.00	0.17	2.27	2.27	0.01
Acenaphthene (a)	491.00	33400	0.05	0.44	0.44	0.00	0.13	1.30	1.30	0.00	0.15	1.17	1.17	0.00	0.11	1.47	1.47	0.00
Acenaphthylene (a)	452.00	24000	0.04	0.34	0.34	0.00	0.10	0.98	0.98	0.00	0.11	0.86	0.86	0.00	0.08	1.08	1.08	0.00
Anthracene (a)	594.00	1300	0.17	1.38	1.38	0.00	0.22	2.20	2.20	0.00	0.25	1.95	1.95	0.00	0.29	3.87	3.87	0.01
Benzo(a)anthracene (a)	841.00	4153	0.98	7.97	7.97	0.01	1.40	14.00	14.00	0.02	1.60	12.50	12.50	0.01	2.00	26.70	26.70	0.03
Benzo(a)pyrene (a)	965.00	3840	1.10	8.94	8.94	0.01	1.40	14.00	14.00	0.01	1.60	12.50	12.50	0.01	1.30	17.36	17.36	0.02
Benzo(b)fluoranthene (a)	979.00	2169	1.10	8.94	8.94	0.01	1.50	15.00	15.00	0.02	1.50	11.72	11.72	0.01	1.40	18.69	18.69	0.02
Benzo(e)pyrene (a)	967.00	4300	0.87	7.07	7.07	0.01	1.40	14.00	14.00	0.01	1.50	11.72	11.72	0.01	1.60	21.36	21.36	0.02
Benzo(g,h,i)perylene (a)	1095.00	648	0.64	5.20	5.20	0.00	0.62	6.20	6.20	0.01	0.64	5.00	5.00	0.00	0.51	6.81	6.81	0.01
Benzo(k)fluoranthene (a)	981.00	1220	0.96	7.80	7.80	0.01	1.00	10.00	10.00	0.01	1.30	10.16	10.16	0.01	0.97	12.95	12.95	0.01
C1 Chrysenes (a)	929.00	---	1.10	8.94	8.94	0.01	2.60	26.00	26.00	0.03	2.70	21.09	21.09	0.02	4.40	58.74	58.74	0.06
C1 Fluorenes (a)	611.00	---	0.19	1.50	1.50	0.00	0.27	2.70	2.70	0.00	0.26	2.03	2.03	0.00	0.30	4.01	4.01	0.01
C1-Fluoranthenes/Pyrenes (a)	770.00	---	1.10	8.94	8.94	0.01	2.80	28.00	28.00	0.04	2.90	22.66	22.66	0.03	5.30	70.76	70.76	0.09
C1-Naphthalenes (a)	444.00	---	0.05	0.44	0.44	0.00	0.17	1.70	1.70	0.00	0.17	1.33	1.33	0.00	0.14	1.87	1.87	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.52	4.23	4.23	0.01	3.40	34.00	34.00	0.05	3.40	26.56	26.56	0.04	5.70	76.10	76.10	0.11
C2 Chrysenes (a)	1008.00	---	1.00	8.13	8.13	0.01	3.30	33.00	33.00	0.03	3.40	26.56	26.56	0.03	4.70	62.75	62.75	0.06
C2 Fluorenes (a)	686.00	---	0.06	0.51	0.51	0.00	0.97	9.70	9.70	0.01	0.85	6.64	6.64	0.01	0.83	11.08	11.08	0.02
C2-Fluoranthenes/Pyrenes	---	---	0.77	6.26	6.26	---	2.80	28.00	28.00	---	2.80	21.88	21.88	---	4.70	62.75	62.75	---
C2-Naphthalenes (a)	510.00	---	0.19	1.54	1.54	0.00	1.00	10.00	10.00	0.02	1.00	7.81	7.81	0.02	0.92	12.28	12.28	0.02
C2-Phenanthrenes/Anthracenes (a)	746	---	0.51	4.15	4.15	0.01	5.30	53.00	53.00	0.07	5.00	39.06	39.06	0.05	6.20	82.78	82.78	0.11
C3 Chrysenes (a)	1112.00	---	0.59	4.80	4.80	0.00	1.60	16.00	16.00	0.01	1.50	11.72	11.72	0.01	1.80	24.03	24.03	0.02
C3 Fluorenes (a)	769.00	---	0.18	1.46	1.46	0.00	2.80	28.00	28.00	0.04	2.60	20.31	20.31	0.03	2.30	30.71	30.71	0.04
C3-Fluoranthenes/Pyrenes	949.00	---	0.55	4.47	4.47	0.00	2.50	25.00	25.00	0.03	2.50	19.53	19.53	0.02	3.70	49.40	49.40	0.05
C3-Naphthalenes (a)	581.00	---	0.23	1.87	1.87	0.00	3.20	32.00	32.00	0.06	3.00	23.44	23.44	0.04	2.60	34.71	34.71	0.06
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.60	4.88	4.88	0.01	5.40	54.00	54.00	0.07	5.40	42.19	42.19	0.05	6.50	86.78	86.78	0.10
C4 Chrysenes (a)	1214.00	---	0.21	1.71	1.71	0.00	0.90	9.00	9.00	0.01	0.74	5.78	5.78	0.00	0.72	9.61	9.61	0.01
C4-Naphthalenes (a)	657.00	---	0.21	1.71	1.71	0.00	4.80	48.00	48.00	0.07	4.10	32.03	32.03	0.05	2.80	37.38	37.38	0.06
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.49	3.98	3.98	0.00	3.40	34.00	34.00	0.04	3.30	25.78	25.78	0.03	4.30	57.41	57.41	0.06
Chrysene (a)	844.00	826	1.10	8.94	8.94	0.01	1.80	18.00	18.00	0.02	2.10	16.41	16.41	0.02	2.90	38.72	38.72	0.05
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.19	1.54	1.54	0.00	0.20	2.00	2.00	0.00	0.23	1.80	1.80	0.00	0.20	2.67	2.67	0.00
Fluoranthene (a)	707.00	23,870.00	1.90	15.45	15.45	0.02	2.10	21.00	21.00	0.03	2.20	17.19	17.19	0.02	2.30	30.71	30.71	0.04
Fluorene (a)	538.00	26,000.00	0.09	0.76	0.76	0.00	0.19	1.90	1.90	0.00	0.16	1.25	1.25	0.00	0.22	2.94	2.94	0.01
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.56	4.55	4.55	0.00	0.51	5.10	5.10	0.00	0.56	4.38	4.38	0.00	0.40	5.34	5.34	0.00
Naphthalene (a)	385.00	61,700.00	0.19	1.50	1.50	0.00	0.13	1.25	1.25	0.00	0.15	1.17	1.17	0.00	0.17	2.27	2.27	0.01
Perylene (a)	967.00	431.00	0.29	2.36	2.36	0.00	0.31	3.10	3.10	0.00	0.33	2.58	2.58	0.00	0.24	3.20	3.20	0.00
Phenanthrene (a)	596	34300	0.71	5.77	5.77	0.01	0.89	8.90	8.90	0.01	1.00	7.81	7.81	0.01	1.90	25.37	25.37	0.04
Pyrene (a)	697.00	9,090.00	1.20	9.76	9.76	0.01	1.70	17.00	17.00	0.02	1.70	13.28	13.28	0.02	2.70	36.05	36.05	0.05
	---	**ESBTU FCVi**	---	---	---	0.16	---	---	---	0.51	---	---	---	0.40	---	---	---	0.87

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	CI13-48				CI13-48				CI13-48				CI13-49			
		Field Sample ID	CI13-48-0103-FD				CI13-48-0305				CI13-48-0305-FD				CI13-49-SURF			
		Sample Depth	1-3				3-5				3-5				0-0.5			
		Sample Date	09/28/2013				09/28/2013				09/28/2013				09/26/2013			
	Coc, PAHi, FCVi[a]	Coc, PAHi, Maxi[a]	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi	µg/g Dry wt	µg/g oc	Coc[b]	ESBTU FCVi
Total Organic Carbon**	--	--	8.2	0.082	---	---	3.54	0.0354	---	---	5.51	0.0551	---	---	13.3	0.133	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.16	1.95	1.95	0.00	0.12	3.39	3.39	0.01	0.01	0.13	0.13	0.00	0.04	0.26	0.26	0.00
2-Methylnaphthalene	447.00	154800	0.16	1.95	1.95	0.00	0.12	3.39	3.39	0.01	0.01	0.18	0.18	0.00	0.14	1.05	1.05	0.00
Acenaphthene (a)	491.00	33400	0.09	1.13	1.13	0.00	0.01	0.34	0.34	0.00	0.01	0.25	0.25	0.00	0.05	0.34	0.34	0.00
Acenaphthylene (a)	452.00	24000	0.07	0.80	0.80	0.00	0.01	0.22	0.22	0.00	0.01	0.12	0.12	0.00	0.05	0.36	0.36	0.00
Anthracene (a)	594.00	1300	0.22	2.68	2.68	0.00	0.10	2.68	2.68	0.00	0.09	1.62	1.62	0.00	0.13	0.98	0.98	0.00
Benzo(a)anthracene (a)	841.00	4153	1.60	19.51	19.51	0.02	0.64	18.08	18.08	0.02	0.66	11.98	11.98	0.01	0.87	6.54	6.54	0.01
Benzo(a)pyrene (a)	965.00	3840	1.10	13.41	13.41	0.01	0.12	3.39	3.39	0.00	0.22	3.99	3.99	0.00	0.95	7.14	7.14	0.01
Benzo(b)fluoranthene (a)	979.00	2169	1.20	14.63	14.63	0.01	0.26	7.34	7.34	0.01	0.28	5.08	5.08	0.01	1.00	7.52	7.52	0.01
Benzo(e)pyrene (a)	967.00	4300	1.30	15.85	15.85	0.02	0.40	11.30	11.30	0.01	0.43	7.80	7.80	0.01	0.79	5.94	5.94	0.01
Benzo(g,h,i)perylene (a)	1095.00	648	0.49	5.98	5.98	0.01	0.08	2.18	2.18	0.00	0.09	1.62	1.62	0.00	0.57	4.29	4.29	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.78	9.51	9.51	0.01	0.12	3.39	3.39	0.00	0.12	2.18	2.18	0.00	0.81	6.09	6.09	0.01
C1 Chrysenes (a)	929.00	---	3.60	43.90	43.90	0.05	1.60	45.20	45.20	0.05	1.60	29.04	29.04	0.03	1.00	7.52	7.52	0.01
C1 Fluorenes (a)	611.00	---	0.23	2.80	2.80	0.00	0.12	3.39	3.39	0.01	0.13	2.36	2.36	0.00	0.14	1.05	1.05	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	3.70	45.12	45.12	0.06	2.20	62.15	62.15	0.08	2.40	43.56	43.56	0.06	1.00	7.52	7.52	0.01
C1-Naphthalenes (a)	444.00	---	0.12	1.46	1.46	0.00	0.12	3.39	3.39	0.01	0.09	1.54	1.54	0.00	0.06	0.47	0.47	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	3.70	45.12	45.12	0.07	3.50	98.87	98.87	0.15	3.40	61.71	61.71	0.09	0.52	3.91	3.91	0.01
C2 Chrysenes (a)	1008.00	---	3.50	42.68	42.68	0.04	1.10	31.07	31.07	0.03	1.20	21.78	21.78	0.02	0.93	6.99	6.99	0.01
C2 Fluorenes (a)	686.00	---	0.63	7.68	7.68	0.01	0.35	9.89	9.89	0.01	0.37	6.72	6.72	0.01	0.06	0.42	0.42	0.00
C2-Fluoranthenes/Pyrenes	---	---	3.60	43.90	43.90	---	1.70	48.02	48.02	---	1.90	34.48	34.48	---	0.77	5.79	5.79	---
C2-Naphthalenes (a)	510.00	---	0.81	9.88	9.88	0.02	0.22	6.21	6.21	0.01	0.23	4.17	4.17	0.01	0.21	1.58	1.58	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	4.40	53.66	53.66	0.07	2.20	62.15	62.15	0.08	2.20	39.93	39.93	0.05	0.54	4.06	4.06	0.01
C3 Chrysenes (a)	1112.00	---	1.60	19.51	19.51	0.02	0.35	9.89	9.89	0.01	0.42	7.62	7.62	0.01	0.58	4.36	4.36	0.00
C3 Fluorenes (a)	769.00	---	1.80	21.95	21.95	0.03	0.62	17.51	17.51	0.02	0.60	10.89	10.89	0.01	0.18	1.35	1.35	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	3.00	36.59	36.59	0.04	1.00	28.25	28.25	0.03	1.20	21.78	21.78	0.02	0.55	4.14	4.14	0.00
C3-Naphthalenes (a)	581.00	---	2.20	26.83	26.83	0.05	0.70	19.77	19.77	0.03	0.58	10.53	10.53	0.02	0.24	1.80	1.80	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	5.20	63.41	63.41	0.08	1.10	31.07	31.07	0.04	1.30	23.59	23.59	0.03	0.60	4.51	4.51	0.01
C4 Chrysenes (a)	1214.00	---	0.63	7.68	7.68	0.01	0.14	3.95	3.95	0.00	0.16	2.90	2.90	0.00	0.24	1.80	1.80	0.00
C4-Naphthalenes (a)	657.00	---	2.50	30.49	30.49	0.05	0.55	15.54	15.54	0.02	0.65	11.80	11.80	0.02	0.22	1.65	1.65	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	3.50	42.68	42.68	0.05	0.55	15.54	15.54	0.02	0.72	13.07	13.07	0.01	0.47	3.53	3.53	0.00
Chrysene (a)	844.00	826	2.20	26.83	26.83	0.03	1.20	33.90	33.90	0.04	1.20	21.78	21.78	0.03	1.10	8.27	8.27	0.01
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.19	2.32	2.32	0.00	0.04	1.16	1.16	0.00	0.05	0.83	0.83	0.00	0.17	1.28	1.28	0.00
Fluoranthene (a)	707.00	23,870.00	1.80	21.95	21.95	0.03	0.51	14.41	14.41	0.02	0.48	8.71	8.71	0.01	1.50	11.28	11.28	0.02
Fluorene (a)	538.00	26,000.00	0.18	2.20	2.20	0.00	0.06	1.72	1.72	0.00	0.06	1.07	1.07	0.00	0.06	0.48	0.48	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.39	4.76	4.76	0.00	0.05	1.53	1.53	0.00	0.06	1.02	1.02	0.00	0.51	3.83	3.83	0.00
Naphthalene (a)	385.00	61,700.00	0.16	1.95	1.95	0.01	0.12	3.39	3.39	0.01	0.01	0.17	0.17	0.00	0.14	1.05	1.05	0.00
Perylene (a)	967.00	431.00	0.24	2.93	2.93	0.00	0.03	0.71	0.71	0.00	0.03	0.51	0.51	0.00	0.26	1.95	1.95	0.00
Phenanthrene (a)	596	34300	1.40	17.07	17.07	0.03	1.20	33.90	33.90	0.06	1.30	23.59	23.59	0.04	0.48	3.61	3.61	0.01
Pyrene (a)	697.00	9,090.00	1.90	23.17	23.17	0.03	1.00	28.25	28.25	0.04	1.10	19.96	19.96	0.03	0.99	7.44	7.44	0.01
	---	**ESBTU FCVi**	---	---	---	0.60	---	---	---	0.64	---	---	---	0.42	---	---	---	0.13

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-49**				**CI13-49**				**CI13-49**				**CI13-49**			
		Field Sample ID	**CI13-49-0001**				**CI13-49-0103**				**CI13-49-0305**				**CI13-49-0507**			
		Sample Depth	**0-1**				**1-3**				**3-5**				**5-7**			
		Sample Date	**09/29/2013**				**09/29/2013**				**09/29/2013**				**09/29/2013**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	16.3	0.163	---	---	12.2	0.122	---	---	9.02	0.0902	---	---	11.3	0.113	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.06	0.39	0.39	0.00	0.10	0.82	0.82	0.00	0.15	1.66	1.66	0.00	0.02	0.14	0.14	0.00
2-Methylnaphthalene	447.00	154800	0.11	0.67	0.67	0.00	0.16	1.31	1.31	0.00	0.13	1.44	1.44	0.00	0.02	0.17	0.17	0.00
Acenaphthene (a)	491.00	33400	0.12	0.74	0.74	0.00	0.19	1.56	1.56	0.00	0.24	2.66	2.66	0.01	0.04	0.38	0.38	0.00
Acenaphthylene (a)	452.00	24000	0.08	0.48	0.48	0.00	0.14	1.15	1.15	0.00	0.09	1.00	1.00	0.00	0.02	0.16	0.16	0.00
Anthracene (a)	594.00	1300	0.18	1.10	1.10	0.00	0.35	2.87	2.87	0.00	0.45	4.99	4.99	0.01	0.12	1.06	1.06	0.00
Benzo(a)anthracene (a)	841.00	4153	1.70	10.43	10.43	0.01	3.20	26.23	26.23	0.03	2.70	29.93	29.93	0.04	1.20	10.62	10.62	0.01
Benzo(a)pyrene (a)	965.00	3840	1.50	9.20	9.20	0.01	3.00	24.59	24.59	0.03	1.90	21.06	21.06	0.02	0.52	4.60	4.60	0.00
Benzo(b)fluoranthene (a)	979.00	2169	1.90	11.66	11.66	0.01	3.00	24.59	24.59	0.03	2.10	23.28	23.28	0.02	0.61	5.40	5.40	0.01
Benzo(e)pyrene (a)	967.00	4300	1.40	8.59	8.59	0.01	2.90	23.77	23.77	0.02	1.80	19.96	19.96	0.02	0.86	7.61	7.61	0.01
Benzo(g,h,i)perylene (a)	1095.00	648	0.84	5.15	5.15	0.00	1.50	12.30	12.30	0.01	1.10	12.20	12.20	0.01	0.24	2.12	2.12	0.00
Benzo(k)fluoranthene (a)	981.00	1220	1.20	7.36	7.36	0.01	2.30	18.85	18.85	0.02	1.50	16.63	16.63	0.02	0.38	3.36	3.36	0.00
C1 Chrysenes (a)	929.00	---	2.20	13.50	13.50	0.01	5.30	43.44	43.44	0.05	4.50	49.89	49.89	0.05	2.60	23.01	23.01	0.02
C1 Fluorenes (a)	611.00	---	0.14	0.86	0.86	0.00	0.38	3.11	3.11	0.01	0.25	2.77	2.77	0.00	0.13	1.15	1.15	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	3.00	18.40	18.40	0.02	7.00	57.38	57.38	0.07	5.40	59.87	59.87	0.08	4.00	35.40	35.40	0.05
C1-Naphthalenes (a)	444.00	---	0.12	0.74	0.74	0.00	0.18	1.48	1.48	0.00	0.19	2.11	2.11	0.00	0.17	1.46	1.46	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	2.00	12.27	12.27	0.02	5.20	42.62	42.62	0.06	4.60	51.00	51.00	0.08	2.80	24.78	24.78	0.04
C2 Chrysenes (a)	1008.00	---	2.50	15.34	15.34	0.02	5.70	46.72	46.72	0.05	4.70	52.11	52.11	0.05	2.00	17.70	17.70	0.02
C2 Fluorenes (a)	686.00	---	0.45	2.76	2.76	0.00	1.20	9.84	9.84	0.01	0.90	9.98	9.98	0.01	0.39	3.45	3.45	0.01
C2-Fluoranthenes/Pyrenes	---	---	2.90	17.79	17.79	---	6.60	54.10	54.10	---	5.30	58.76	58.76	---	3.30	29.20	29.20	---
C2-Naphthalenes (a)	510.00	---	0.58	3.56	3.56	0.01	1.50	12.30	12.30	0.02	1.50	16.63	16.63	0.03	0.39	3.45	3.45	0.01
C2-Phenanthrenes/Anthracenes (a)	746	---	2.70	16.56	16.56	0.02	7.60	62.30	62.30	0.08	7.90	87.58	87.58	0.12	2.50	22.12	22.12	0.03
C3 Chrysenes (a)	1112.00	---	0.85	5.21	5.21	0.00	2.10	17.21	17.21	0.02	2.20	24.39	24.39	0.02	0.79	6.99	6.99	0.01
C3 Fluorenes (a)	769.00	---	1.40	8.59	8.59	0.01	3.50	28.69	28.69	0.04	3.00	33.26	33.26	0.04	0.79	6.99	6.99	0.01
C3-Fluoranthenes/Pyrenes	949.00	---	2.10	12.88	12.88	0.01	4.90	40.16	40.16	0.04	4.90	54.32	54.32	0.06	2.00	17.70	17.70	0.02
C3-Naphthalenes (a)	581.00	---	1.40	8.59	8.59	0.01	4.40	36.07	36.07	0.06	4.10	45.45	45.45	0.08	0.89	7.88	7.88	0.01
C3-Phenanthrenes/Anthracenes (a)	829.00	---	4.30	26.38	26.38	0.03	12.00	98.36	98.36	0.12	10.00	110.86	110.86	0.13	2.80	24.78	24.78	0.03
C4 Chrysenes (a)	1214.00	---	0.40	2.45	2.45	0.00	0.90	7.38	7.38	0.01	1.30	14.41	14.41	0.01	0.32	2.83	2.83	0.00
C4-Naphthalenes (a)	657.00	---	2.20	13.50	13.50	0.02	6.10	50.00	50.00	0.08	4.80	53.22	53.22	0.08	0.83	7.35	7.35	0.01
C4-Phenanthrenes/Anthracenes (a)	913.00	---	3.20	19.63	19.63	0.02	7.40	60.66	60.66	0.07	7.40	82.04	82.04	0.09	1.70	15.04	15.04	0.02
Chrysene (a)	844.00	826	2.00	12.27	12.27	0.01	4.00	32.79	32.79	0.04	3.40	37.69	37.69	0.04	1.90	16.81	16.81	0.02
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.26	1.60	1.60	0.00	0.41	3.36	3.36	0.00	0.35	3.88	3.88	0.00	0.10	0.85	0.85	0.00
Fluoranthene (a)	707.00	23,870.00	2.20	13.50	13.50	0.02	3.60	29.51	29.51	0.04	3.80	42.13	42.13	0.06	0.82	7.26	7.26	0.01
Fluorene (a)	538.00	26,000.00	0.11	0.67	0.67	0.00	0.19	1.56	1.56	0.00	0.33	3.66	3.66	0.01	0.08	0.67	0.67	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.73	4.48	4.48	0.00	1.10	9.02	9.02	0.01	0.90	9.98	9.98	0.01	0.16	1.42	1.42	0.00
Naphthalene (a)	385.00	61,700.00	0.15	0.92	0.92	0.00	0.21	1.72	1.72	0.00	0.20	2.22	2.22	0.01	0.02	0.19	0.19	0.00
Perylene (a)	967.00	431.00	0.40	2.45	2.45	0.00	0.70	5.74	5.74	0.01	0.47	5.21	5.21	0.01	0.08	0.74	0.74	0.00
Phenanthrene (a)	596	34300	0.78	4.79	4.79	0.01	1.40	11.48	11.48	0.02	1.50	16.63	16.63	0.03	0.75	6.64	6.64	0.01
Pyrene (a)	697.00	9,090.00	2.40	14.72	14.72	0.02	4.70	38.52	38.52	0.06	3.10	34.37	34.37	0.05	1.90	16.81	16.81	0.02
	---	**ESBTU FCVi**	---	---	---	0.27	---	---	---	0.79	---	---	---	0.91	---	---	---	0.28

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
sediment on an organic carbon basis; only the contribution up to the maximum
COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture
(EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-50**				**CI13-50**				**CI13-50**				**CI13-50**			
		Field Sample ID	**CI13-50-SURF**				**CI13-50-0001**				**CI13-50-0001-FD**				**CI13-50-0103**			
		Sample Depth	**0-0.5**				**0-1**				**0-1**				**1-3**			
		Sample Date	**09/27/2013**				**09/30/2013**				**09/30/2013**				**09/30/2013**			
	Coc, PAHi, FCVi[a] µg/g oc	**Coc, PAHi, Maxi[a] µg/g oc**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**	**Conc µg/g Dry wt**	**Coc µg/g oc**	**Final Coc[b]**	**ESBTU FCVi**
Total Organic Carbon**	--	--	3.45	0.0345	---	---	1.7	0.017	---	---	1.7	0.017	---	---	1.37	0.0137	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)																		
1-Methylnaphthalene	446.00	165700	0.03	0.72	0.72	0.00	0.01	0.82	0.82	0.00	0.01	0.76	0.76	0.00	0.00	0.15	0.15	0.00
2-Methylnaphthalene	447.00	154800	0.07	2.03	2.03	0.00	0.01	0.82	0.82	0.00	0.01	0.76	0.76	0.00	0.00	0.15	0.15	0.00
Acenaphthene (a)	491.00	33400	0.03	0.72	0.72	0.00	0.01	0.65	0.65	0.00	0.01	0.76	0.76	0.00	0.00	0.04	0.04	0.00
Acenaphthylene (a)	452.00	24000	0.03	0.93	0.93	0.00	0.01	0.65	0.65	0.00	0.01	0.58	0.58	0.00	0.00	0.05	0.05	0.00
Anthracene (a)	594.00	1300	0.10	2.84	2.84	0.00	0.05	2.94	2.94	0.00	0.04	2.24	2.24	0.00	0.00	0.12	0.12	0.00
Benzo(a)anthracene (a)	841.00	4153	0.41	11.88	11.88	0.01	0.10	5.88	5.88	0.01	0.09	5.29	5.29	0.01	0.01	0.61	0.61	0.00
Benzo(a)pyrene (a)	965.00	3840	0.47	13.62	13.62	0.01	0.10	5.82	5.82	0.01	0.09	5.41	5.41	0.01	0.01	0.56	0.56	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.50	14.49	14.49	0.01	0.09	5.35	5.35	0.01	0.08	4.88	4.88	0.00	0.01	0.46	0.46	0.00
Benzo(e)pyrene (a)	967.00	4300	0.35	10.14	10.14	0.01	0.07	3.82	3.82	0.00	0.06	3.59	3.59	0.00	0.01	0.47	0.47	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.34	9.86	9.86	0.01	0.07	3.94	3.94	0.00	0.06	3.53	3.53	0.00	0.01	0.48	0.48	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.37	10.72	10.72	0.01	0.08	4.47	4.47	0.00	0.06	3.71	3.71	0.00	0.01	0.37	0.37	0.00
C1 Chrysenes (a)	929.00	---	0.31	8.99	8.99	0.01	0.07	4.06	4.06	0.00	0.07	4.00	4.00	0.00	0.01	0.88	0.88	0.00
C1 Fluorenes (a)	611.00	---	0.02	0.49	0.49	0.00	0.01	0.82	0.82	0.00	0.01	0.51	0.51	0.00	0.00	0.13	0.13	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.46	13.33	13.33	0.02	0.13	7.65	7.65	0.01	0.12	7.06	7.06	0.01	0.02	1.24	1.24	0.00
C1-Naphthalenes (a)	444.00	---	0.04	1.28	1.28	0.00	0.01	0.49	0.49	0.00	0.01	0.57	0.57	0.00	0.00	0.09	0.09	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.26	7.54	7.54	0.01	0.11	6.47	6.47	0.01	0.11	6.47	6.47	0.01	0.02	1.53	1.53	0.00
C2 Chrysenes (a)	1008.00	---	0.24	6.96	6.96	0.01	0.05	2.82	2.82	0.00	0.05	2.76	2.76	0.00	0.02	1.09	1.09	0.00
C2 Fluorenes (a)	686.00	---	0.03	0.87	0.87	0.00	0.02	1.00	1.00	0.00	0.02	0.88	0.88	0.00	0.00	0.24	0.24	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.28	8.12	8.12	---	0.07	3.82	3.82	---	0.07	4.12	4.12	---	0.01	0.95	0.95	---
C2-Naphthalenes (a)	510.00	---	0.13	3.77	3.77	0.01	0.05	2.76	2.76	0.01	0.05	3.12	3.12	0.01	0.01	0.50	0.50	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.21	6.09	6.09	0.01	0.11	6.47	6.47	0.01	0.12	7.06	7.06	0.01	0.04	3.21	3.21	0.00
C3 Chrysenes (a)	1112.00	---	0.13	3.77	3.77	0.00	0.02	1.12	1.12	0.00	0.02	1.41	1.41	0.00	0.01	0.65	0.65	0.00
C3 Fluorenes (a)	769.00	---	0.04	1.19	1.19	0.00	0.03	1.88	1.88	0.00	0.04	2.29	2.29	0.00	0.01	0.58	0.58	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.17	4.93	4.93	0.01	0.04	2.35	2.35	0.00	0.05	2.65	2.65	0.00	0.01	0.95	0.95	0.00
C3-Naphthalenes (a)	581.00	---	0.15	4.35	4.35	0.01	0.09	5.41	5.41	0.01	0.09	5.24	5.24	0.01	0.02	1.75	1.75	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.23	6.67	6.67	0.01	0.09	5.35	5.35	0.01	0.11	6.47	6.47	0.01	0.04	2.55	2.55	0.00
C4 Chrysenes (a)	1214.00	---	0.05	1.39	1.39	0.00	0.01	0.39	0.39	0.00	0.01	0.35	0.35	0.00	0.00	0.21	0.21	0.00
C4-Naphthalenes (a)	657.00	---	0.10	2.78	2.78	0.00	0.08	4.47	4.47	0.01	0.08	4.88	4.88	0.01	0.04	2.55	2.55	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.27	7.83	7.83	0.01	0.05	3.06	3.06	0.00	0.06	3.53	3.53	0.00	0.02	1.24	1.24	0.00
Chrysene (a)	844.00	826	0.46	13.33	13.33	0.02	0.11	6.47	6.47	0.01	0.10	5.65	5.65	0.01	0.01	0.80	0.80	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.09	2.64	2.64	0.00	0.02	1.18	1.18	0.00	0.02	0.94	0.94	0.00	0.00	0.09	0.09	0.00
Fluoranthene (a)	707.00	23,870.00	0.66	19.13	19.13	0.03	0.20	11.76	11.76	0.02	0.18	10.59	10.59	0.02	0.01	0.88	0.88	0.00
Fluorene (a)	538.00	26,000.00	0.05	1.30	1.30	0.00	0.02	0.88	0.88	0.00	0.02	0.94	0.94	0.00	0.00	0.10	0.10	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.28	8.12	8.12	0.01	0.06	3.35	3.35	0.00	0.05	3.00	3.00	0.00	0.00	0.27	0.27	0.00
Naphthalene (a)	385.00	61,700.00	0.07	2.03	2.03	0.01	0.01	0.82	0.82	0.00	0.01	0.76	0.76	0.00	0.00	0.15	0.15	0.00
Perylene (a)	967.00	431.00	0.10	2.90	2.90	0.00	0.05	2.71	2.71	0.00	0.04	2.18	2.18	0.00	0.02	1.75	1.75	0.00
Phenanthrene (a)	596	34300	0.28	8.12	8.12	0.01	0.10	5.82	5.82	0.01	0.10	5.88	5.88	0.01	0.01	0.36	0.36	0.00
Pyrene (a)	697.00	9,090.00	0.49	14.20	14.20	0.02	0.13	7.65	7.65	0.01	0.13	7.65	7.65	0.01	0.01	0.80	0.80	0.00
	---	**ESBTU FCVi**	---	---	---	0.24	---	---	---	0.14	---	---	---	0.13	---	---	---	0.02

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 EQUILIBRIUM SEDIMENT BENCHMARKS FOR POLYAROMATIC HYDROCARBONS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

		Location ID	**CI13-50**				**CI13-50**				**CI13-50**			
		Field Sample ID	**CI13-50-0103-FD**				**CI13-50-0305**				**CI13-50-0507**			
		Sample Depth	**1-3**				**3-5**				**5-7**			
		Sample Date	**09/30/2013**				**09/30/2013**				**09/30/2013**			
	Coc, PAHi, FCVi^{a}	**Coc, PAHi, Maxi^{a}**	**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**		**Conc**	**Coc**	**Final**	
	µg/g oc	**µg/g oc**	**µg/g Dry wt**	**µg/g oc**	**Coc^{b}**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc^{b}**	**ESBTU FCVi**	**µg/g Dry wt**	**µg/g oc**	**Coc^{b}**	**ESBTU FCVi**
Total Organic Carbon**	--	--	1.32	0.0132	---	---	1.79	0.0179	---	---	3.44	0.0344	---	---
Enriched Polycyclic Aromatic Hydrocarbons (EPAH) (µg/kg)														
1-Methylnaphthalene	446.00	165700	0.00	0.16	0.16	0.00	0.00	0.19	0.19	0.00	0.00	0.06	0.06	0.00
2-Methylnaphthalene	447.00	154800	0.00	0.16	0.16	0.00	0.00	0.19	0.19	0.00	0.00	0.06	0.06	0.00
Acenaphthene (a)	491.00	33400	0.00	0.07	0.07	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00
Acenaphthylene (a)	452.00	24000	0.00	0.06	0.06	0.00	0.00	0.19	0.19	0.00	0.00	0.06	0.06	0.00
Anthracene (a)	594.00	1300	0.00	0.20	0.20	0.00	0.00	0.02	0.02	0.00	0.00	0.06	0.06	0.00
Benzo(a)anthracene (a)	841.00	4153	0.01	0.55	0.55	0.00	0.00	0.08	0.08	0.00	0.00	0.03	0.03	0.00
Benzo(a)pyrene (a)	965.00	3840	0.01	0.48	0.48	0.00	0.00	0.06	0.06	0.00	0.00	0.02	0.02	0.00
Benzo(b)fluoranthene (a)	979.00	2169	0.01	0.53	0.53	0.00	0.00	0.16	0.16	0.00	0.00	0.06	0.06	0.00
Benzo(e)pyrene (a)	967.00	4300	0.01	0.45	0.45	0.00	0.00	0.17	0.17	0.00	0.00	0.08	0.08	0.00
Benzo(g,h,i)perylene (a)	1095.00	648	0.01	0.42	0.42	0.00	0.00	0.18	0.18	0.00	0.00	0.10	0.10	0.00
Benzo(k)fluoranthene (a)	981.00	1220	0.01	0.38	0.38	0.00	0.00	0.08	0.08	0.00	0.00	0.02	0.02	0.00
C1 Chrysenes (a)	929.00	---	0.01	0.83	0.83	0.00	0.01	0.54	0.54	0.00	0.01	0.24	0.24	0.00
C1 Fluorenes (a)	611.00	---	0.00	0.14	0.14	0.00	0.00	0.10	0.10	0.00	0.00	0.04	0.04	0.00
C1-Fluoranthenes/Pyrenes (a)	770.00	---	0.02	1.14	1.14	0.00	0.01	0.53	0.53	0.00	0.01	0.26	0.26	0.00
C1-Naphthalenes (a)	444.00	---	0.00	0.13	0.13	0.00	0.00	0.08	0.08	0.00	0.00	0.06	0.06	0.00
C1-Phenanthrenes/Anthracenes (a)	670.00	---	0.02	1.67	1.67	0.00	0.02	1.01	1.01	0.00	0.02	0.47	0.47	0.00
C2 Chrysenes (a)	1008.00	---	0.02	1.21	1.21	0.00	0.02	0.95	0.95	0.00	0.02	0.44	0.44	0.00
C2 Fluorenes (a)	686.00	---	0.00	0.26	0.26	0.00	0.00	0.20	0.20	0.00	0.00	0.10	0.10	0.00
C2-Fluoranthenes/Pyrenes	---	---	0.02	1.14	1.14	---	0.01	0.67	0.67	---	0.01	0.35	0.35	---
C2-Naphthalenes (a)	510.00	---	0.01	0.67	0.67	0.00	0.01	0.41	0.41	0.00	0.01	0.19	0.19	0.00
C2-Phenanthrenes/Anthracenes (a)	746	---	0.05	4.02	4.02	0.01	0.03	1.84	1.84	0.00	0.07	1.92	1.92	0.00
C3 Chrysenes (a)	1112.00	---	0.01	0.70	0.70	0.00	0.01	0.61	0.61	0.00	0.01	0.26	0.26	0.00
C3 Fluorenes (a)	769.00	---	0.01	0.72	0.72	0.00	0.01	0.51	0.51	0.00	0.01	0.23	0.23	0.00
C3-Fluoranthenes/Pyrenes	949.00	---	0.01	0.98	0.98	0.00	0.01	0.78	0.78	0.00	0.01	0.35	0.35	0.00
C3-Naphthalenes (a)	581.00	---	0.03	1.97	1.97	0.00	0.03	1.45	1.45	0.00	0.02	0.61	0.61	0.00
C3-Phenanthrenes/Anthracenes (a)	829.00	---	0.04	2.95	2.95	0.00	0.04	2.01	2.01	0.00	0.04	1.08	1.08	0.00
C4 Chrysenes (a)	1214.00	---	0.00	0.24	0.24	0.00	0.00	0.18	0.18	0.00	0.00	0.08	0.08	0.00
C4-Naphthalenes (a)	657.00	---	0.04	2.73	2.73	0.00	0.04	2.12	2.12	0.00	0.03	0.96	0.96	0.00
C4-Phenanthrenes/Anthracenes (a)	913.00	---	0.02	1.52	1.52	0.00	0.02	1.12	1.12	0.00	0.02	0.58	0.58	0.00
Chrysene (a)	844.00	826	0.01	0.76	0.76	0.00	0.01	0.37	0.37	0.00	0.01	0.17	0.17	0.00
Dibenzo(a,h)anthracene (a)	1123.00	2,389.00	0.00	0.08	0.08	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00
Fluoranthene (a)	707.00	23,870.00	0.01	1.06	1.06	0.00	0.00	0.19	0.19	0.00	0.00	0.06	0.06	0.00
Fluorene (a)	538.00	26,000.00	0.00	0.14	0.14	0.00	0.00	0.04	0.04	0.00	0.00	0.03	0.03	0.00
Indeno(1,2,3-cd)pyrene (a)	1115.00	---	0.00	0.26	0.26	0.00	0.00	0.06	0.06	0.00	0.00	0.02	0.02	0.00
Naphthalene (a)	385.00	61,700.00	0.00	0.16	0.16	0.00	0.00	0.19	0.19	0.00	0.00	0.06	0.06	0.00
Perylene (a)	967.00	431.00	0.02	1.67	1.67	0.00	0.04	2.01	2.01	0.00	0.02	0.52	0.52	0.00
Phenanthrene (a)	596	34300	0.01	0.63	0.63	0.00	0.00	0.19	0.19	0.00	0.00	0.06	0.06	0.00
Pyrene (a)	697.00	9,090.00	0.01	0.83	0.83	0.00	0.00	0.19	0.19	0.00	0.00	0.08	0.08	0.00
	---	**ESBTU FCVi**	---	---	---	0.03	---	---	---	0.01	---	---	---	0.01

Notes:

[a] PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in sediment on an organic carbon basis; only the contribution up to the maximum COC,PAHi,Maxi is counted in the D ESBTUFCV for the PAH mixture (EPA, 2003, Section 4.3 and Section 6.3).

**Used TOC from 10/2008 sample event for 5/2009 sample event. U-coded data was omitted from ESB calculations..
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-2 EQUILIBRIUM SEDIMENT BENCHMARKS FOR METALS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-01	CI13-02	CI13-03	CI13-04	CI13-05	CI13-05	CI13-06	CI13-07	CI13-08	CI13-09	CI13-10
	Sample Name:	CI13-01-SURF	CI13-02-SURF	CI13-03-SURF	CI13-04-SURF	CI13-05-SURF	CI13-05-SURF-FD	CI13-06-SURF	CI13-07-SURF	CI13-08-SURF	CI13-09-SURF	CI13-10-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/27/13	9/30/13	9/30/13
Analyte	**Units**											
SEM/AVS Ratio	none	**2.42**	**1.04**	0.225	0.106	0.101	0.106	0.0896	0.121	0.0879	0.239	0.069
Σ SEM	µmol/g dry	1.5586	2.4653	1.4831	0.6936	1.1134	1.0098	0.7973	0.9213	0.665	0.8388	0.369
AVS	µmol/g dry	0.65	2.4	6.3	6.5	11	9.5	8.8	7.6	7.4	3.5	5.2
foc	fraction	0.0308	0.0603	0.0567	0.0145	0.0258	0.0263	0.0135	0.026	0.0175	0.0111	0.0228
(Σ SEM - AVS) / foc	µmol/g dry	30	1	-85	-400	-383	-323	-593	-257	-385	-240	-212

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 4-2 EQUILIBRIUM SEDIMENT BENCHMARKS FOR METALS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-11	CI13-12	CI13-13	CI13-14	CI13-15	CI13-16	CI13-17	CI13-18	CI13-20	CI13-21	CI13-22
	Sample Name:	CI13-11-SURF	CI13-12-SURF	CI13-13-SURF	CI13-14-SURF	CI13-15-SURF	CI13-16-SURF	CI13-17-SURF	CI13-18A-SURF	CI13-20-SURF	CI13-21-SURF	CI13-22-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/26/13	10/28/13
Analyte	**Units**											
SEM/AVS Ratio	none	0.0642	0.118	0.143	0.27	0.283	0.234	0.0611	0.102	0.0203	0.211	0.0425
Σ SEM	µmol/g dry	0.4868	1.4829	1.999	2.6	2.1877	2.0415	0.39	0.6456	0.11285	0.401	0.3993
AVS	µmol/g dry	7.5	12.2	14.3	9.6	7.7	8.7	6.2	6.3	5.6	1.8	9.5
foc	fraction	0.0212	0.0552	0.0443	0.0347	0.0369	0.0376	0.00789	0.0355	0.0153	0.0181	0.00318
(Σ SEM - AVS) / foc	µmol/g dry	-331	-194	-278	-202	-149	-177	-736	-159	-359	-77	-2862

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 4-2 EQUILIBRIUM SEDIMENT BENCHMARKS FOR METALS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-23	CI13-24	CI13-25	CI13-26	CI13-27	CI13-28	CI13-29	CI13-30	CI13-31	CI13-31	CI13-32
	Sample Name:	CI13-23-SURF	CI13-24-SURF	CI13-25-SURF	CI13-26-SURF	CI13-27A-SURF	CI13-28-SURF	CI13-29A-SURF	CI13-30-SURF	CI13-31-SURF	CI13-31-SURF-FD	CI13-32-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	10/28/13	10/28/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/30/13	9/27/13	9/27/13	9/27/13
Analyte	**Units**											
SEM/AVS Ratio	none	0.187	0.179	0.284	0.165	0.325	**1.27**	0.177	0.0196	0.232	0.139	0.387
Σ SEM	µmol/g dry	2.0998	1.778	1.612	1.8755	2.4391	2.2087	1.6415	0.19756	1.9421	1.9482	2.562
AVS	µmol/g dry	11.1	9.9	5.8	11.2	7.6	1.8	9.2	9.9	8.3	14.2	6.5
foc	fraction	0.0268	0.027	0.0149	0.0786	0.0542	0.0704	0.0365	0.0439	0.0339	0.0306	0.0252
(Σ SEM - AVS) / foc	µmol/g dry	-336	-301	-281	-119	-95	6	-207	-221	-188	-400	-156

NOTES:
J = Indicates that the concentration is an estimated value.
U = Indicates the analyte was analyzed for but not detected.
AVS = Acid Volatile Sulfides
SEM = Simultaneously Extracted Metals
foc = fraction organic carbon
µmol/g dry = micromole per gram dry weight

TABLE 4-2 EQUILIBRIUM SEDIMENT BENCHMARKS FOR METALS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-33	CI13-34	CI13-35	CI13-36	CI13-37	CI13-38	CI13-38	CI13-39	CI13-40	CI13-41
	Sample Name:	CI13-33-SURF	CI13-34-SURF	CI13-35-SURF	CI13-36-SURF	CI13-37-SURF	CI13-38-SURF	CI13-38-SURF-FD	CI13-39-SURF	CI13-40-SURF	CI13-41-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/27/13	9/27/13	9/26/13	9/25/13	9/27/13	9/27/13	9/27/13	9/26/13	9/26/13	9/26/13
Analyte	**Units**										
SEM/AVS Ratio	none	0.686	0.218	0.255	0.773	0.224	0.388	0.181	0.465	0.395	0.351
Σ SEM	µmol/g dry	4.862	4.21	0.9157	7.212	5.296	3.587	3.728	5.165	4.271	4.683
AVS	µmol/g dry	7.1	19.1	3.6	9.4	23.7	9.2	20.8	11.1	10.8	13.3
foc	fraction	0.0835	0.0861	0.0642	0.0394	0.0779	0.0738	0.0672	0.0332	0.0714	0.0626
(Σ SEM - AVS) / foc	µmol/g dry	-27	-173	-42	-56	-236	-76	-254	-179	-91	-138

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 4-2 EQUILIBRIUM SEDIMENT BENCHMARKS FOR METALS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-41	CI13-42	CI13-43	CI13-44	CI13-45	CI13-45	CI13-46	CI13-47	CI13-48	CI13-49
	Sample Name:	CI13-41-SURF-FD	CI13-42-SURF	CI13-43-SURF	CI13-44-SURF	CI13-45-SURF	CI13-45-SURF-FD	CI13-46-SURF	CI13-47-SURF	CI13-48-SURF	CI13-49-SURF
	Sample Depth (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Date Sampled:	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13	9/26/13
Analyte	**Units**										
SEM/AVS Ratio	none	0.38	0.563	0.499	0.272	0.597	0.52	0.119	0.232	0.435	0.459
Σ SEM	µmol/g dry	4.31	6.371	4.147	2.585	7.226	8.21	1.2929	3.1591	7.332	6.538
AVS	µmol/g dry	11.4	11.4	8.3	9.3	12.1	15.8	10.9	13.6	16.8	14.2
foc	fraction	0.0669	0.0906	0.111	0.0311	0.0916	0.081	0.0208	0.0677	0.123	0.133
(Σ SEM - AVS) / foc	µmol/g dry	-106	-56	-37	-216	-53	-94	-462	-154	-77	-58

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

µmol/g dry = micromole per gram dry weight

TABLE 4-2 EQUILIBRIUM SEDIMENT BENCHMARKS FOR METALS
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

	Sample Location:	CI13-50
	Sample Name:	CI13-50-SURF
	Sample Depth (ft):	0-0.5
	Date Sampled:	9/27/13
Analyte	**Units**	
SEM/AVS Ratio	none	0.165
Σ SEM	μmol/g dry	2.3979
AVS	μmol/g dry	14.4
foc	fraction	0.0345
(Σ SEM - AVS) / foc	μmol/g dry	-348

NOTES:

J = Indicates that the concentration is an estimated value.

U = Indicates the analyte was analyzed for but not detected.

AVS = Acid Volatile Sulfides

SEM = Simultaneously Extracted Metals

foc = fraction organic carbon

μmol/g dry = micromole per gram dry weight

TABLE 5-1 PROBABLE EFFECT CONCENTRATION QUOTIENTS (PEC-Qs)
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Location ID	Field Sample ID	mean PEC-Q
CI13-01	CI13-01-0001	0.04
CI13-01	CI13-01-SURF	0.33
CI13-02	CI13-02-SURF	0.62
CI13-03	CI13-03-0001	0.14
CI13-03	CI13-03-0103	0.07
CI13-03	CI13-03-SURF	0.59
CI13-04	CI13-04-0001	1.65
CI13-04	CI13-04-0103	1.72
CI13-04	CI13-04-SURF	0.10
CI13-05	CI13-05-0001	0.05
CI13-05	CI13-05-0001-FD	0.06
CI13-05	CI13-05-0103	0.04
CI13-05	CI13-05-0103-FD	0.04
CI13-05	CI13-05-SURF	0.27
CI13-05	CI13-05-SURF-FD	0.20
CI13-06	CI13-06-0001	0.43
CI13-06	CI13-06-0103	0.11
CI13-06	CI13-06-SURF	0.18
CI13-07	CI13-07-0001	0.12
CI13-07	CI13-07-0103	0.06
CI13-07	CI13-07-SURF	0.36
CI13-08	CI13-08-SURF	0.08
CI13-09	CI13-09-0001	0.06
CI13-09	CI13-09-0103	0.06
CI13-09	CI13-09-SURF	0.11
CI13-10	CI13-10-0001	0.10
CI13-10	CI13-10-0001-FD	0.13
CI13-10	CI13-10-0103	0.06
CI13-10	CI13-10-0103-FD	0.05
CI13-10	CI13-10-0305	0.07
CI13-10	CI13-10-0305-FD	0.07
CI13-10	CI13-10-SURF	0.17
CI13-11	CI13-11-0001	0.05
CI13-11	CI13-11-0103	0.06
CI13-11	CI13-11-SURF	0.09
CI13-12	CI13-12-SURF	0.27
CI13-13	CI13-13-0001	0.82
CI13-13	CI13-13-0103	0.03
CI13-13	CI13-13-0305	0.03
CI13-13	CI13-13-SURF	0.40
CI13-14	CI13-14-0001	1.19
CI13-14	CI13-14-0103	0.03
CI13-14	CI13-14-SURF	0.68
CI13-15	CI13-15-0001	0.28
CI13-15	CI13-15-0103	0.04
CI13-15	CI13-15-SURF	0.87
CI13-16	CI13-16-0001	0.55
CI13-16	CI13-16-0103	0.11
CI13-16	CI13-16-SURF	4.48
CI13-17	CI13-17-0001	0.64
CI13-17	CI13-17-SURF	0.07
CI13-18A	CI13-18A-0001	0.04
CI13-18A	CI13-18A-SURF	0.09
CI13-20	CI13-20-0001	0.32
CI13-20	CI13-20-0103	0.04
CI13-20	CI13-20-SURF	0.22
CI13-21	CI13-21-SURF	0.07
CI13-22	CI13-22-SURF	0.05
CI13-23	CI13-23-0001	0.07
CI13-23	CI13-23-0103	0.10
CI13-23	CI13-23-SURF	0.35
CI13-24	CI13-24-0001	0.07
CI13-24	CI13-24-SURF	0.42
CI13-25	CI13-25-SURF	1.65
CI13-26	CI13-26-0001	0.18
CI13-26	CI13-26-0103	0.02
CI13-26	CI13-26-0305	0.02
CI13-26	CI13-26-0507	0.02
CI13-26	CI13-26-0709	0.02
CI13-26	CI13-26-SURF	1.24
CI13-27A	CI13-27A-0001	1.92
CI13-27A	CI13-27A-0103	1.48
CI13-27A	CI13-27A-0305	1.86
CI13-27A	CI13-27A-0507	0.46
CI13-27A	CI13-27A-SURF	0.41
CI13-28	CI13-28-0001	0.03
CI13-28	CI13-28-0103	0.04
CI13-28	CI13-28-0305	0.03
CI13-28	CI13-28-0507	0.04
CI13-28	CI13-28-0709	0.04
CI13-28	CI13-28-0911	0.01
CI13-28	CI13-28-SURF	0.40
CI13-29A	CI13-29A-0001	0.02
CI13-29A	CI13-29A-0103	0.02
CI13-29A	CI13-29A-SURF	0.65
CI13-30	CI13-30-0001	0.36

TABLE 5-1 PROBABLE EFFECT CONCENTRATION QUOTIENTS (PEC-Qs)
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Location ID	Field Sample ID	mean PEC-Q
CI13-30	CI13-30-SURF	1.36
CI13-31	CI13-31-0001	0.04
CI13-31	CI13-31-0103	0.03
CI13-31	CI13-31-0305	0.03
CI13-31	CI13-31-0507	0.03
CI13-31	CI13-31-SURF	0.33
CI13-31	CI13-31-SURF-FD	0.33
CI13-32	CI13-32-0001	0.07
CI13-32	CI13-32-0103	0.07
CI13-32	CI13-32-SURF	0.27
CI13-33	CI13-33-0001	0.77
CI13-33	CI13-33-0103	0.05
CI13-33	CI13-33-0305	0.03
CI13-33	CI13-33-SURF	0.68
CI13-34	CI13-34-0001	0.61
CI13-34	CI13-34-0103	0.04
CI13-34	CI13-34-0305	0.03
CI13-34	CI13-34-0507	0.03
CI13-34	CI13-34-0709	0.03
CI13-34	CI13-34-SURF	0.78
CI13-35	CI13-35-0001	0.05
CI13-35	CI13-35-0103	0.06
CI13-35	CI13-35-SURF	0.11
CI13-36	CI13-36-0001	0.10
CI13-36	CI13-36-0103	0.05
CI13-36	CI13-36-0305	0.04
CI13-36	CI13-36-0507	0.04
CI13-36	CI13-36-0709	0.03
CI13-36	CI13-36-0709-FD	0.03
CI13-36	CI13-36-0911	0.03
CI13-36	CI13-36-0911-FD	0.03
CI13-36	CI13-36-1113	0.03
CI13-36	CI13-36-1113-FD	0.03
CI13-36	CI13-36-1315	0.03
CI13-36	CI13-36-1315-FD	0.03
CI13-36	CI13-36-SURF	0.62
CI13-37	CI13-37-0001	0.40
CI13-37	CI13-37-0103	0.06
CI13-37	CI13-37-SURF	0.84
CI13-38	CI13-38-0001	0.72
CI13-38	CI13-38-0001-FD	0.74
CI13-38	CI13-38-0103	0.08
CI13-38	CI13-38-0103-FD	0.08
CI13-38	CI13-38-0305	0.04
CI13-38	CI13-38-0507	0.06
CI13-38	CI13-38-SURF	0.39
CI13-38	CI13-38-SURF-FD	0.50
CI13-39	CI13-39-0001	0.65
CI13-39	CI13-39-0103	1.17
CI13-39	CI13-39-0305	2.71
CI13-39	CI13-39-0507	0.24
CI13-39	CI13-39-SURF	0.56
CI13-40	CI13-40-0001	0.50
CI13-40	CI13-40-0103	0.30
CI13-40	CI13-40-0305	0.04
CI13-40	CI13-40-0507	0.04
CI13-40	CI13-40-SURF	0.42
CI13-41	CI13-41-0001	0.59
CI13-41	CI13-41-0103	0.07
CI13-41	CI13-41-0305	0.05
CI13-41	CI13-41-SURF	0.42
CI13-41	CI13-41-SURF-FD	0.47
CI13-42	CI13-42-0001	2.70
CI13-42	CI13-42-0103	8.48
CI13-42	CI13-42-0305	0.15
CI13-42	CI13-42-SURF	0.60
CI13-43	CI13-43-0001	0.70
CI13-43	CI13-43-0103	2.20
CI13-43	CI13-43-0305	17.57
CI13-43	CI13-43-0507	1.89
CI13-43	CI13-43-SURF	0.47
CI13-44	CI13-44-0001	0.70
CI13-44	CI13-44-0103	3.12
CI13-44	CI13-44-0305	9.12
CI13-44	CI13-44-0507	0.24
CI13-44	CI13-44-SURF	0.36
CI13-45	CI13-45-0001	0.63
CI13-45	CI13-45-0001-FD	0.74
CI13-45	CI13-45-0103	0.04
CI13-45	CI13-45-0103-FD	0.04
CI13-45	CI13-45-0305	0.05
CI13-45	CI13-45-SURF	1.04
CI13-45	CI13-45-SURF-FD	0.93
CI13-46	CI13-46-0001	0.96
CI13-46	CI13-46-0103	0.16
CI13-46	CI13-46-0305	0.05

TABLE 5-1 PROBABLE EFFECT CONCENTRATION QUOTIENTS (PEC-Qs)
CELERON ISLAND SITE CHARACTERIZATION
GROSSE ILE, MICHIGAN (SEPTEMBER 2013)

Location ID	Field Sample ID	mean PEC-Q
CI13-47	CI13-47-0001	0.15
CI13-47	CI13-47-0103	0.08
CI13-47	CI13-47-0305	0.06
CI13-47	CI13-47-0507	0.04
CI13-47	CI13-47-SURF	0.44
CI13-48	CI13-48-0001	2.83
CI13-48	CI13-48-0001-FD	2.61
CI13-48	CI13-48-0103	1.47
CI13-48	CI13-48-0103-FD	1.69
CI13-48	CI13-48-0305	0.19
CI13-48	CI13-48-0305-FD	0.19
CI13-48	CI13-48-SURF	0.70
CI13-49	CI13-49-0001	1.74
CI13-49	CI13-49-0103	2.28
CI13-49	CI13-49-0305	1.24
CI13-49	CI13-49-0507	0.29
CI13-49	CI13-49-SURF	0.62
CI13-50	CI13-50-0001	0.11
CI13-50	CI13-50-0001-FD	0.10
CI13-50	CI13-50-0103	0.02
CI13-50	CI13-50-0103-FD	0.02
CI13-50	CI13-50-0305	0.02
CI13-50	CI13-50-0507	0.02
CI13-50	CI13-50-SURF	0.30

Appendix A:

Field Logbooks and Data Collection Forms

Core Processing Logbook

Location CELERON D Date 9/23/13

Project / Client EPA V|GLNPO

0715 M. Gelinas
T. King
S. Voss
C. Yarrington

meet K. Kowalk @ Ann Arbor
EA office

0840 Arrive at EPA Grosse Ile
facility

0900 S. Voss meets utilities at
joint meet - all clear
13400 Gibraltar Rd.

0915 Ice chest arrives
EA obtains badges at
EPA facility

1000 S. Voss meets mudpuppy
crew, M. Gelinas, King, Yarrington
+ Kowalk set up core
processing

Location CELERON ISLAND Date 9/23/13

Project / Client EPA-V|GLNPO

1200 Gelinas, Yarrington + King
attend joint meet at
Erie Metropark - all clear

1230 mudpuppy returns w/ samples

1330 CI13-01 logged (18")

1340 CI13-01-0001
6X4oz jars

1053 CI13-01-SURF
1X16 oz
1X2 oz

1200 CI13-02-SURF
1X16 oz
1X2 oz
*No core for CI13-02, could only
get surface recovery

1500 Samples loaded in fridge truck.
Core processing complete for day

1800- mudpuppy returns w/ 5 cores +
surf samples

Location CELERON ISLAND Date 9/23/13

Project / Client EPA V/GLNPO

1425	CI13-03-SURF	1x1603, 1x203
	CI13-03-SURF-FD	1x203
1308	CI13-04-SURF	1x1603, 1x203
1542	CI13-05-SURF	1x1603, 1x203
1613	CI13-06-SURF	1x1603, 1x203
1656	CI13-07-SURF	1x1603, 1x203
	CI13-07-SURF-FD	1x203

2100 S. Whitin Arrives @ Detroit Airport

Location CELERON ISLAND Date 9/24/13

Project / Client EPA V/GLNPO

TUESDAY

Sunny, 70°

800 Core processing crew meets at EPA

M. Gelinas
S. White
C. Yarrington
T. King

900 T. King meets utilities @ Ford Yacht Club

0855	CI13-03-0001	6x403	-all clear, no utilities attend.
0905	CI13-03-0103	6x403	
930	CI13-04-0001	6x403	
940	CI13-04-0103	6x403	
945	CI13-04-0103-MS	5x403	
950	CI13-04-0103-MSD	5x403	

Location CELERON ISLAND Date 9/24/13

Project / Client EPA V/GLNPO

1000	CI13-05-0001	6x403
1000	CI13-05-0001-FD	"
1010	CI13-05-0103	6x403
	CI13-05-0103-FD	"
1035	CI13-06-0001	6x403
1045	CI13-06-0103	6x403
1115	CI13-07-0001	6x403
1125	CI13-07-0103	6x403

1230
meet mudpuppy for cores + surface samples

844	CI13-08-SURF
915	CI13-09-SURF

[illegible]

Location CELERON ISLAND Date 9/24/13

Project / Client EPA V/GLNPO

948	CI13-10-SURF	
948	CI13-10-SURF-MS	
948	[illegible] CI13-10-SURF-MSD	
1023	CI13-11-SURF	
1054	CI13-12-SURF	
1054	CI13-12-SURF-FD	
1128	CI13-13-SURF	
1430	CI13-09-0001	6x403
1440	CI13-09-0103	6x403
1450	CI13-10-0001	6x403
	CI13-10-0001-FD	6x403
1455	CI13-10-0103	6x403
	CI13-10-0103-FD	6x403

DTWA 257 Fedex pickup

Location CELERON ISLAND Date 9/24/13
Project / Client EPA-V|GLNPO

1505	CI13-10-0305	6x403
1505	CI13-10-0305-FD	6x403
1555	CI13-11-0001	6x403
1605	CI13-11-0103	6x403
1605	CI13-11-0103-MS	5x403
1605	CI13-11-0103-MSD	5x403
1630	CI13-13-0001	6x403
1640	CI13-13-0103	4x403
1650	CI13-13-0305	6x403

1500 Received dumpster- unloaded by Roy

Location CELERON ISLAND Date 9/24/13
Project / Client EPA V|GLNPO

1800 FedEx Arrives - 5 coolers shipped to TA-Burlington

Tracking #s: 8030 2424 9370* orig. chains/sigs within

8989974881404
8989974881389
898997481390
898997481415

1815 mudpuppy returns to dock

Done for day.

Surface Samples collected:

1353	CI13-14-SURF	1x16, 1x203
1425	CI13-15-SURF	1x16, 1x203
1456	CI13-16-SURF	"
1543	CI13-17-SURF	"
1641	CI13-18A-SURF	"

Location CELERON ISLAND Date 9/25/13

Project / Client EPA V/GLNPO

Wednesday

sunny, 65/70°

900 core processing @ EPA facility

w/

T. King

S. Whitin

M. Gelinas

C. Yarrington leaves for Detroit airport

955 CI13-14-0001 6x4oz

1005 CI13-14-0103 6x4oz

1035 CI13-15-0001 6x4oz

1045 CI13-15-0103 6x4oz

1105 CI13-16-0001 6x4oz

1115 CI13-16-0103 6x4oz

Location CELERON ISLAND Date 9/25/13

Project / Client EPA V/GLNPO

DTWA237

1155 CI13-17-0001 6x4oz jars

1200 meet mudpuppy w/ cores & surface samples

Lunch.

0842 CI13-20-SURF 1x16oz, 1x2oz

0959 CI13-21-SURF "

1033 CI13-22-SURF "

1100 CI13-23-SURF "

0921 CI13-30-SURF 1x16oz, 1x2oz
0921 CI13-30-SURF-MS 1x2oz
0921 CI13-30-SURF-MSD 1x2oz

1410 CI13-18A-0001 6x4oz jars

Location CELERON ISLAND Date 9/25/13

Project / Client EPA I | GLNPO

1330-1400

Discussion with Rose regarding ponar grabs - grab samples (-SURF) should include all chemistry AND Gr. size + AVS/SEM. Going to proceed w/ coring, then go back for ponar samples at all locations to redo -SURF samples and include full suite.

1510 CI13-20-0001 6x4oz

1520 CI13-20-0103 6x4oz
1550 CI13-30-0001 6x4oz
1640 CI13-23-0001 6x4oz jars

1650 CI13-23-0103 6x4oz jars

1550 FedEx arrives: 2 coolers shipped to TA-Burlington

Location CELERON ISLAND Date 9/26/13

Project / Client EPA I | GLNPO

Thursday 70°, sunny

Core Processing:
M. Gelinas
T. King } EA
S. Voss

Aboard mudpuppy: S. Voss (EA)
Joe + Stacie
Rose Ellison (EPA

Sample collected on 9/25/13 via ponar:

1523 CI13-36-SURF 1x16oz
1x2oz
3x4oz

1055 CI13-24-0001 3x 4oz jars

1120 CI13-35-0001 3x4oz
1130 CI13-35-0103 3x4oz

Lunch - after lunch, S. Voss on mudpuppy, S. Whitin processing

Location CELERON ISLAND Date 9/26/13

Project / Client EPA V/GLNPO

DTWA08

1405	CI13-36-0001	3 x 4oz jars
1415	CI13 36-0103	3 x 4oz
1425	CI13-36-0305	3 x 4oz
1435	CI13-36-0507	3 x 4oz

1510	CI13-39-0001	3x4oz
1520	CI13-39-0103	"
1530	CI13-39-0305	"
1540	CI13-39-0507	"

1400 Russ Short + Kiana Smith (both EA) observe core processing

1500 S Whitin + T. King meet mudpuppy II at yacht club - S. Voss in dental distress, brought for emergency root canal.

Discussion regarding ponar collection - 8 samples in am were collected + held in HDPE plastic buckets. EA advised client against this practice - sent out lab-approved containers for sediment. Client insisted upon

Location CELERON ISLAND Date 9/26/13

Project / Client EPA V / GLNPO

buckets. Moving forward, ponars will be collected in aluminum tins, a second aluminum tin will be placed on top and taped in place. Will be processed at EPA facility.

1416	CI13-46-SURF	collected in jars on mudpuppy 1x16, 1x2oz, 3x4oz
1348	CI13-47-SURF	collected in jars on mudpuppy 1x16oz, 1x2oz, 3x 4oz
0900	CI13-35-SURF	1x16 oz, 1x2oz, 3x4oz collected in HDPE buckets AVS/SEM in lab
0935	CI13-39-SURF	1x16oz, 1x2oz, 3x4oz collected in HDPE plast buckets AVS/SEM in jar

Location CELERON ISLAND Date 9/26/13

Project / Client EPA V | GLNPO

1025 CI13-43-SURF 1x16oz, 1x2oz, 3x4oz collected in HDPE plastic buckets. MS/SEM directly in jar.

~~43-SURF-MS~~
~~43 SURF MSD~~

1730 FedEx Arrives
2 coolers to TA-Burlington
8030 2424 9336
898976481553

1730 R. Short leaves, to return in Am

1800 mudpuppy returns to dock w/ cores + surf samples

Location CELERON ISLAND Date 9/26/13

Project / Client EPA V | GLNPO

1735 CI13-21-SURF 5 jars

1655 CI13-42-SURF 5 jars

1625 CI13-48-SURF "

1550 CI13-49-SURF "

1000 CI13-41-SURF Held in HDPE plastic
1000 CI13-41-SURF-FD " 4x4oz
0945 CI13-40-SURF " 5 jars

1055 CI13-44-SURF Held in HDPE plastic
1055 CI13-44-SURF-MS " 4 jars
CI13-44-SURF-MSD " 4 jars

1120 CI13-45-SURF Held in HDPE plastic
1120 CI13-45-SURF-FD "

Location CELERON ISLAND Date 9/27/13
Project / Client EPA I/GLNPO

Friday

0730 safety briefing
S. Whitin
M. Gelinas
S. Voss
T. King
R Short

0745 R Ellison arrives to discuss using stainless steel bowls onboard Mudpuppy

0800 S. Whitin, R Ellison, S Voss & S Short go to meet Mudpuppy

process surface samples

0930 CI13-36-0709 3x4oz jars
CI13-36-0709-FD 3x4oz

0940 CI13-36-0911 3x4oz
CI13-36-0911-FD 3x4oz

Location CELERON ISLAND Date 9/27/13
Project / Client EPA I/GLNPO

0950 CI13-36-1113 3x4oz
0950 CI13-36-1113-FD "

1000 CI13-36-1315 3x4oz
~~1000 CI13-36-1315 3x4oz~~
1000 CI13-36-1315-FD "

1110 CI13-40-0001 3x4oz

1120 CI13-40-0103 3x4oz

1130 CI13-40-0305 3x4oz
1130 CI13-40-0305-MS "
1130 CI13-40-0305-MSD "

1140 CI13-40-0507 3x4oz

1215 CI13-41-0001 3x4oz

1225 CI13-41-0103 3x4oz

1235 ~~1225~~ CI13-41-0305 3x4oz

1300 Mudpuppy arrives @ dock w/ samples
Lunch

Location CELERON ISLAND Date 9/27/13
Project / Client EPA V/GLNPO

1225	CI13-41-0103-MS	
1225	CI13-41-0103MSD	
1200	CI13-31-SURF	5x jars
	CI13-31-SURF-FD	1X1603, 1x203, 3x403
1005	CI13-32-SURF	1X1603, 203, 3x403
1035	CI13-33-SURF	"
1120	CI13-34-SURF	Held in APCD
1120	CI13-34-SURF-MS	plastic 1x203, 3x403
1120	CI13-34-SURF-MSD	1x203, 3x403
0935	CI13-37-SURF	1x1603, 1x203, 3x403
0855	CI13-38-SURF	1x1603, 1x203, 3x403
	CI13-38-SURF-FD	1x203, 3x403
1235	CI13-50-SURF	1x1603, 1x203 3x403

1800 Mudpuppy arrives @ docking, stores surface samples
Kaacke

Location CELERON ISLAND Date 9/27/13
Project / Client EPA V/GLNPO

1555	CI13-46-0001	3x403
1605	CI13-46-0103	3x403
1615	CI13-46-0305	3x403
1640	CI13-47-0001	3x403
1650	CI13-47-0103	3x403
1700	CI13-47-0305	"
1710	CI13-47-0507	"
1720	CI13-42-0001	3x403
1730	CI13-42-0103	3x403
1730	CI13-42-0103-MS	3x403
1730	CI13-42-0103-MSD	3x403
1740	CI13-42-0305	3x403

Location CELERON ISLAND Date 9/27/13

Project / Client EPA V | GLNPO

1300 J King goes to pick up cores/samples from Mudpuppy

1315 FedEx Arrives - 5 coolers shipped to TA-Burlington

8030 2424 9369
8004 6893 7170
8004 6893 7192
8004 6893 7181
8004 6893 7207

Ponar surface samples:

1501	CI13-01-SURF	1x16oz, 1x2oz, 3x4oz
1545	CI13-02-SURF	"
1620	CI13-03-SURF	"
1645	CI13-05-SURF	"
	CI13-05-SURF-FD	1x2oz, 3x4oz

Location CELERON ISLAND Date 9/27/13

Project / Client EPA-V | GLNPO

1635	CI13-04-SURF	Held in SS bowl w/
~~1635~~	~~CI13-04-SURF-FD~~	aluminum foil lid
		unneeded - have all QC
1700	CI13-06-SURF	"
	CI13 06 - MS/MSD	
1720	CI13-07-SURF	"
1735	CI13-08-SURF	"
~~1735~~	~~CI13-08-SURF-FD~~	not enough sed.

Location CELERON ISLAND Date 9/28/13

Project / Client EPA I/GLNPO

Saturday 70°, sunny.

T King
M Gelinas processing
S Whitin

S. Voss flies home

mudpuppy off

830-1030

Process/label all surface samples brought in by mudpuppy on Fri. pm.

Fridge truck temp: 40°F

1040	CI13-45-0001	3x4oz
	CI13-45-0001-FD	3x4oz
1050	CI13-45-0103	3x4oz
	CI13-45-0103-FD	3x4oz
1100	CI13-45-0305	3x4oz

Location CELERON ISLAND Date 9/28/13

Project / Client EPA I/GLNPO

1125	CI13-48-0001	3x4oz jars
	CI13-48-0001-FD	3x4oz
1135	CI13-48-0103	3x4oz
	CI13-48-0103-FD	"
1145	CI13-48-0305	3x4oz
	CI13-48-0305FD	"
1205	CI13-44-0001	3x4oz
1215	CI13-44-0103	3x4oz
	CI13-44-0105 MS	"
	CI13-44-0103 MSD	"
1225	CI13-44-0305	3x4oz
1235	CI13-44-0507	3x4oz
1245	Done processing for day	

Location CELERON ISLAND Date 9/29/13

Project / Client EPA V /GLNPO

Sunday

cloudy, 65°

T King
S Whitin
M Gelinas } EA, processing @ EPA facility

Fridge truck temp: 41°

0945	CI13-34-0001	3x4oz
0955	CI13-34-0103	3x4oz
1005	CI13-34-0305	"
1015	CI13-34-0507	3x4oz
	CI13-34-0507 MS	"
	CI13-34-0507 MSD	"
1025	CI13-34-0709	3x4oz
1045	CI13-49-0001	3x4oz
1050	CI13-~~50~~ 49-0103	"

Location Date

Project / Client

1055	CI13-~~50~~ 49-0305	3x4oz
1100	CI13-~~50~~ 49-0507	3x4oz
1120	CI13-43-0001	3x4oz
1140	CI13-43-0103	"
1150	CI13-43-0305	"
1200	CI13-43-0507	"
1205	CI13-31-0001	3x4oz jars
1210	CI13-31-0103	
1215	CI13-31-0305	
1220	CI13-31-0507	

1230 Done processing for day

Location CELERON ISLAND Date 9/30/13

Project / Client EPA-V/GLNPO

65°, cloudy

Monday 39°, Fridge Truck

800 S. Whitin onboard mudpuppy

w/ R Ellison, J+S

[illegible] @ Cetol M. Gelinas } EA, processing @

T King } EPA facility

0850 CI13-37-0001 3x4oz

0900 CI13-37-0103 "

0915 CI13-32-0001 "

0925 CI13-32-0103

1000 CI13-33-0001 3x4oz

1010 CI13-33-0103 "

1015 CI13-33-0305 "

Location CELERON ISLAND Date 9/30/13

Project / Client EPA V/GLNPO

1050 CI13-38-0001 3x4oz jar

CI13-38-0001-FD "

1100 CI13-38-0103 3x4oz jars

CI13-38-0103-FD "

1110 CI13-38-0305 3x4oz

CI13-38-0305-MS "

CI13-38-0305-MSD "

1120 CI13-38-0507 3x4oz

Lunch + supplies

1300 meet Mudpuppy w/ surf grabs + 4 cores

1205 CI13-25-SURF 1x16, 1x2, 3x4oz

1250 CI13-26-SURF "

1135 CI13-27A-SURF " Held in SS bowl

1030 CI13-28-SURF " "

0945 CI13-29A-SURF 1x16oz, 1x2oz, 3x 4oz

Location CELERON ISLAND Date 9/30/13

Project / Client EPA V/GLNPO

1510	CI13-27A-0001	3x4oz	
1520	CI13-27A-0103	3x4oz	
1530	CI13-27A-0305	"	
1540	CI13-27A-0507	"	
1605	CI13-29A-0001	3x4oz	
1615	CI13-29A-0103	"	
1630	CI13-50-0001	3x4oz	50-0001-FD
1635	CI13-50-0103	"	50 0103-FD
1640	CI13-50-0305	"	
1645	CI13-50-0507		
1800	FEDEX Arrives - 6 coolers to TA-Burl.		
1825	CI13-28-0001	3x4oz	
1835	CI13-28-0103-[illegible]		
"	CI13-28-0103-MS	"	
"	CI13-28-0103-MSD	"	
1845	CI13-28-0305	3x4oz	
1855	CI13-29-0507	"	
1905	CI13-28-0709	"	
1915	CI13-28-0911	"	

Location CELERON ISLAND Date 9/30/13

Project / Client EPA-V/GLNPO

1820 mudpuppy returns w/ 1 core & 12 ponars.

~~1550~~ 1555	CI13-13-SURF	1x16 oz, 1x2oz, 3x4oz
1605	CI13-14-SURF	"
1625	CI13-15-SURF	"
1640	CI13-16-SURF	"

Above samples held in SS bowls, AVS/SEM not taken out in field

FEDEX TRACKING INFO:

master: 8030 2424 9358
8765 78734 299
8765 78734 314
8765 78734 336
" 303
" 325

Location CELERON ISLAND Date 10/1/13

Project / Client EPA V/GLNPO

Tuesday 65°F, sunny
41°F, Fridge Truck

Gov't shutdown. ~~All work stop~~
All gov't work stops EA must be out of EPA facility by noon

S. Whitin
T. King
M. Gelinas } EA, processing

No mudpuppy = will go without last 3 ponars

0740	CI13-26-0001	3x4oz
0750	CI13-26-0103	"
0800	CI13-26-0305	"
0810	CI13-26-0507	"
0820	CI13-~~26~~-0709	"

Location CELERON ISLAND Date 10/1/13

Project / Client EPA V/GLNPO

From 9/30/13:

1500	CI13-09-SURF	Held in SS bowls, AVS/SEM, not taken SUH
1515	CI13-10-SURF	"
1525	CI13-11-SURF	"
1543	CI13-12-SURF	"
1655	CI13-17-SURF	"
1715	CI13-19A-SURF	"
1745	CI13-30-SURF	"
1815	CI13-20-SURF	1x16oz, 1x2oz, 3x4oz

Inventory:
25x 16oz bottles
33x 4oz ~~glass~~ jars

Need: M+L gloves
2gal ziplocs

Clean + stow EA equipment.
1130 leave EPA facility

Location CELERON ISLAND Date 10/1/13

Project / Client EPA V / GLNPO

1230	Ship 3 coolers to TA-Burlington 8020 0320 5251 7958 4357 7513 7958 4357 7524
1245	Drop fridge truck @ Ryder
1315	Arrive Ann Arbor office, drop printer + ~~excess sed~~ shears
1400	leave for Detroit airport
1635	flight to BWI for M Gelinas T King S Whitin

Location Date

Project / Client

Core Collection Logbook

9/23/13

1656 onsite at CI 13-07

* move location upstream of marina
entrance. Rose-Ellison does not want
sample influenced by possible contaminati
from marina - moved by EPA
42°05.3701 N 83°10.2725 W
water depth = 7' 7"

Core: Refusal = 2.0 ft
Recovery = 20 in

Ponar: 2 ponars taken
silt w/ macrophytes, little sand

1724- head back to dock for the day

9/24/13

60° F
mostly cloudy
calm 5mph wind

0800 - meet Mudpuppy at dock
Sam Voss
Rose Ellison
Joe Benem
Stacy Coullard

0820 - leave dock; plan to head to CI13-08

0844 - onsite at CI13-08
move location offshore because it is to close to shore and ~~EA~~ large rock nearby
- 42°05.3281N 83°10.1176W
water depth = 3'5"

Ponar: 5 ponars taken for volume due to macrophytes. Sediment silty with some sand + organics

Core: 3 attempts made with vibracore. Unable to get any recovery due to hard packed sand

9/24/13

0915 - onsite at CI13-09
42°05.2374N 83°09.9737W
Water depth = 5'5"

Core: Refusal = 1.8 ft
Recovery = 1.75 ft   stiff clay at bttm

Ponar: 2 ponars taken for volume due to macrophytes. Surface sediment silty with gravel and stone; some sand and organics.

0948 - onsite at CI13-10
42°05.2707N 83°09.7572
water depth = 4'11"

Ponar: 1 ponar taken - silt with some sand + organics

Core: Refusal = 4.5 ft
Recovery = 51"

- sample taken in bare spot with no macrophytes

9/24/13

1023 - onsite at CI13-11
42°05.1642 N 83°09.5828 W
water depth = 6'8"

Core: Refusal = 3.75 ft
Recovery = 3.4 clay + some gravel at bttm

Ponar: 2 ponars taken for volume due to macrophytes. silt w/ some sand + organics

1054 - onsite at CI13-12

water depth = 7.5 ft

Ponar: 1 ponar taken: silty - less water content than previous samples - some sand

core: Refusal = .5 ft
Recovery = 0 - no recovery

2nd core: Refusal = .5 ft
Recovery = 0 = no recovery

9/24/13

1128 - onsite at CI13-13
42°05.1563 N 83°10.3259 W
water depth = 7.16

Core: Refusal = 4 ft
Recovery = 4.5 ft

Ponar: 2 ponars taken
silty sediment with litle sand

1158 - head back to dock for lunch

1335 - leave dock - head to CI13-14

1353 onsite at CI13-14

water depth = 7.0 ft

Ponar: 1 ponar take - silt with organic staining. Eurasian milfoil present

Core: Refusal = 3.5 ft
Recovery = 3.16 ft
stiff clay at bttm of core

9/24/13

1425 - onsite at CI13-15
42°04.8148N 83°10.0889
water depth = 6.5 ft

Core: Refusal = 2.25 ft
Recovery = 2.25 ft

Ponar: 1 ponar taken - silt with some sand; some macrophytes

1456 - onsite at CI13-16

water depth = 6.08 ft

Ponar: 3 ponars taken - silty with some organic staining and sand/silty material

Core: Refusal = 3 ft
Recovery = 0 ft - sample lost

2nd Core: Refusal = 2.5 ft
Recovery = 2.25 ft

9/24/13

1543 - onsite at CI13-17
42°04.4366N 83°09.9937
water depth = 3.3 ft
* location moved slightly by EPA

Core: Refusal = 1.2 ft
Recovery = 1.1 ft

Ponar: 1 ponar taken - mostly sand with some silt

1624 - onsite at CI13-18
42°04.2523N 83°10.2547W
water depth = 6.4 ft
* Location coordinates do not match location on map. EPA decision to use map location

Ponar: - all rock; decide to move location towards shore

1641 - onsite at CI13-18A (Alternate)
42°04.3228N 83°10.2212W
water depth = 4.5 ft

Ponar: 3 attempts at ponar unsuccessful

9/24/13

CI13-18A con't

1st core: Refusal = .9 ft
Recovery = .5 ft
- transfer contents of core into pan and use for surface sample
- gravel, larger stones, sand, but mostly stiff clay

2nd core: Refusal = .9 ft
Recovery = .7 ft
- clay, gravel

1722 - onsite at CI13-19
42°04.3879N 83°10.4510
water depth = 7.6 ft

Core: 2 attempts made with 0 penetration and 0 recovery

Ponar: 3 attempts mad with 0 recovery - large rocks/stones along bottom

---

9/25/13

65° F
partly cloudy
wind calm < 5 mph

0800 - meet Mudpuppy at marina
- Sam Voss
- Joe Bonem
- Stacy Coullard
- Rose Ellison

0825 - leave marina; head to CI13-20

0842 - onsite at CI13-20
42°04.6740 N 83°10.6311 w
water depth = 8.08 ft
A - moved location to the west offshore because of a group of large rocks in the area of the proposed location

Ponar: 1 ponar taken - silty sand; dark
no macrophytes

Core: Refusal = 2 ft
Recovery = 1.8 ft - sand

9/25/13

0921 - onsite at CI13 - 30
42°04.4773N 83°10.5125
water depth = 7.9 ft
* location app. 40 ft off. EPA (Rose Ellison)
ok with offset

Core: Refusal = 2 ft
Recovery: 1.5 ft sandy

Ponar: 2 ponar taken - silty sand
Eurasian milfoil present

0959: onsite at CI13-21
42°04.7513N 83°10.5518
water depth = 3.16 ft
* had to move location b/c it was
too close to shore and too shallow

Ponar: 3 ponars taken for volume - lots of cobble
silty sand. some macrophytes

Core: Refusal = 0
Recovery = 0
* 2 attempts made with vibracore and
no penetration - hard pack sand + rock

9/25/13

1033 - onsite at CI13 - 22
42°04.8959N 83°10.7214
water depth = 3.58

Core: Refusal = / no core taken
Recovery = / hard pack sand

Ponar: 1 ponar taken - sand with some
organics

- probed area by hand and could only
get about 2 inches of penetration

1100 - onsite at CI13-23
42°05.1270N 83°10.6716 W
water depth = 3.58 ft

Ponar: 1 ponar taken: sandy silt; macrophytes

1st Core: Refusal = 3.0 ft
Recovery = lost contents

2nd Core: Refusal = 3.5 ft
Recovery = 3.3 ft stiff clay at bttm

9/25/13

1140 - head back to Marina for lunch

1322 - leave marina - head to fuel dock

1356 - onsite at CI13-24
42°05.2548 N 83°10.5583 W
water depth = 5.58 ft

core: Refusal = 1.5 ft
Recovery = 1.25 ft stiff clay in Bttm

1446 - onsite at CI13-35
42°04.7495 N 83°11.1281 W
water depth = 4.58 ft
* location moved upstream out
of channel. EPA did not want
to sample in the channel

Core: Refusal = 2 ft
Recovery = 2.58 ft
- gray clay - stiff; extensive
macrophytes with Eurasian Milfoil

9/25/13

1523 - onsite at CI13-36
42°04.9741 N 83°11.2249 W
water depth = 2.6 ft
* location moved slightly due to shallow
water

Core: Refusal = 14.5
Recovery = 12.5
- dark sediment - clay at bottom
- heavy microphytes - Eurasian Milfoil

Ponar: 1 ponar taken - black sedimen

1655 - onsite at CI13-41

water depth = 3.25 ft

Core: Refusal = 4.5
Recovery = 4.9

* location offset slight due to
shallow water

9/25/13

1718- onsite at CI 13-40

water depth = 3.5 ft
* Location moved because of the weed bed at proposed location

core: Refusal = 5.75
Recovery = 5.9

1747 - onsite at CI 13-39
42°04.7791 N 83°11.4320 W
water depth = 5.08 ft

core: Refusal = 6.0 ft
Recovery = 6.4 ft
- dark sediment silt w/ odor
clay at bttm

9/26/13

65°
Sunny
NNW 5-10

0800 Arrive onsite

Sam Whiting
Rose Ellison
Joe Bonem
Stacy Coullard

0830 Leave marina; head to CI 13-35

0845 Onsite at CI 13-35
water depth: 4.60 ft

8 ponar attempts at
42° 04.7478 N
83 11.1326 W
Sample at 0900
silty with coarse sand
live mussels and significant
SAV present. ~~Cob~~ Little cobble

0923 Onsite at CI 13-39
42° 04.7790 N
83° 11.4316 W

9/26/13

2 ponar attempts
silty and organic material.
SAV present. little sand

Sample at ~~0935~~ 0935

0940 arrive @ CI13-40
42° 04.8276
83° 11.5456
sample @ 0945
1 ponar attempt
Silty and organic material
SAV present.

0953 arrive @ CI13-41
42° 04.8444
83 11.6579
sample @ 1000
1 ponar attempt
silty with little sand.
SAV present

9/26/13

1011 Arrive @ CI13-43
42° 04.9108
83° 11.7330
water depth: 3.2 ft

sample taken @ 1025
ponar: 1 attempt
silty with little sand
limited SAV present

core: refusal: 6.0
recovery 6.66

1038 arrive @ CI13-44
42° 04.9869
83 11.78~~48~~54
water depth: ~~3'10"~~ 3.83'

location moved off location
due to inaccessability from lilly
sample @ 1055

core refusal: 5.0
recovery: 5.6
sheen noted

ponar 1 attempt
42 04 9875
83 11 .7850
ponar location slightly moved
as spud moved so boat
had to re-set.

1105 arrive @ CI 13-45
42° 04. 1038
83° 11. 8008
depth to bottom: 3.16'

location moved due to
inaccessability from lilly
sample @ 1120

ponar 1 attempt
odor observed
silty with some fine sand
limited SAV

core refusal: 3.5'
recovery: 3.41'
Rodney Smith - Gibralters
Waterways Commision

9/26/13
visits core site on his
boat.

1135 Head back to launch ramp
for lunch

1320 - leave marina

1348 - onsite at CI 13 - 47
42°05. 1468 N 83°11. 9006 W
Water depth = 4.0 ft
* move location slightly due to
heavy surface vegetation

Core: Refusal = 5.5 ft
Recovery = 5.4 ft

Ponar: 1 ponar taken - 5 jars filled
- dark silt with some fine sand

1416 - onsite at CI 13 - 46
42°05. 0465 N 83°12. 0186 W
water depth = 3.9 ft

Ponar: 1 ponar taken - dark
sandy silt

9/26/13

CI13-46 con't

Core: Refusal = 5.5 ft
Recovery = 5.5 ft
dark sandy silt

1505 S. Voss offsite.

1510 S. Whitin onboard

1530 arrive @ CI13-49
42 05. 2779
83 11. 5562
Sample @ 1550
core refusal: ~~5.8'~~ ~~6.5'~~ 7.5'
recovery: 7.5'
depth to bottom: 3.5'

ponar 1 attempt
silty with little fine
sand. SAV present

1612 Arrive @ CI13-48
Position move due to
RE. repositioning sample
to area with more
deposition

9/26/13

depth to bottom: 3.58
Sample @ 1625
42 05 1454
83 11 7157

ponar 1 attempt
silt with little fine sand
limited SAV.

core refusal: 4.25
recovery: 4.58

Odor and sheen observed
(napthalene odor)

1642 arrive @ CI13-42
depth to btm: 3.83
42 ~~05~~ 04. 9309
83 11.55~~18~~
Sample @ 1655 60
core refusal: ~~5.8~~ 4.5
recovery: 5.58

hydrocarbon odor
light sheen observed

9/26/13

ponar 1 core attempt
silt ~~a~~ with little fine sand

1725 arrive @ CI13-21
for ponar grab

Sample @ 1735

42 04.87560 N
83 10.5433 W

Sand and cobble
some SAV
10+ attempts to obtain
sufficient volume

1805 Return to dock

SW

9/27/13

65°F
calm
Sunny

0820 Depart from dock
S. White
R. Ellison
J. Bann
S. Coullard

0840 Arrive @ CI13-38

Sample @ 0855

Depth to Bottom: 3.75 ft

Ponar Field Dup taken at location. One attempt.
Silt with Fine Sand
42° 04.7007 N
83 11.4689 W

core refusal: 4.75 ft
recovery: 5.58 ft

0921 arrive @ CI13-37

9/27/13

sample location moved
due to macrophyte density

Depth to bottom 4.58'

Sample @ (0935)

core refusal: 3.0 ft
recovery: 3.0 ft

42° 04.5970
83 11. 4432

ponar ~~2 atter~~ ②
2 attempts. Dense
macrophytes. ~~Slt~~ Silt with
trace fine sand.

0950 Arrive @ ~~CI 38~~ CI 13-32
Sample location moved
due to shallow water.
Dense macrophytes of
different species
Sample @ (1005)
Depth to bottom 4.5

9/27/13

ponar 1 attempt.
silt with fine to coarse
sand

core refusal ~~4.5~~ 2.5 ft
recovery: 2.25 ft

42 04.4480 N
83 11.4165 W

1023 arrive @ CI 13-33

moved location due to
dense macrophyte colony

depth to bottom 4.5'
Sample @ (1035)

core refusal 5.0
recovery 5.25

42 04.5547N
83 11.3090 W

ponar 1 attempt. Silt with fine
sand

9/27/13

1105 Arrive @ CI 13-34

Depth to bottom 4.75'
Sample @ 1120

42 04.6784 N
83 11.2835 W

ponar MS/MSD taken on ponar sample
1 attempt.
Silt with fine sand

core refusal: SW ~~4.75'~~ 8.5'
recovery: 9.08'

1145 Arrive @ CI 13-31

Location moved slightly to sample in area that is slightly more shallow per R.E.

Sample @ 1200

Depth to bottom 6.5'

9/27/13

core refusal: 6.0
recovery:

42° 04.3280 N
83° 11.0741 W

ponar Field Dup (split) taken on ponar sample

One attempt a ponar
silt with some fine sand
SAV present

1218 Arrive @ CI 13-50

Depth to bottom 8.58

ponar Sample @ 1235

42 04.2219
83 11.7669

Sample moved off location per R.E. to a more shallow depth

9/27/13

Core refusal 6.5'
recovery 0.0'

Initial core lost upon retrieval.

Revised core: Revise DTB to 8.10 as core is moved. New coordinates for core are

42 04.2209 N
83 11.7677 W

SW ~~Revised core~~ refusal 6.0
recovery 0.0

Second core is lost during recovery

2nd Revised core Revise DTB to 8.10 as core is moved. New coordinates are:
42 04.2198
83 11.7673

9/27/13

Second revised core is lost as well

1257 Return to dock

1500 Arrived @ CI13-01

Re-take ponar sample
42°05. ~~7759~~ SW 7910
83°11. ~~3087~~ 2230

sample @ 1501

2 ponar attempts

medium to coarse sand. trace silt and cobble

1538 Arrive @ CI13-02

Retake ponar sample
42° 05.8438
83 11.0032
Sample @ 1544
Six attempts

9/27/03
1610 Arrive @ CI 13-03
re-sample original location
Retake ponar
Sample @ 1620

One attempt

Fine to coarse sand with silt.

1626 arrive @ CI 13-04

Retake ponar
sample @ 1635

42° 05.6439
83° 10.5188

One attempt

Fine to coarse sand with silt

9/27/13
1640 Arrive @ CI 13-05
re-sample ponar
@ original location

Sample @ 1645

42° 05.5424
83 10.3806

3 attempts
fine to coarse sand and silt

1655 Arrive @ CI 13-06

Retake ponar
Sample @ 1700

42 ~~8~~ 05.4031
83 10.3197

2 attempts
fine to coarse sand and silt

9/27/13 SW ~~Arrive @~~

1709 Arrive @ CI13-07

Retake ponar
Sample @ 1720

42° 05.3693
83 10.2662

3 attempts
Fine to coarse sand with silt

1725 Arrive @ CI13-08

retake ponar
sample @ 1735

42 05.3292
83 10.1205

4 attempts
fine to coarse sand with silt.
dense SAV

9/27/13

1745 Head back to launch ramp

1800 arrive @ boat ramp

SW

9/30/13

60 F
Overcast
no wind

0800 Arrive at ramp

0825 Depart from dock
S. Whitin
J. Borem
S. Coulland
R. Ellison

0837 Arrive @ KI13-50
to re-attempt core.
Ponar sample was previously
collected on 9/27/13.

Depth to bottom: 8.16'

core
42° 04.2195 N
83 10.7641 W

refusal: 6.5'
recovery: 6.33'

Sample @ 0850

9/30/13

0912 Arrive @ CI13-29

depth to bottom: 14.58'
strong current might be affecting
~~core:~~ depth reading.

core. Initial attempt yielded
no recovery on zero penetration

42° 04.5939 N
83° 10.8784 W

Second attempt yields
no penetration. Move
sample location slightly
to:

42° 04.5923 N
83° 10.8797 W

Third attempt on new
coordinates yields no
penetration. ~~Move sample~~ (SC)
~~location further to the east~~
~~in an attempt to find softer material~~

9/30/13

Sample location CI13-29 is
abandoned and new location
CI13-29A is attempted east
of CI13-29

0930 Arrive @ CI13-29A

Depth to bottom: 10.1'

core refusal: 3.0'
recovery: 2.83'

Sample @ 0945

42° 04.5995 N
83° 10.8170 W

ponar 1 attempt. Fine to
course sand with silt.
SAV present

9/30/13
1015 Arrive @ CI13-28

Depth to bottom: 5.83'
Location moved slightly due to rocks
ponar 1 attempt: Silt
with fine to coarse sand

42 05.2656N
83 11.0985W

Sample @ 1030

core refusal: 9.0'
recovery: 9.75

R.E. states that it
might be beneficial
to return to 28 area
to determine if there is
a change in substrate
in the area.

1052 Arrive @ CI13-27 sw

Depth to Bottom: 16.~~8~~300

9/30/13

Likely that strong current is making DTB reading more than it is.

core No penetration. Small to med cobble

42 05.4538 N
83 11.1090 W

Abandon CI13-27

1118 Arrive @ CI13-27A

Depth to bottom: 3.25'

Location moved closer to shore per R.E.

core 42 05.4440 N
83 11.1203 W

refusal: 6.5
recovery: 6.75
odor present.
sample @ 1135

9/30/13

ponar 1 attempt. Fine to coarse sand with silt. SAV present

1150 Arrive @ CI13-25

Off location slightly due to strong current. In same depositional area as intended, so R.E. is OK with location.

Depth to Bottom: 2016
strong current may affect sounding.

ponar 4 attempts. Medium sand with trace silt.
sample @ 1205

42 05.7063 N
83 10.8103 W

core refusal: 6-in
recovery: recovery medium cobble.

9/30/13

no sand or silt. Approx
6-in of cobble is recovered (fist diameter)
but no sample. Second
attempt made at:
42 05.40050 N
83 10 8093 W

6-in penetration and recovery
of cobble only. No sample.

No core taken @ CI13-25

1240 Arrive @ CI13-26

Depth to bottom: 7.5'
sample @ 1250
42 05. 6069 N
83 10. 9426 W

core refusal: 8.0'
recovery: 8.16'

ponar One attempt. Silt
with fine sand. Some
SAV.

9/30/13
1259 return to camp

1450 Depart camp

1455 Arrive @ CI13-09

re sample ponar @
1500
(52)
42°05[illegible] 2413 N
83 09. 9742 W

2 attempts. Silt with fine
Sand. SAV present

1505 Arrive @ CI13-10

re-sample ponar @
1515

42 05. 2752 N
83 09. 7555 W

2 attempts. Silt ~~with~~ and
fine sand. SAV present

9/30/13

1520 Arrive at CI13-11

resample ponar @ ~~1~~ 1525.

42 05.1647
83 09.5779

2 attempts. Silt and fine sand. SAV present

1536 Arrive at CI13-12

resample ponar @ 1543

42 04.9972
83 09.8577

One attempt Silt and fine sand. SAV present

1548 Arrive @ CI13-13
resample @ 1555

9/30/13

42° 05. 1600 N
83° 10. 3322 W

One attempt. Silt with fine sand. Significant milfoil present

1600 Arrive @ CI13-14
resample ponar @ 1605

42° 04. 9861 N
83° 10. 2147 W

One attempt. Silt with fine sand. SAV present

1615 Arrive @ CI13-15
re-sample ponar @ 1625

42° 04. 8191 N
83° 10. 0891 W
One attempt. Silt with fine sand. SAV present

9/30/13

1632 Arrive @ CI13-16

resample ponar @ (1640)

42° 04.6537 N
83° 10.0130 W

2 attempts. Silt with fine sand
Significant milfoil
present.

1650 Arrive @ CI13-17

resample ponar @ (1655)

42° 04.4355
83 09.9945

One attempt. Silt with
fine sand. Less dense SAV

9/30/13

1707 Arrive @ CI13-18A

resample ponar @ (1715)

42° 04. 3198
83 10 ~~09~~. 2079
(SW)

3 attempts yield no
sample. Reposition to:

42° 04.3217
83° 10~~09~~. 2127
(SW)

10+ attempts. Silt and
fine sand and gravel and
some cobble.

1740 Arrive @ CI13-30

resample ponar @ (1745)

42° 04.4736
83° 10.5070

9/30/13

2 attempts. Silt with fine and coarse sand

1806 Arrive @ CI13-20

resample @ ponar @ 1815

42° 04.6758
83° 10.6276

One attempt.
Fine and coarse sand with silt. No SAV present.

~~1862 Arrive @ CI13-21~~

1826 head to camp.

10/28/13

mostly cloudy
52°F
wind 5-8mph

0815 - meet Rose Ellison at EPA office. Load up IDW and head to Mudpuppy.

@ 930 - load IDW onto mudpuppy. Conduct H+S meeting for Ecorse/River Rouge.

0950 - leave dock - plan to dump IDW first

11:10 - all IDW disposed of - head to CI13-24 for ponar

1154 - onsite at CI13-24
42° 05.2521 N 83° 10.5562 W

Ponar: 2 ponars taken for volume. Mostly silty with sand + layer of organics. Some macrophytes present

1214 onsite at CI13-23
42° 05.1258 N 83° 10.6701 W

Ponar: 1 ponar taken for volume, Sandy silt with organic layer, some macrophytes

10/28/13

1233 - onsite at CI13-22
42°04.8923N 83°10.7203W

Ponar: 2 ponars taken for volume.
Sand with some darker organic
layering. Some macrophytes.

1300 - back at dock - mobe to Ecorse

1520 - leave dock River Rouge/Ecorse

1533 - onsite at RREC13-36
42°14.0963N 83°08.8892W
water depth = 8.6 ft

Ponar: 1 ponar taken. Silty with leaf litter.

Core: Refusal = 3.0 ft
Recovery = 2.8 ft

1604 - onsite at RREC13-40
42°14.1417N 83°08.6605W
water depth = 3.5 ft
-sheen observed while anchoring

Core: Refusal = 7.0 ft
Recovery = 7.1 ft

10/28/13

RREC13-40 con't

Ponar: 3 ponars taken: Medium - coarse sand
with some shell frag.

1639 - onsite at RREC13-37
42°14.2855N 83°08.5958W
water depth = 3.08 ft

Ponar: 1 ponar taken, Silt with organics

Core: Refusal = 10 ft
Recovery = 9.5 ft

1710 - head back to dock

10/29/13

overcast
47°F
wind 5-10mph W

0800 - meet at marina - Sam Voss
Rose Ellison
Joe Bonen
Stacy Coullard

0820 - leave marina

Field Data Collection Forms

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-01 **Area**

Lat. 42°6.7901 **Long.** 83°11.2194 **Degrees Decimal Minutes**

Date Collected: 9/23/13 **Time Collected:** 1058

Sample Collected By: SV

Water Depth: 12.0 **ft**

Sediment Depth: 2.5 ft

Sediment Recovery: 1.6 ft **% Recovery:** 64

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) Lat. **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Sandy surface with some gravel - light grey
Some large snail shells

Comments/Remarks: 1 core taken + ponar sample taken. Strong current!

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-01 **Area** SW

Lat. 42 05.~~2759~~ 7910 SW **Long.** 83 11.~~2084~~ 2230 **Degrees Decimal Minutes**

Date Collected: 9/27/01 **Time Collected:** 1501

Sample Collected By: SW

Water Depth: ______ **ft**

Sediment Depth: ______

Sediment Recovery: ______ **% Recovery:** ______

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ______

Sample Collected to refusal: YES [✓ NO]

Coordinates as proposed: YES NO

(New) **Lat.** ______ **Long.** ______ **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Medium to coase sand. trace silt and ~~cobb~~ cobble

Comments/Remarks: 2 ponar attempts

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-02 **Area**

Lat. 42°05.8541 **Long.** 83°11.0024 **Degrees Decimal Minutes**

Date Collected: 9/23/13 **Time Collected:** 1200

Sample Collected By: SV

Water Depth: 16 **ft**

Sediment Depth: 0 ft

Sediment Recovery: 0 ft **% Recovery:** —

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Ponar -> Sandy w/ some silt; greyish brown with some dark stained streaks. Macrophytes and mussel shells present. Some sheen observed. Core: unable to recovery any sediment - decide to abendon location

Comments/Remarks: 2 ponar attempts necessary for required volume. 2 attempt at vibracore unsucessful. 1st attempt all stone; 2nd attempt no recovery at all

Location Abendoned

SIGNATURE: T Voss

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-02 **Area**

Lat. 42 05.8438 **Long.** 83 11.0032 **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1545

Sample Collected By: SW

Water Depth: ____ **ft**

Sediment Depth: ____

Sediment Recovery: ____ **% Recovery:** ____

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ____

Sample Collected to refusal: YES [✓ NO] ____

Coordinates as proposed: YES NO

(New) **Lat.** ____ **Long.** ____ **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) loose fine to coarse sand. Trace silt

Comments/Remarks: Resample ponar interval - Six attempts

SIGNATURE: SW

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-03 **Area**

Lat. 42°05.6982 **Long.** 83°10.4576 **Degrees Decimal Minutes**

Date Collected: 9/23/13 **Time Collected:** 1425

Sample Collected By: SV

Water Depth: 6.0 **ft**

Sediment Depth: 2.5

Sediment Recovery: 35 in **% Recovery:** 116

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: [✓ YES] ~~NO~~ **Depth:** SURFACE

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) silty surface with some sand; light brown color. grey clay below approximately the top ft. Sediment surface covered in macrophytes

Comments/Remarks: A total of 3 ponar samples taken for required volume due to the extensive macrophytes. 1 core collected

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-03 **Area** ________

Lat. ________ **Long.** ________ **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1620

Sample Collected By: SW

Water Depth: ________ **ft**

Sediment Depth: ________

Sediment Recovery: ________ **% Recovery:** ________

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ________

Sample Collected to refusal: YES [✓ NO] ________

Coordinates as proposed: YES NO

(New) Lat. ________ **Long.** ________ **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Fine to coarse sand with silt
one attempt

Comments/Remarks: Resample CI13-03 ponar.

SIGNATURE: SSW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-04 **Area**

Lat. 42°05.6475 **Long.** 88° 10.5191 **Degrees Decimal Minutes**

Date Collected: 9/23/13 **Time Collected:** 1308

Sample Collected By: SV

Water Depth: 5.58 **ft**

Sediment Depth: 3.5 ft

Sediment Recovery: 39 in **% Recovery:** 92

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment silty with some sand and macrophytes.

Comments/Remarks: A total of 2 ponar samples taken.

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-04 **Area**

Lat. 42 05.6439 **Long.** 83 10.5188 **Degrees Decimal Minutes**

Date Collected: 9/27/013 **Time Collected:** 1635

Sample Collected By: SW

Water Depth: ______ **ft**

Sediment Depth: ______

Sediment Recovery: ______ **% Recovery:** ______

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ______

Sample Collected to refusal: YES [✓ NO] ______

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** ______ **Long.** ______ **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) fine to coarse sand with silt

Comments/Remarks: re-sample CI13-04 ponar

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-05 **Area**

Lat. 42°05.5470 **Long.** 83°10.3758 **Degrees Decimal Minutes**

Date Collected: 9/23/13 **Time Collected:** 1542

Sample Collected By: SV

Water Depth: 5'5" **ft**

Sediment Depth: 3.0 ft

Sediment Recovery: 35 in **% Recovery:** 96

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment mostly silt with some sand. Light brown color. Macrophytes.

Comments/Remarks: A total of 2 ponars taken for volume

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-05 **Area**

Lat. 42° 05.5424 **Long.** 83° 10.3806 **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1645

Sample Collected By: SW

Water Depth: ______ **ft**

Sediment Depth: ______

Sediment Recovery: ______ **% Recovery:** ______

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ______

Sample Collected to refusal: YES [✓ NO] ______

Coordinates as proposed: YES NO

(New) Lat. ______ **Long.** ______ **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) 3 attempts. fine to coarse sand and silt

Comments/Remarks: Cc sample CI13-05 ponar

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-06 **Area**

Lat. 42°05.4064 **Long.** 83°10.3155 **Degrees Decimal Minutes**

Date Collected: 9/23/13 **Time Collected:** 1613

Sample Collected By: SV

Water Depth: 6'9" **ft**

Sediment Depth: 1.25

Sediment Recovery: 19" **% Recovery:** 126

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface silt with some sand. Thick macrophytes

Comments/Remarks: A total of 2 ponar samples taken for volume. A total of 2 cores (1st core - contents lost).

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-06 **Area**

Lat. 4205.4031 **Long.** 83 10.3197 **Degrees Decimal Minutes**

Date Collected: **Time Collected:** 1700

Sample Collected By: SW

Water Depth: ft

Sediment Depth:

Sediment Recovery: **% Recovery:**

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: YES [✓ NO]

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) 2 attempts. fine to coarse sand and silt

Comments/Remarks: resample CI13-06 ponar

SIGNATURE: SW

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-07 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/23/13 **Time Collected:** 1656

Sample Collected By: SV

Water Depth: 7'7" ft

Sediment Depth: 2.0 ft

Sediment Recovery: 20 in - 1.6 ft **% Recovery:** 80%

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: [✓ YES] ~~NO~~ **Depth:** SURFACE

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

[✓ (New)] **Lat.** 42°05.3701 **Long.** 83°10.2725 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment - silt with some sand turning into clay. Heavy macrophytes at surface

Comments/Remarks: A total of 2 ponar sample taken for volume.

★ - Location moved by EPA (Rose Ellison). Moved up river of entrance to marina to avoid possible influence of contamination from marina

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-07 **Area**

Lat. 42°05.3693 **Long.** 83°10.2662 **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1720

Sample Collected By: SW

Water Depth: ______ **ft**

Sediment Depth: ______

Sediment Recovery: ______ **% Recovery:** ______

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ______

Sample Collected to refusal: YES [✓ NO] ______

Coordinates as proposed: [✓ YES] NO

(New) Lat. ______ **Long.** ______ **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Fine to coarse sand with silt

Comments/Remarks: re-sample CI13.07 ponar

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-08 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 0844

Sample Collected By: SV

Water Depth: 3.4 **ft**

Sediment Depth: 0

Sediment Recovery: 0 **% Recovery:** —

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°05.3281 **Long.** 83°10.1176 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Ponar samples contained silt with some sand and organics. Heavy macrophytes

Comments/Remarks: A total of 5 ponar samples taken for volume due to macrophytes. Made 3 attempts with vibracore and unable to recover any sample.

Location moved offshore because it was too close to shore and a large rock was in the area.

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-08 **Area**

Lat. 42 05.3292 **Long.** 83 10.1205 **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1735

Sample Collected By: SW

Water Depth: ______ **ft**

Sediment Depth: ______

Sediment Recovery: ______ **% Recovery:** ______

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ______

Sample Collected to refusal: YES [✓ NO] ______

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** ______ **Long.** ______ **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) fine to coarse sand with silt dense, SW

Comments/Remarks: re-sample CI13-08 ponar

SIGNATURE: SW

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-09 **Area**

Lat. 42°05.2374 **Long.** 83°09.9737 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 0915

Sample Collected By: SV

Water Depth: 5.4 **ft**

Sediment Depth: 1.8 ft

Sediment Recovery: 1.75 **% Recovery:** 97

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) Lat. **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment silty with gravel and stone. Some sand and organics. Bottom of core stiff clay.

Comments/Remarks: A total of 2 ponar samples taken for required volume due to extensive macrophytes.

SIGNATURE: Voss

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-09 **Area**

Northing 42°05.2413 **Easting** 83°09.9742 **~~WGS84~~**

Date Collected: 9/30/13 **Time Collected:** 1500

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:**

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) Northing **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt with fine sand.

Comments/Remarks: returned to location for ponar sample
2 ponars taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-10 **Area**

Lat. 42°05.2707 **Long.** 83°09.7572 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 0948

Sample Collected By: SV

Water Depth: 4.9 **ft**

Sediment Depth: 4.5 ft

Sediment Recovery: 4.25 ft **% Recovery:** 94

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) surface sediment silty with some sand and organic staining.

Comments/Remarks: 1 ponar taken for volume. MS/MSD sample taken at surface. Sample taken in bare spot - patch where no macrophytes present.

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-10 **Area**

Northing 42° 05.2852 **Easting** 83°09.7555 **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1515

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt + fine sand. SAV

Comments/Remarks: Returned to location for ponar sample
2 ponars taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-11 **Area**

Lat. 42°05.1642 **Long.** 83°09.5828 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1023

Sample Collected By: SV

Water Depth: 6.6 **ft**

Sediment Depth: 3.75 ft

Sediment Recovery: 3.4 ft **% Recovery:** 90

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface silty with some sand + organics. Bottom of core clay with some gravel

Comments/Remarks: A total of 2 ponar samples taken due to macrophytes

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-11 **Area**

Northing 42°05.1647 **Easting** 83°09.5779 **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1525

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt + fine sand. SAV

Comments/Remarks: Returned to location for ponar sample
2 ponars taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-12 **Area**

Lat. 42°04.9954 **Long.** 83°09.8623 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1054

Sample Collected By: SV

Water Depth: 7.5 **ft**

Sediment Depth: .5 ft

Sediment Recovery: 0 ft **% Recovery:** —

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) surface sediment silt (somewhat plastic) with little sand

Comments/Remarks: 1 ponar sample taken, could not recover sample with vibracore

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-12 **Area**

Northing 42°04.9972 **Easting** 83°09.8577 **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1543

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt + fine sand. SAV

Comments/Remarks: Returned to location for ponar sample
1 ponar taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-13 **Area**

Lat. 42°05.1563 **Long.** 83°10.3259 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1128

Sample Collected By: SV

Water Depth: 7.16 **ft**

Sediment Depth: 4 ft

Sediment Recovery: 4.5 ft **% Recovery:** 112

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) surface sediment silt with little sand

Comments/Remarks: A total of 2 ponar samples taken for volume due to macrophytes

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-13 **Area**

Northing 42°05.1600 **Easting** 83°10.3322 **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1555

Sample Collected By: SW

Water Depth: — ft

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt with fine sand. Significant milfoil present

Comments/Remarks: Returned to location for ponar sample 1 ponar taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-14 **Area**

Lat. 42°04.9832 **Long.** 83°10.2095 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1353

Sample Collected By: SV

Water Depth: 7.0 **ft**

Sediment Depth: 3.5

Sediment Recovery: 3.16 **% Recovery:** 90

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) surface sediment silt with organic staining, Eurasian Milfoil present. Stiff clay at bottom of core.

Comments/Remarks: A total of 1 ponar taken. Eurasian Milfoil present in surface grab

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-14 **Area**

Northing 42°04.9861 **Easting** 83°10.2147 ~~**WGS84**~~

Date Collected: 9/30/13 **Time Collected:** 1605

Sample Collected By: SW

Water Depth: — ft

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt with fine sand. SAV

Comments/Remarks: Returned to location for ponar sample
1 ponar taken

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-15 **Area**

Lat. 42°04.8148 **Long.** 83°10.0889 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1425

Sample Collected By: SV

Water Depth: 6.5 **ft**

Sediment Depth: 2.25 ft

Sediment Recovery: 2.25 ft **% Recovery:** 100

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment silt with some sand/gritty material and organic staining. Some macrophytes. Botton of core stiff clay

Comments/Remarks: 1 ponar sample taking. Eurasian milfoil present

SIGNATURE: Paul Voss

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-15 **Area**

Northing 42°04.8191 **Easting** 83°10.0891 ~~**WGS84**~~

Date Collected: 9/30/13 **Time Collected:** 1625

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt with fine sand. SAV

Comments/Remarks: Returned to location for ponar sample
1 ponar taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-16 **Area**

Lat. 42°04.6517 **Long.** 83°10.0088 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1456

Sample Collected By: SV

Water Depth: 6.08 **ft**

Sediment Depth: 2.5 ft

Sediment Recovery: 2.25 ft **% Recovery:** 90

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment silty with some organic staining and sand/gritty material. Bottom of core stiff clay

Comments/Remarks: A total of 3 ponars taken for volume due to macrophytes. Eurasian Milfol present

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-16 **Area**

Northing 42°04.6537 **Easting** 83°10.0130 ~~**WGS84**~~

Date Collected: 9/30/13 **Time Collected:** 1640

Sample Collected By: SW

Water Depth: — ft

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt with fine send. Significant milfoil present

Comments/Remarks: Returned to location for ponar sample 2 ponars taken

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-17 **Area**

Lat. 42°04.4366 **Long.** 83°09.9937 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1543

Sample Collected By: SV

Water Depth: 3.3 **ft**

Sediment Depth: 1.2 ft

Sediment Recovery: 1.1 ft **% Recovery:** 91

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment mostly sand with some silt. core mostly sand.

Comments/Remarks: A total of 3 poner sample taken

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-17 **Area**

Northing 42°04.4355 **Easting** 83°09.9945 **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1655

Sample Collected By: SW

Water Depth: ______ **ft**

Sediment Depth: ______

Sediment Recovery: ______ **% Recovery:** ______

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:** ______

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** ______ **Easting** ______ **WGS84**

Sample Observations: (color, texture, odor) silt with fine sand. Less SAV present

Comments/Remarks: Returned to location for ponar sample
1 ponar taken

SIGNATURE: ______

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-18 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1624

Sample Collected By: SV

Water Depth: 6.4 **ft**

Sediment Depth: 0

Sediment Recovery: 0 **% Recovery:** —

Sample Technique: VIBRACORE GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) Lat. 42°04.2523 **Long.** 83°10.2547 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Sediment surface all rock

Comments/Remarks: Made 3 attempts with ponar - rocky bottom - no recovery

* Location coordinates do not match location of the map. EPA decision to sample at map location

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13 - 18A **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1641

Sample Collected By: SV

Water Depth: 4.5 **ft**

Sediment Depth: 0.9 ft

Sediment Recovery: 0.7 ft **% Recovery:** 77%

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.3228 **Long.** 83°10.2212 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Stiff clay with gravel, larger stones, coarse sand

Comments/Remarks: Attempted 3 ponar samples and no recovery. 2 vibracore samples taken -

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-18A **Area**

Northing 42°04.3198 **Easting** 83°10.2049 ~~WGS84~~

Date Collected: 9/30/13 **Time Collected:** 1715

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt, fine sand with gravel + some cobble

Comments/Remarks: Returned to location for ponar sample
10 ponars taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-19 **Area**

Lat. 42°04.3879 **Long.** 83°10.4510 **Degrees Decimal Minutes**

Date Collected: 9/24/13 **Time Collected:** 1722

Sample Collected By: SV

Water Depth: 7.6 **ft**

Sediment Depth: 0

Sediment Recovery: 0 **% Recovery:** —

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) Lat. **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Rocky bottom. Sampling unsuccessful

Comments/Remarks: Made 2 attempts with vibracore and 3 attempts with ponar and were unable to get any recovery at all

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-20 **Area**

Lat. 42°04.6740 **Long.** 83°10.6311 **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 0842

Sample Collected By: SV

Water Depth: 8.08 **ft**

Sediment Depth: 2 ft

Sediment Recovery: 1.8 ft **% Recovery:** 90

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** See top ↑ **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) surface sediment silty sand, dark. core mostly sand

Comments/Remarks: * ponar sample taken. No macrophytes present.

* Location moved west offshore from Celeron Is. because of a group of large rocks in the area of the proposed location

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-20 **Area**

Northing 42°04.6758 **Easting** 83°10.6276 ~~**WGS84**~~

Date Collected: 9/30/13 **Time Collected:** 1815

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) fine + coarse sand with silt. No SAV

Comments/Remarks: Returned to location for ponar sample
1 ponar taken

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-21 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 0959

Sample Collected By: SV

Water Depth: 3.16 **ft**

Sediment Depth: 0

Sediment Recovery: 0 **% Recovery:** —

Sample Technique: ~~VIBRACORE~~ GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.7513 **Long.** 83°10.5518 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment silty sand with some gravel and scattered cobbles

Comments/Remarks: A total of 3 ponars samples taken for volume due to scattered cobble. Some macrophytes. 2 attempts at vibracoring made and no penetration possible - unable to vibracore

* Location moved because it was too close shore and the water was too shallow to access with mudpuppy

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-22 **Area**

Lat. 42°04.8959 **Long.** 83°10.7214 **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1033

Sample Collected By: SV

Water Depth: 3.58 **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Sample Technique: VIBRACORE GEOPROBE PONAR

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment sand with a little organic staining.

Comments/Remarks: No core taken because are is hard pack sand. Attempted probe and could not penetrate more than 2 inches

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-23 **Area**

Lat. 42°05.1270 **Long.** 83°10.6716 **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1100

Sample Collected By: SV

Water Depth: 5.58 **ft**

Sediment Depth: 3.5 ft

Sediment Recovery: 3.3 ft **% Recovery:**

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment sandy silt, macrophytes
Bottom of core stiff clay

Comments/Remarks: Eurasian milfoil present. 2 cores taken - lost contents of 1st core

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-24 **Area**

Lat. 42°05.2548 **Long.** 83°10.5583 **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1356

Sample Collected By: SV

Water Depth: 5.58 **ft**

Sediment Depth: 1.5 ft

Sediment Recovery: 1.25 ft **% Recovery:** 83

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) Lat. **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Stiff clay at bottom of core

Comments/Remarks: Heavy macrophytes - Eurasian milfoil present

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-25 **Area**

Northing See below **Easting** **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1205

Sample Collected By: SW

Water Depth: 20.16 **ft**

Sediment Depth: .5 ft

Sediment Recovery: 0 **% Recovery:** —

Drill Event: Initial Second

Sample Technique: [✓ VIBRACORE] DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES [✓ NO]

(New) **Northing** 42° 05.4063 **Easting** 83° 10.8103 **WGS84**

Sample Observations: (color, texture, odor) Sand with trace silt

Comments/Remarks: Location off slightly due to strong current. No core recovered - all cobble

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-26 **Area**

Northing 42°05.6069 **Easting** 83°10.9426 **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1250

Sample Collected By: SW

Water Depth: 7.5 **ft**

Sediment Depth: 8.0

Sediment Recovery: 8.16 **% Recovery:** 162

Drill Event: [✓ Initial] Second

Sample Technique: [✓ VIBRACORE] DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) Ponar - silt with fine sand. some SAV

Comments/Remarks: 1 ponar taken

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-27A **Area**

Northing See below **Easting** **WGS84**

Date Collected: 9/30/13 **Time Collected:** 1135

Sample Collected By: SW

Water Depth: ~~16.~~3.25 **ft**

Sediment Depth: 6.5

Sediment Recovery: 6.75 **% Recovery:** 103

Drill Event: Initial Second

Sample Technique: [✓ VIBRACORE] DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES NO

(New) **Northing** 42°05.4440 **Easting** 83°11.1203 **WGS84**

Sample Observations: (color, texture, odor) odor detected in core.
Ponar - fine to coarse sand with silt. SAV present

Comments/Remarks: CI13-27 was abandoned due to zero penetration with vibracore.

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-28 **Area**

Northing See below **Easting** ~~**WGS84**~~

Date Collected: 9/30/13 **Time Collected:** 1030

Sample Collected By: SW

Water Depth: 5.83 **ft**

Sediment Depth: 9.0

Sediment Recovery: 9.75 **% Recovery:** 108

Drill Event: [✓ Initial] Second

Sample Technique: [✓ VIBRACORE] DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Northing** 42° 05.2656 **Easting** 83° 11.0985 ~~**WGS84**~~

Sample Observations: (color, texture, odor) silt with fine to coarse sand

Comments/Remarks: location moved slightly due to rocks

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-29A **Area**

Northing see below **Easting** ~~WGS84~~

Date Collected: 9/30/13 **Time Collected:** 0845

Sample Collected By: SW

Water Depth: 10.1 **ft**

Sediment Depth: 3.0 ft

Sediment Recovery: 2.83 ft **% Recovery:** 94

Drill Event: [✓ Initial] Second

Sample Technique: [✓ VIBRACORE] DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES NO

(New) **Northing** 42° 04.5995 **Easting** 83° 10.8170 ~~WGS84~~

Sample Observations: (color, texture, odor) Fine to coarse sand with silt. SAV present

Comments/Remarks: CI13-29 was abandoned after 3 failed attempts of sampling. Location moved to the east CI13-29A

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13 - 30 **Area**

Lat. location off **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 0921

Sample Collected By: SV

Water Depth: 7.9 **ft**

Sediment Depth: 2.0ft

Sediment Recovery: 1.5 **% Recovery:** 75

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: [✓ YES] NO **Depth:** MS/MSD

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) Lat. 42°04.4773 **Long.** 83°10.5125 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface sediment silty sand, dark. Core mostly sand

Comments/Remarks: Eurasian milfoil present. MS/MSD collected

Location approximately 40ft off proposed site. The offset is OK with EPA (Rose Ellison)

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-30 **Area**

Northing 42°04.4736 **Easting** 83°10.5870 ~~**WGS84**~~

Date Collected: 9/30/13 **Time Collected:** 1745

Sample Collected By: SW

Water Depth: — **ft**

Sediment Depth: —

Sediment Recovery: — **% Recovery:** —

Drill Event: Initial Second

Sample Technique: VIBRACORE DIRECT-PUSH [✓ GRAB]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES NO

(New) **Northing** **Easting** **WGS84**

Sample Observations: (color, texture, odor) silt with fine to coarse sand

Comments/Remarks: Returned to location for ponar sample
2 ponars taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-31 **Area**

Lat. see bel **Long.** **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1200

Sample Collected By: SW

Water Depth: 6.5 **ft**

Sediment Depth: 6.0

Sediment Recovery: 6.91 **% Recovery:** 115

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES NO

(New) **Lat.** 42 04.3280 **Long.** 83 11.0741 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Silt with some fine sand. SAV present

Comments/Remarks: Location moved slightly to sample in area that is slightly more shallow per R.E.
Field Dup (split) taken on ponar

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-32 **Area**

Lat. **Long.** **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1005

Sample Collected By: SZW

Water Depth: 4.5 **ft**

Sediment Depth: SW ~~4.5~~ 2.5'

Sediment Recovery: SW ~~4.5~~ 2.25 **% Recovery:** 90

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES NO

(New) **Lat.** 42 04.4480 **Long.** 83 11.4165 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) silt with fine to coarse sand

Comments/Remarks: Sample location moved due to shallow water. Dense macrophytes of a variety of species

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-33 **Area**

Lat. See below **Long.** **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1035

Sample Collected By: SW

Water Depth: 4.5 **ft**

Sediment Depth: 5.0

Sediment Recovery: 5.25 **% Recovery:** 105

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42 04.5547 **Long.** 83 11.3090 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Silt with fine sand

Comments/Remarks: moved due to dense macrophyte colony

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-34 **Area**

Lat. 42 04.6784 **Long.** 83 11.2835 **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1120

Sample Collected By: SW

Water Depth: 4.75 **ft**

Sediment Depth: 8.5'

Sediment Recovery: 9.08 **% Recovery:** 105

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Silt with fine sand

Comments/Remarks: MS/MSD Taken on Ponar Sample

SIGNATURE: SSW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-35 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1446

Sample Collected By: SV

Water Depth: 4.58 **ft**

Sediment Depth: 2.0 ft

Sediment Recovery: 2.58 ft **% Recovery:** 129

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.7495 **Long.** 83°11.1287 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Grey clay in majority of core

Comments/Remarks: Very heavy macrophytes - extensive Eurasian milfoil

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-36 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1523

Sample Collected By: SV

Water Depth: 2.6 **ft**

Sediment Depth: 14.5 ft

Sediment Recovery: 14.5 ft **% Recovery:** 100

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.9741 **Long.** 83°11.2249 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Dark sediment - clay at bottom

Comments/Remarks: Heavy microphytes - Eurasian Milfoil

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI 13-37 **Area**

Lat. See below **Long.** **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 0935

Sample Collected By: SW

Water Depth: 4.58 ft

Sediment Depth: 3.0 ft

Sediment Recovery: 3.0 ft **% Recovery:** 100

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) Lat. 42° 04.5970 **Long.** 83° 11.4432 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Silt with trace fine sand, dense macrophytes

Comments/Remarks: Sample location moved due to macrophyte density

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-38 **Area**

Lat. 42 04.7007 **Long.** 83 11.4689 **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 0855

Sample Collected By: SW

Water Depth: 3.75 **ft**

Sediment Depth: 4.75 ft

Sediment Recovery: 5.58 **% Recovery:** 117

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: [✓ YES] NO

(New) Lat. **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Silt with Fine Sand.

Comments/Remarks: Field Dup taken on ponar sample
(split taken) [illegible]

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-39 **Area**

Lat. 42°04.7791 **Long.** 83°11.4320 **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1747

Sample Collected By: SV

Water Depth: 5.08 **ft**

Sediment Depth: 6

Sediment Recovery: 6.4 **% Recovery:** 106

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Dark silt- odor detected
clay at bottom

Comments/Remarks:

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-40 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1718

Sample Collected By: SV

Water Depth: 3.5 **ft**

Sediment Depth: 5.75

Sediment Recovery: 5.9 **% Recovery:** 102

Sample Technique: VIBRACORE GEOPROBE PONAR

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.8218 **Long.** 83°11.5496 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) dark silt with clay at the bottom.

Comments/Remarks: Heavy macrophytes - lilly pads, Euresian milfoil

* Location moved due to very thick weed bed at proposed location

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-41 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/25/13 **Time Collected:** 1655

Sample Collected By: SV

Water Depth: 3.25 **ft**

Sediment Depth: 4.5 ft

Sediment Recovery: 4.9 ft **% Recovery:** 108

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.8447 **Long.** 83°11.6558 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) soft sediment from surface down to clay at bottom

Comments/Remarks: Macrophytes - lilly pads, duck weed, Eurasian Milfoil

* Location moved slightly due to shallow water + heavy vegetation on surface

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI13-42 **Area**

Lat. ____ **Long.** ____ **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1655

Sample Collected By: ____

Water Depth: 3.83 **ft**

Sediment Depth: (SW) ~~5.5'~~ 4.5'

Sediment Recovery: 5.58 **% Recovery:** 122

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES [✓ NO] **Depth:** ____

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** 42` 04.9309 **Long.** 83' 11.5518 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) hydro carbon odor. light sheen Observed

Comments/Remarks: ____

SIGNATURE: ____

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-43 **Area**

Lat. **Long.** **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1025

Sample Collected By: S.W

Water Depth: 3.2 **ft**

Sediment Depth: 6.0

Sediment Recovery: 6.66 **% Recovery:** 110

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:** ~~110%~~

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42° 04.9708 **Long.** 83° 11.7330 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Ponar - silty with some sand, some macrophytes present

Comments/Remarks: One ponar taken

SIGNATURE: Paul T Vos

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI 13-44 **Area**

Lat. **Long.** **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1038

Sample Collected By: SW

Water Depth: 3.83 **ft**

Sediment Depth: 5.0 ft

Sediment Recovery: 5.6 ft **% Recovery:** 112%

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.9869 **Long.** 83° 11.7854 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) One ponar taken. Sheen observed while pulling core.

Comments/Remarks:

Location moved due to extensive lilly pads at location.

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-45 **Area**

Lat. **Long.** **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1105

Sample Collected By: SW

Water Depth: 3.16 **ft**

Sediment Depth: 3.5 ft

Sediment Recovery: 3.4 ft **% Recovery:** 97%

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°04.1038 **Long.** 83°11.8608 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Ponar - silty with some fine sand. Some marcophytes present. Odor observed in poner sample

Comments/Remarks: One poner taken.

Location moved due to inaccessability from extensive lilly pads

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CIB-46 **Area**

Lat. 42°05.0465 **Long.** 83°12.0186 **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1416

Sample Collected By: SV

Water Depth: 3.9 **ft**

Sediment Depth: 5.5 ft

Sediment Recovery: 5.5 **% Recovery:** 100

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) surface sediment dark sandy silt

Comments/Remarks:

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-47 **Area**

Lat. location moved **Long.** see below **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1348

Sample Collected By: SV

Water Depth: 4.0 **ft**

Sediment Depth: 5.5 ft

Sediment Recovery: 5.4 ft **% Recovery:** 98

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42°05.1468 **Long.** 83°11.9006 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Surface - silt, dark. Clay at bottom of core

Comments/Remarks:

* Location moved slightly due to heavy surface vegetation

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-48 **Area**

Lat. **Long.** **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1625

Sample Collected By:

Water Depth: 3.58 **ft**

Sediment Depth: 4.25'

Sediment Recovery: 4.58 **% Recovery:** 107

Sample Technique: [✓ VIBRACORE] GEOPROBE PONAR

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Lat.** 42 05.~~15~~ 1454 **Long.** 83 11.7157 **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Silt with little fine sand odor + sheen observed. Napthalene odor

Comments/Remarks: location moved per RE to area with greater deposition

SIGNATURE: SW

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-49 **Area**

Lat. 42°05.2779 **Long.** 83°11.5562 **Degrees Decimal Minutes**

Date Collected: 9/26/13 **Time Collected:** 1530

Sample Collected By: SW

Water Depth: 3.5 **ft**

Sediment Depth: 7.5

Sediment Recovery: 7.5 **% Recovery:** 100%

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: [✓ YES] NO

(New) **Lat.** **Long.** **Degrees Decimal Minutes**

Sample Observations: (color, texture, odor) Ponar - silt with some fine sand

Comments/Remarks: One ponar taken

SIGNATURE:

Field Data Collection Form

Project Title **Celeron Island Area Site Characterization**

Sampling Location: CI13-50 **Area**

Lat. See below **Long.** **Degrees Decimal Minutes**

Date Collected: 9/27/13 **Time Collected:** 1235

Sample Collected By:

Water Depth: 8.58 **ft**

Sediment Depth: (SW) ~~6.5~~ 6.0

Sediment Recovery: **% Recovery:**

Sample Technique: [✓ VIBRACORE] GEOPROBE [✓ PONAR]

Field duplicate: YES [✓ NO] **Depth:**

Sample Collected to refusal: YES NO

Coordinates as proposed: YES [✓ NO]

Ponar **(New)** **Lat.** 42 04.2216 **Long.** 83 11.7669 **Degrees Decimal Minutes**

core (SW) ~~42 04 2204~~ (SW) ~~83 11.7677~~

Sample Observations: (color, texture, odor)

Comments/Remarks: Sample location moved per R.E to an area, with a more shallow depth. Initial core was lose during recovery, as was second and third attempt

SIGNATURE:

Field Data Collection Form

Project Title Celeron Island Area Site Characterization

Sampling Location: CI 13-50 **Area**

Northing See below **Easting** ~~WGS84~~

Date Collected: 9/30/13 **Time Collected:** 0850

Sample Collected By: SW

Water Depth: 8.16 **ft**

Sediment Depth: 6.5

Sediment Recovery: 6.33 **% Recovery:** 97

Drill Event: Initial [✓ Second]

Sample Technique: [✓ VIBRACORE] DIRECT-PUSH GRAB

Field duplicate: YES NO **Depth:**

Sample Collected to refusal: [✓ YES] NO

Coordinates as proposed: YES [✓ NO]

(New) **Northing** 42° 04.2195 **Easting** 83° 10.7641 ~~WGS84~~

Sample Observations: (color, texture, odor)

Comments/Remarks: Returned to site to reattempt vibracore

SIGNATURE:

Appendix B:

Lithologic Core Logs

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-01

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/23/2013 10:58:00 AM

LATITUDE (D D.M) 42° 05.7901

DATE LOGGED 9/23/2013 1:30:00 PM

LONGITUDE (D D.M) 83° 11.2194

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 560 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.3

CORE RECOVERY (ft) 1.5

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	18	CT	CI13-01-0001	▨	CL	PEBBLEY CLAY: gray clay andpebbles (50%), some gravel (30%), and little organic roots (10%)	0.3
1				▨	CL	GRAVELLY CLAY: gray, semi-stiff and gravel (40%), some coarse sand (25%), 1 large (7x5x4 cm) cobble, little pebbles (15%)	1.5
2						End of Boring at 1.5 ft.	
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-03

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/23/2013 2:25:00 PM

LATITUDE (D D.M) 42° 05.6982

DATE LOGGED 9/24/2013 8:46:00 AM

LONGITUDE (D D.M) 83° 10.4576

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 566 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 3

CORE RECOVERY (ft) 2.9

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-03-0001	▨	CL	GRAVELLY SILTY CLAY: dark gray clay and some gravel (30%), some coarse sand (20%), and some organic debris (25%) up to 8 cm long.	0.3
1				▨	CH	CLAY: gray with light gray/red farving, little gravel (~15%), stiff	
2	23	CT	CI13-03-0103	▨			2.3
				▨	CH	GRAVELLY CLAY: gray clay, stiff, and gravel (45%), angular to subrounded	2.9
3						End of Boring at 2.9 ft.	
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

SEDIMENT BORING CI13-04

EA Engineering, Science, and Technology, Inc.

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/23/2013 8:44:00 AM

LATITUDE (D D.M) 42° 05.6475

DATE LOGGED 9/24/2013 9:15:00 AM

LONGITUDE (D D.M) 83° 10.5191

DRILLING CONTRACTOR Mudpuppy

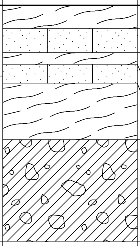
ELEVATION (Sediment Surface) 566.4 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 5.3

CORE RECOVERY (ft) 3.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-04-0001		SC	CLAYEY SAND: dark gray, sand fine to medium	0.3
					SM	SANDY SILT: dark gray	0.7
					SC	CLAYEY SAND: dark gray, sand fine to medium	0.8
1	28	CT	CI13-04-0103		SM	SANDY SILT: dark gray, fine sand	1.1
2					SC	SANDY CLAY: gray soft clay with some medium grained sand (25-30%)	1.9
3					CL	CLAY: gray, semi-soft @29-31": fine to medium grained sand with some soft clay (20%) @37-38": clay and white shell pieces 1 cm across (~60%)	3.3
4						End of Boring at 3.3 ft.	
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-05

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/23/2013 3:42:00 PM

LATITUDE (D D.M) 42° 05.5470

DATE LOGGED 9/24/2013 9:50:00 AM

LONGITUDE (D D.M) 83° 10.3758

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 566.6 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 3.1

CORE RECOVERY (ft) 2.7

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-05-0001		SC	CLAYEY SAND: gray and fine-medium sand (55%), some organic debris (~30%), tuburous ~8 cm long	0.2
1	20	CT	CI13-05-0103	▨	CH	CLAY: stiff gray clay and organic debris (40%), with some gravel/coarse sand (30%), some Pebbles/small cobbles (~20%)	
2							2.7
3						End of Boring at 2.7 ft.	
4							
5							
6							
7							
8							
9							
10							
11							
12							
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14							
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16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-06

PROJECT NUMBER 62561.14
PROJECT NAME Celeron Island
LOCATION Celeron Island, MI
DATE COLLECTED 9/23/2013 4:13:00 PM
LATITUDE (D D.M) 42° 05.4064
DATE LOGGED 9/24/2013 10:20:00 AM
LONGITUDE (D D.M) 83° 10.3155
DRILLING CONTRACTOR Mudpuppy
ELEVATION (Sediment Surface) 562.2 ft IGLD 1985
DRILLING METHOD Vibracore
LOGGED BY M. Gelinas
WATER DEPTH (ft) 3.9
CORE RECOVERY (ft) 1.6

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-06-0001	▨	SC	CLAYEY, SILTY SAND: fine to medium sand with some organic debris <0.5 cm (30%) and some small shells (0.5 cm) (20%). Slight hydrocarbon odor.	1.5
1	7	CT	CI13-06-0103				
				▨	CH	CLAY: gray, stiff with red/light gray farving and some gravel/pebbles (~30%).	1.6
2						End of Boring at 1.6 ft.	
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-07

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/23/2013 4:56:00 PM

LATITUDE (D D.M) 42° 05.3701

DATE LOGGED 9/24/2013 11:00:00 AM

LONGITUDE (D D.M) 83° 10.2725

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 564.4 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.9

CORE RECOVERY (ft) 1.9

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-07-0001		SC	SILTY, SANDY CLAY: gray clay and organic material at surface 8 cm length max. (50%) with some fine-medium grained sand (25%), some silt (~20%); @7-8": one large pebble/small cobble (4x4x3 cm) semiangular, limestone	0.6
1	11	CT	CI13-07-0103		CH	CLAY: gray, stiff with red/light gray farving. Gravel 20%, pebbles 20%.	1.9
2							
3						End of Boring at 1.9 ft.	
4							
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NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-09

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 9:15:00 AM

LATITUDE (D D.M) 42° 05.2374

DATE LOGGED 9/24/2013 2:25:00 PM

LONGITUDE (D D.M) 83° 09.9737

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 566.6 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 5.4

CORE RECOVERY (ft) 1.8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-09-0001	░	SP	GRAVELLY SAND: gray clay and organic debris/roots at surface (50%) with some medium-coarse sand (30%) with some gravel (30%)	0.3
				▨	CH	CLAY: gray, stiff with red/light gray farving and gravel and coarse sand (~35%); some pebbles and organic debris up to 1 cm (~20%); trace small wood pieces ~1cm (10%).	1.8
1	10.2	CT	CI13-09-0103	▨			
2						End of Boring at 1.8 ft.	
3							
4							
5							
6							
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NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-10

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 9:48:00 AM

LATITUDE (D D.M) 42° 05.2707

DATE LOGGED 9/24/2013 2:30:00 PM

LONGITUDE (D D.M) 83° 09.7572

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 567.1 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

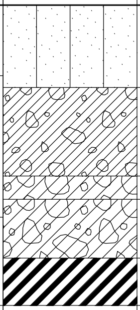
WATER DEPTH (ft) 2.5

CORE RECOVERY (ft) 4.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
0	12	CT	CI13-10-0001
1	24	CT	CI13-10-0103
3	15	CT	CI13-10-0305

DEPTH (ft): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

GRAPHIC LOG



USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
ML	SILT: black/dark gray and organic material (roots) (50%), moisture ~45%	1.2
CL	SILTY CLAY: black/gray organic, semi-stiff with some organic material (roots) (30%)	2.4
GC	GRAVELLY, SILTY CLAY: clay with some gravel (~30%), some organic debris (~30%), and some coarse sand (25%).	2.8
GC	GRAVELLY CLAY: color change to orangeish/brown gray, semi-hard clay with some pebbles (2x2cm) (~20%), subrounded	3.6
CH	CLAY: gray, stiff with red/light gray farving and organic debris 1-3 cm (40%) with some gravel/coarse sand (~30%).	4.3

End of Boring at 4.3 ft.

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-11

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 10:23:00 AM

LATITUDE (D D.M) 42° 05.1642

DATE LOGGED 9/24/2013 3:45:00 PM

LONGITUDE (D D.M) 83° 09.5828

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 565.4 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 3.2

CORE RECOVERY (ft) 3.5

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-11-0001	〰	SC	SANDY, SILTY CLAY: dark gray and organic roots at surface (50%) with some medium-coarse sand (30%) and trace pebbles (~10%)	0.9
1	30	CT	CI13-11-0103	▨	CH	CLAY: gray, organic, semi-stiff with some semi-angular gravel (25%)	1.8
2 3				▨	CH	CLAY: gray, stiff with orange streaks with some subrounded gravel (20%), some pebbles (20%). @32": dry clay inclusions ~1 cm diameter, white in color.	3.5
4						End of Boring at 3.5 ft.	
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-13

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 11:28:00 AM

LATITUDE (D D.M) 42° 05.1563

DATE LOGGED 9/24/2013 4:20:00 PM

LONGITUDE (D D.M) 83° 10.3259

DRILLING CONTRACTOR Mudpuppy

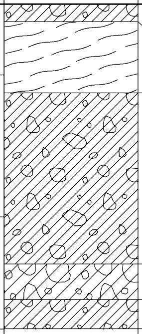
ELEVATION (Sediment Surface) 564.8 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 3.8

CORE RECOVERY (ft) 4.6

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-13-0001		CL SC	SANDY SILTY CLAY: black/gray organic soft clay and organic material 1-2 cm (40%) with some coarse-medium sand (20%), trace pebbles (~10%). CLAYEY SAND: gray medium-fine sand and organic material (40%) with some clay (25%).	0.3 1.3
1 2	24	CT	CI13-13-0103		CL	CLAY: gray, organic, soft with trace coarse subrounded gravel (5%)	3.7
3 4	19	CT	CI13-13-0305		GC CL	GRAVELLY CLAY: gray clay with some medium-coarse gravel, subangular (~30%), some coarse sand (~30%), trace pebbles (10%). @48": white shell hash ~1cm, 40%, wood pieces (thin) ~2 cm CLAY: gray, stiff with red/light gray farving, rounded gravel ~20%	4.2 4.6
5 6 7 8 9 10 11 12 13 14 15 16						End of Boring at 4.6 ft.	

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-14

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 1:53:00 PM

LATITUDE (D D.M) 42° 04.4832

DATE LOGGED 9/25/2013 9:45:00 AM

LONGITUDE (D D.M) 83° 10.2095

DRILLING CONTRACTOR Mudpuppy

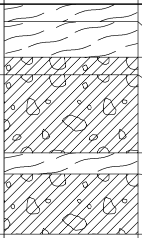
ELEVATION (Sediment Surface) 565 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.2

CORE RECOVERY (ft) 3.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-14-0001		SC	CLAYEY SAND: black, medium sand with faint hydrocarbon odor with some organic material (stringy roots) ~25%. High moisture content ~60%	0.3
					SC	SANDY CLAY: clay with some sand (20%) and some small shells (20%) (3 mm), white in color	0.8
					CL	CLAY: gray, soft clay with some coarse sand (30%), some shells 0.5-1 cm (20%), trace gravel (10%).	1.0
1 2	27	CT	CI13-14-0103		CL	CLAY: gray, organic, soft	2.1
					SC	CLAYEY SAND: gray, medium grained clayey sand with some gravel and small wood pieces/shells (25%), organic material	2.4
3					CL	CLAY: gray, stiff with red/light gray farving, with some gravel/small pebbles (~35%) and organic material (~30%)	3.3
4							
5							
6						End of Boring at 3.3 ft.	
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-15

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 2:25:00 PM

LATITUDE (D D.M) 42° 04.8148

DATE LOGGED 9/25/2013 10:20:00 AM

LONGITUDE (D D.M) 83° 10.0889

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 565.5 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.6

CORE RECOVERY (ft) 2.4

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-15-0001		CL	SILTY CLAY: black/dark gray and organics (~60%), some fine-medium sand (30%) and trace gravel (10%). Faint hydrocarbon odor	0.3
					CL	CLAY: gray, organic, soft clay with some fine sand (25%), some small gastropod shells (0.5 cm) (15-20%), and trace subrounded gravel (5%)	1.7
1	17	CT	CI13-15-0103		SC	SANDY CLAY: clay and medium-coarse sand (35%), some rounded gravel (20%); 2 large pebbles/small cobbles (5x3x3cm)	1.9
2					CH	CLAY: gray, stiff clay and gravel (40%), some pebbles (up to 3x2x2 cm)(30%), some organics throughout, some fine sand (~25%)	2.4
3							
4						End of Boring at 2.4 ft.	
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

SEDIMENT LOG CELERON CORE LOGS.GPJ 12/13/13

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-16

PROJECT NUMBER 62561.14
PROJECT NAME Celeron Island
LOCATION Celeron Island, MI
DATE COLLECTED 9/24/2013 2:56:00 PM
LATITUDE (D D.M) 42° 04.6517
DATE LOGGED 9/25/2013 10:50:00 AM
LONGITUDE (D D.M) 83° 10.0088
DRILLING CONTRACTOR Mudpuppy
ELEVATION (Sediment Surface) 565.9 ft IGLD 1985
DRILLING METHOD Vibracore
LOGGED BY M. Gelinas
WATER DEPTH (ft) 4.4
CORE RECOVERY (ft) 2.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-16-0001	▨	SC	CLAYEY SAND: dark gray/black fine-medium sand with some shell pieces (20%) and small shells (1 mm to 1 cm in size)	0.4
				▨	CL	CLAY: gray, organic clay with some coarse sand and organic pieces ~1 cm in size (30%).	0.8
1	15	CT	CI13-16-0103	▨	CH	CLAY: gray, stiff with red/light gray farving with some angular gravel (30%), some coarse sand (25%), and some pebbles/cobbles (20%)	2.3
2							
3						End of Boring at 2.3 ft.	
4							
5							
6							
7							
8							
9							
10							
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12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-17

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 3:43:00 PM

LATITUDE (D D.M) 42° 04.4366

DATE LOGGED 9/25/2013 11:40:00 AM

LONGITUDE (D D.M) 83° 09.9937

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 568.7 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 5.6

CORE RECOVERY (ft) 1.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	15	CT	CI13-17-0001		SC	CLAYEY SAND: gray, clayey fine-medium sand with some tuburous organic material (30%) with dark black sand bands ~1 cm thick	0.3
1					SC	CLAYEY SAND: gray, clayey fine-medium sand @13-15": trace small (<1 cm) shells and pebbles (15%)	1.3
2							
3						End of Boring at 1.3 ft.	
4							
5							
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NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-18A

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/24/2013 4:41:00 PM

LATITUDE (D D.M) 42° 04.3228

DATE LOGGED 9/25/2013 2:05:00 PM

LONGITUDE (D D.M) 83° 10.2212

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 567.5 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 1.9

CORE RECOVERY (ft) 0.8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	9	CT	CI13-18A-0001	▨	GC	GRAVELLY CLAY: gray, stiff clay with pebbles, some tuburous organic material (20%); one large cobble (6x4x3 cm)	0.8
1						End of Boring at 0.8 ft.	
2							
3							
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NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-20

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/25/2013 8:42:00 AM

LATITUDE (D D.M) 42° 04.6740

DATE LOGGED 9/25/2013 2:50:00 PM

LONGITUDE (D D.M) 83° 10.6311

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 563.9 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 3

CORE RECOVERY (ft) 2

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-20-0001	≋	SC	SANDY CLAY: black/dark gray and fine-medium sand (45%), some organic material (30%), fine, small. High moisture content, water visible in core.	0.7
1	12	CT	CI13-20-0103	▨	CL	CLAY: gray, soft @8-9": trace small shells and coarse sand (10%)	2.0
2						End of Boring at 2 ft.	
3							
4							
5							
6							
7							
8							
9							
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16							

NOTES:

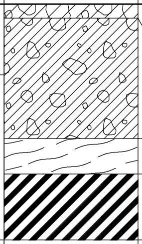
CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-23

PROJECT NUMBER 62561.14	
PROJECT NAME Celeron Island	**LOCATION** Celeron Island, MI
DATE COLLECTED 9/25/2013 11:00:00 AM	**LATITUDE (D D.M)** 42° 05.1270
DATE LOGGED 9/25/2013 4:25:00 PM	**LONGITUDE (D D.M)** 83° 10.6716
DRILLING CONTRACTOR Mudpuppy	**ELEVATION (Sediment Surface)** 566.4 ft IGLD 1985
DRILLING METHOD Vibracore	

LOGGED BY M. Gelinas **WATER DEPTH (ft)** 3.8 **CORE RECOVERY (ft)** 3.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-23-0001		GC	GRAVELLY, SANDY CLAY: dark gray sandy clay with some sand (30%), some gravel (20%), 30% sand, 20% small (< 1cm) gastropod shells, tuburous organics 2-4 cm long.	0.2
1	28	CT	CI13-23-0103		CL	CLAY: gray, soft clay with trace fine sand (10%) @20": lone pebble	1.9
2					SC	SANDY CLAY: gray, with some fine-medium sand (35%)	2.4
3					CH	CLAY: gray, stiff with red/yellow/light gray farving, with some coarse sand/fine gravel (30%) @29-30": black clay	3.3
4						End of Boring at 3.3 ft.	
5							
6							
7							
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NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering,
Science, and
Technology, Inc.

SEDIMENT BORING CI13-24

PROJECT NUMBER 62561.14
PROJECT NAME Celeron Island
LOCATION Celeron Island, MI
DATE COLLECTED 9/25/2013 1:56:00 PM
LATITUDE (D D.M) 42° 05.2548
DATE LOGGED 9/26/2013 10:50:00 AM
LONGITUDE (D D.M) 83° 10.5583
DRILLING CONTRACTOR Mudpuppy
ELEVATION (Sediment Surface) 566.4 ft IGLD 1985
DRILLING METHOD Vibracore
LOGGED BY M. Gelinas
WATER DEPTH (ft) 4
CORE RECOVERY (ft) 1.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	15	CT	CI13-24-0001	▨	SC	SANDY SILTY CLAY: dark gray with some subrounded gravel and organic material up to 5 cm long (20%), little small shells < 1cm (15%)	0.2
1					CH	CLAY: gray, stiff with red/yellow/light gray farving with some gravel(30%), some pebbles (20%). Lower moisture content, @10-15" almost dry clay.	1.3
2						End of Boring at 1.3 ft.	
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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14							
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16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-26

PROJECT NUMBER 62561.14
PROJECT NAME Celeron Island
LOCATION Celeron Island, MI
DATE COLLECTED 9/13/2013 1:53:00 PM
LATITUDE (D D.M) 42° 05.6069
DATE LOGGED 10/1/2013 7:30:00 AM
LONGITUDE (D D.M) 83° 10.9426
DRILLING CONTRACTOR Mudpuppy
ELEVATION (Sediment Surface) 564.5 ft IGLD 1985
DRILLING METHOD Vibracore
LOGGED BY M. Gelinas
WATER DEPTH (ft) 4.2
CORE RECOVERY (ft) 8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0					SC	CLAYEY SAND: dark gray, sand fine-medium, water visible in core	0.3
	12	CT	CI13-26-0001				
1							
2	24	CT	CI13-26-0103				
3							
4	24	CT	CI13-26-0305		SC	SANDY CLAY: gray, semi-stiff clay and fine sand (30%). @10-11": 2 pebbles and shell hash	
5							
6	24	CT	CI13-26-0507				
7							
	12	CT	CI13-26-0709				7.8
8					SC	CLAYEY SAND: clayey fine-medium sand with little small shells (<1 cm) and gravel (15%)	8.0
9						End of Boring at 8 ft.	
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-27A

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/30/2013 11:35:00 AM

LATITUDE (D D.M) 42° 05.4440

DATE LOGGED 9/30/2013 2:59:00 PM

LONGITUDE (D D.M) 83° 11.1203

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 568.8 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.5

CORE RECOVERY (ft) 6.8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-27A-0001	▨			
1							
2	24	CT	CI13-27A-0103				
3					CL	CLAY: dark gray organic clay, little fine sand (15%)	
4	24	CT	CI13-27A-0305				
5							5.6
6	21.6	CT	CI13-27A-0507	≈	SC	SANDY CLAY: gray, semi-stiff clay and fine sand (30%), little coarse sand, pebbles and gravel (15%), trace wood pieces < 1 cm. (5%)	6.8
7						End of Boring at 6.8 ft.	
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-28

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/30/2013 10:30:00 AM

LATITUDE (D D.M) 42° 05.2656

DATE LOGGED 9/30/2013 6:15:00 PM

LONGITUDE (D D.M) 83° 11.0885

DRILLING CONTRACTOR Mudpuppy

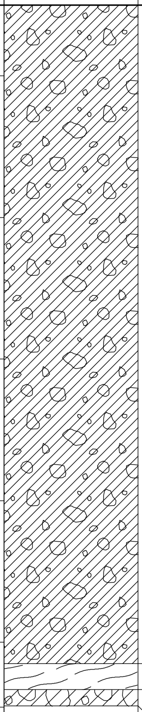
ELEVATION (Sediment Surface) 566.2 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 2.8

CORE RECOVERY (ft) 9.9



DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0							
	12	CT	CI13-28-0001				
1							
2	24	CT	CI13-28-0103				
3							
4	24	CT	CI13-28-0305				
5					CL	CLAY: gray semi-soft clay with some fine sand (20%)	
6	24	CT	CI13-28-0507				
7							
8	24	CT	CI13-28-0509				
9							
	11	CT	CI13-28-0911		SC	SANDY CLAY: gray clay and fine sand (45%)	9.3
					GC	GRAVELLY CLAY: gray clay and coarse sand (40%) with some subrounded gravel (30%), little shell hash <1 cm (15%), pebbles up to 3x3x2 cm in size.	9.7
							9.9
10							
11						End of Boring at 9.9 ft.	
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-29A

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/30/2013 8:45:00 AM

LATITUDE (D D.M) 42° 04.5995

DATE LOGGED 9/30/2013 3:55:00 PM

LONGITUDE (D D.M) 83° 10.8170

DRILLING CONTRACTOR Mudpuppy

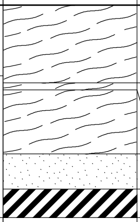
ELEVATION (Sediment Surface) 561.9 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 3.2

CORE RECOVERY (ft) 3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-29A-0001		SC	SANDY CLAY: gray clay and fine sand (45%), organic roots visible	1.1
1					SC	CLAYEY SAND: gray clayey coarse-medium sand with trace white shells < 1mm (10%)	1.2
2	24	CT	CI13-29A-0103		SC	CLAYEY SAND: gray sand and clay (45%), organic roots visible	2.1
					SP	COBBLEY SAND: cobbley coarse sand with some gravel (30%) and little shell fragments up to 3 cm across (20%).	2.6
3					CH	CLAY: stiff gray clay with reddish/yellow streaks/farving; some angular gravel/pebbles (30%)	3.0
4							
5						End of Boring at 3 ft.	
6							
7							
8							
9							
10							
11							
12							
13							
14							
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16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-30

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/25/2013 9:21:00 AM

LATITUDE (D D.M) 42° 04.4773

DATE LOGGED 9/25/2013 3:40:00 PM

LONGITUDE (D D.M) 83° 10.5125

DRILLING CONTRACTOR Mudpuppy

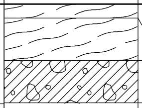
ELEVATION (Sediment Surface) 564.1 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4

CORE RECOVERY (ft) 1.4

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	17	CT	CI13-30-0001		SC	SANDY CLAY: dark gray clay and fine sand and green grass/organic material up to 8 cm long (50%) with some silt (30%)	0.2
					SC	CLAYEY SAND: black clayey fine to medium sand with some small shells < 1 cm (30%)	0.8
1					CL	CLAY: gray soft clay with little medium sand (15%) and trace angular gravel (10%)	1.4
2							
3						End of Boring at 1.4 ft.	
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-31

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/27/2013 12:00:00 PM

LATITUDE (D D.M) 42° 04.3280

DATE LOGGED 9/29/2013 11:30:00 AM

LONGITUDE (D D.M) 83° 11.0741

DRILLING CONTRACTOR Mudpuppy

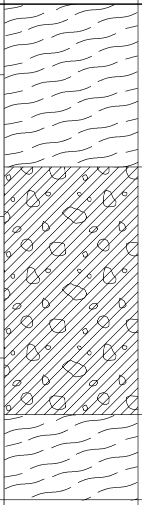
ELEVATION (Sediment Surface) 565.5 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 19.1

CORE RECOVERY (ft) 7

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-31-0001		SC	SANDY CLAY: gray semi-stiff clay and fine sand (30%)	
1 2	24	CT	CI13-31-0103				2.3
3 4	24	CT	CI13-31-0305		CL	CLAY: gray organic clay, semi soft	
5 6	24	CT	CI13-31-0507				5.8
					SC	SANDY CLAY: gray semi-stiff clay and fine sand (30%)	7.0
7						End of Boring at 7 ft.	
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-32

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/27/2013 10:05:00 AM

LATITUDE (D D.M) 42° 04.4480

DATE LOGGED 9/30/2013 9:10:00 AM

LONGITUDE (D D.M) 83° 11.4165

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 567.5 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 13.8

CORE RECOVERY (ft) 2.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-32-0001	≈	SC	SANDY CLAY: dark gray/black clay and medium-coarse sand with some gravel (20%), some shells <1 cm up to 2 cm, little pebbles/cobbles up to 2x2x2 cm (10%)	0.8
1	16	CT	CI13-32-0103	▨	CH	CLAY: gray stiff clay with reddish/yellow farving, some angular gravel (25%)	2.3
2							
3						End of Boring at 2.3 ft.	
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

SEDIMENT BORING CI13-33

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/27/2013 10:35:00 AM

LATITUDE (D D.M) 42° 04.5547

DATE LOGGED 9/30/2013 9:15:00 AM

LONGITUDE (D D.M) 83° 11.3090

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 567.5 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.9

CORE RECOVERY (ft) 5.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-33-0001		SC	CLAY: dark gray/black organic clay with some fine sand (25%)	0.8
1 2	24	CT	CI13-33-0103		CL	SILTY CLAY: gray/brown organic silty clay with some stringy reddish roots (20%)	1.7
					CL	CLAY: gray organic clay, semi-stiff	3.2
3 4 5	28	CT	CI13-33-0305		SC	SANDY CLAY: gray clay with some fine-medium sand (25%) @48": little white shell hash (10%). @59-64": little white shell hash (10%).	5.3
6 7 8 9 10 11 12 13 14 15 16						End of Boring at 5.3 ft.	

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-34

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/27/2013 11:20:00 AM

LATITUDE (D D.M) 42° 04.6784

DATE LOGGED 9/29/2013 9:30:00 AM

LONGITUDE (D D.M) 83° 11.2835

DRILLING CONTRACTOR Mudpuppy

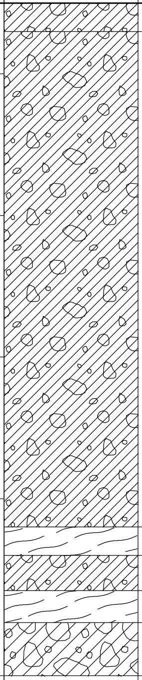
ELEVATION (Sediment Surface) 567.3 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 2.6

CORE RECOVERY (ft) 9.5



DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0					CL	CLAY: dark gray organic clay, some fine sand (25%), little silt (20%), stringy roots up to 4 cm long, high moisture content.	0.4
	12	CT	CI13-34-0001				
1							
2	24	CT	CI13-34-0103				
3							
4	24	CT	CI13-34-0305		CL	CLAY: dark gray organic clay, semi-soft with little shell fragments 0.5-1 cm (10%).	7.4
5							
6	24	CT	CI13-34-0507				
7							
					SC	SANDY CLAY: gray clay and fine to medium sand (30%).	7.8
8	30	CT	CI13-34-0709		CL	CLAY: dark gray organic clay, semi-soft with little shell fragments 0.5-1 cm (10%).	8.3
					SC	SANDY CLAY: gray clay and fine to medium sand (30%) with little pebbles/small subrounded cobbles (10%).	8.8
9					GC	GRAVELLY CLAY: gray organic clay and semiangular gravel with some pebbles and cobbles (20%).	9.5
10							
11						End of Boring at 9.5 ft.	
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-35

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/25/2013 2:46:00 PM

LATITUDE (D D.M) 42° 04.7495

DATE LOGGED 9/26/2013 11:10:00 AM

LONGITUDE (D D.M) 83° 11.1281

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 567.4 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 15.8

CORE RECOVERY (ft) 2.8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-35-0001	▨	CL	CLAY: black organic soft clay, green SAV at the surface 6 cm long, pomegeton species	0.5
				▨	CL	CLAY: gray semi-soft clay with some organic stringy roots (35%)	1.0
1							
2	21	CT	CI13-35-0103	▨	CH	CLAY: stiff gray clay with reddish/yellow streaks/farving; some subrounded gravel/pebbles (20%)	2.8
3						End of Boring at 2.8 ft.	
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-36

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/25/2013 3:23:00 PM

LATITUDE (D D.M) 42° 04.9741

DATE LOGGED 9/26/2013 1:55:00 PM

LONGITUDE (D D.M) 83° 11.2249

DRILLING CONTRACTOR Mudpuppy

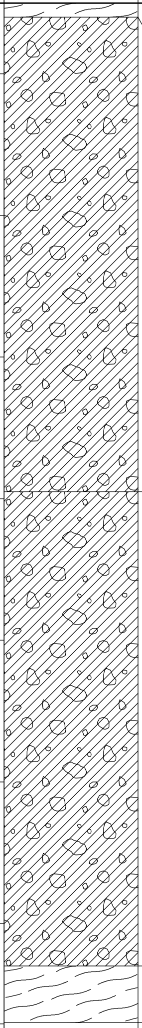
ELEVATION (Sediment Surface) 569.4 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 3.7

CORE RECOVERY (ft) 14.4

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-36-0001		SC	SANDY CLAY: fine sandy gray clay with small (<1 cm) white shell pieces	0.2
1					CL	CLAY: gray semi-soft clay and organic material, reddish in color (40%).	6.9
2	24	CT	CI13-36-0103				
3							
4	24	CT	CI13-36-0305				
5							
6	24	CT	CI13-36-0507				
7					CL	CLAY: gray semi-soft clay with trace fine sand (10%)	13.6
8	24	CT	CI13-36-0709				
9							
10	24	CT	CI13-36-0911				
11							
12	24	CT	CI13-36-1113				
13	17	CT	CI13-36-1315				
14					SC	SANDY CLAY: gray seim-stiff clay and fine-medium sand (30%)	14.4
15						End of Boring at 14.4 ft.	
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-37

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/27/2013 9:35:00 AM

LATITUDE (D D.M) 42° 04.5970

DATE LOGGED 9/30/2013 8:45:00 PM

LONGITUDE (D D.M) 83° 11.4432

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 567.4 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 5

CORE RECOVERY (ft) 3.3

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-37-0001	▨	CL	CLAY: black/dark gray clay with some small shells < 1 cm (20%), little fine sand (10%). Hydrocarbon odor.	0.4
				▨	CL	CLAY: gray/brown organic clay, semi-soft.	1.0
1	27	CT	CI13-37-0103	▨	CL	CLAY: gray organic clay, semi-stiff. @22-25": reddish roots	2.5
2							
3				▨	CH	CLAY: stiff gray clay with reddish/yellow striations/farving with little-some angular gravel (15-20%)	3.3
4						End of Boring at 3.3 ft.	
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

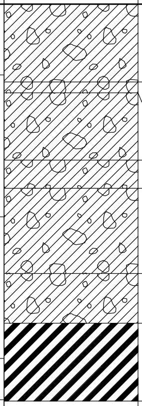
CT=Core Tube
GB=Grab Sample

SEDIMENT BORING CI13-38

PROJECT NUMBER 62561.14
PROJECT NAME Celeron Island
LOCATION Celeron Island, MI
DATE COLLECTED 9/27/2013 8:55:00 AM
LATITUDE (D D.M) 42° 04.7007
DATE LOGGED 9/30/2013 10:40:00 AM
LONGITUDE (D D.M) 83° 11.4689
DRILLING CONTRACTOR Mudpuppy
ELEVATION (Sediment Surface) 568.3 ft IGLD 1985
DRILLING METHOD Vibracore
LOGGED BY M. Gelinas
WATER DEPTH (ft) 17.9
CORE RECOVERY (ft) 5.6

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
0	12	CT	CI13-38-0001
1	24	CT	CI13-38-0103
3	24	CT	CI13-38-0305
5	7	CT	CI13-38-0507

GRAPHIC LOG



USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
CL	SILTY CLAY: black/dark gray silty organic soft clay with little shells (<1 cm) and twigs (up to 2 cm long) (15%). Hydrocarbon odor.	1.1
CL		1.3
CL	SILTY CLAY: silty semi-soft clay with some fine sand (25%), some small white shells (1 mm) (25%). Hydrocarbon odor.	2.2
CL	CLAY: gray/brown organic clay, semi-soft.	2.6
CL	CLAY: gray/brown organic clay, semi-stiff, with some fine sand (25%) CLAY: gray clay, semi-soft with some reddish wood pieces 1-2 cm in size (15-20%), little fine sand (10-15%)	3.8
CL	CLAY: dark gray clay, semi-stiff with some fine-medium sand (30%)	4.5
CH	CLAY: gray, stiff clay with reddish/yellow striations/farving with some medium-coarse sand, fine angular gravel (30%). @58-59": sand lens	5.6

End of Boring at 5.6 ft.

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-39

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/25/2013 5:47:00 PM

LATITUDE (D D.M) 42° 04.7791

DATE LOGGED 9/26/2013 2:30:00 PM

LONGITUDE (D D.M) 83° 11.4320

DRILLING CONTRACTOR Mudpuppy

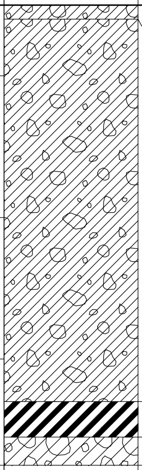
ELEVATION (Sediment Surface) 566.9 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 5.1

CORE RECOVERY (ft) 6.5



DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-39-0001		CL	SILTY CLAY: dark gray silty clay and green SAV up to 10" long (45%) with some fine sand (25%) and tiny shells (<1 mm)	0.2
1							
2	24	CT	CI13-39-0103				
3					CL	SILTY CLAY: dark gray silty clay with trace small (<0.5 cm) shells (10%), trace small twigs (1-2 cm long) (10%). Slight hydrocarbon odor.	5.6
4	24	CT	CI13-39-0305				
5							
6	18	CT	CI13-39-0507		CH	CLAY: stiff gray clay with reddish/yellow/light gray striations, some angular grave/coarse sand (35%), little pebbles (15%)	6.1
					GC	GRAVELLY CLAY: gravelly stiff gray clay with some pebbles (25%)	6.5
7							
8						End of Boring at 6.5 ft.	
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-40

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/25/2013 5:18:00 PM

LATITUDE (D D.M) 42° 04.8218

DATE LOGGED 9/27/2013 11:00:00 AM

LONGITUDE (D D.M) 83° 11.5496

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 568.5 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 2.7

CORE RECOVERY (ft) 5.9

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
0	12	CT	CI13-40-0001
1	24	CT	CI13-40-0103
3	24	CT	CI13-40-0305
5	11	CT	CI13-40-0507

GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
▨	CL	SILTY CLAY: dark gray soft silty clay with some organic material < 1cm (20%)	0.5
▨	CL	CLAY: dark gray semi-soft clay with some super-fine sand (20%)	1.2
▨	CL	CLAY: dark gray semi-soft clay and small shells <1 cm, shell pieces 3mm-1 cm, 2 large gastropod intact shells (30%)	2.1
▨	CL	CLAY: dark gray clay with dense reddish brown organic material (50%) and little gastropod shells/hash (15%)	3.2
▨	CL	CLAY: gray stiff clay with some brown wood pieces 1-2 cm (30%). @68-71": pebbles/coarse sand ~25% up to 3x2x2 cm	5.9

End of Boring at 5.9 ft.

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-41

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/25/2013 4:55:00 PM

LATITUDE (D D.M) 42° 04.8447

DATE LOGGED 9/27/2013 12:10:00 PM

LONGITUDE (D D.M) 83° 11.6558

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 568.8 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.2

CORE RECOVERY (ft) 4.8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-41-0001	▨	CL	SILTY CLAY: dark gray silty soft clay with some tuburous roots (20%) up to 5 cm long and trace small shells < 1 mm in size (10%)	0.7
1	24	CT	CI13-41-0103	▨	CL	CLAY: gray/brown semi-soft clay. @28-35": 20% small shell pieces < 1mm in size	2.9
2							
3	21	CT	CI13-41-0305	≋	SC	SANDY CLAY: gray clay with and fine-medium sand (45%)	4.0
4				▧	CH	CLAY: gray stiff clay with reddish/yellow farving, some angular gravel, pebbles and cobbles up to 5x4x2 cm (35%)	4.8
5						End of Boring at 4.8 ft.	
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

SEDIMENT BORING CI13-42

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/26/2013 4:55:00 PM

LATITUDE (D D.M) 42° 04.9309

DATE LOGGED 9/27/2013 5:15:00 PM

LONGITUDE (D D.M) 83° 11.5518

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 568.2 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 5.9

CORE RECOVERY (ft) 5.5

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-42-0001	▨			
1				▨	CL	SILTY CLAY: dark gray silty clay with some small black shells (< 1 mm) (25%). Slight odor, possibly hydrocarbon.	
2	24	CT	CI13-42-0103	▨			2.5
3				▨			
4	30	CT	CI13-42-0305	▨	CH	CLAY: gray stiff clay with reddish/yellow streaks, some coarse sand/fine gravel (25%), some small shell pieces (<1 mm) (25%)	
5				▨			5.5
6						End of Boring at 5.5 ft.	
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

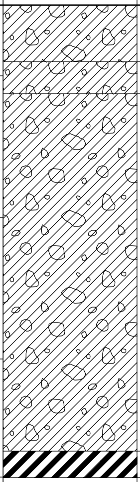
NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-43

PROJECT NUMBER 62561.14
PROJECT NAME Celeron Island
LOCATION Celeron Island, MI
DATE COLLECTED 9/26/2013 10:25:00 AM
LATITUDE (D D.M) 42° 04.9708
DATE LOGGED 9/29/2013 11:15:00 AM
LONGITUDE (D D.M) 83° 11.7330
DRILLING CONTRACTOR Mudpuppy
ELEVATION (Sediment Surface) 568.8 ft IGLD 1985
DRILLING METHOD Vibracore
LOGGED BY M. Gelinas
WATER DEPTH (ft) 6.8
CORE RECOVERY (ft) 6.7



DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-43-0001		CL	SILTY CLAY: dark gray silty clay with some fine sand (20%)	0.8
1					CL	SILTY CLAY: black silty clay and wood pieces <1cm in size (60%), some shells (1 mm) (20%). Hydrocarbon odor	1.3
2	24	CT	CI13-43-0103				
3 4	24	CT	CI13-43-0305		CL	CLAY: dark gray semi-soft clay with some twigs and organic material up to 4 cm long (20%), little fine sand (10%)	
5 6	20	CT	CI13-43-0507				6.3
					CH	CLAY: light gray semi-stiff clay with some coarse gravel/fine pebbles (30%), little fine-medium sand (20%)	6.7
7 8						End of Boring at 6.7 ft.	
9 10 11 12 13 14 15 16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-44

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/26/2013 10:38:00 AM

LATITUDE (D D.M) 42° 04.9869

DATE LOGGED 9/28/2013 11:50:00 AM

LONGITUDE (D D.M) 83° 11.7854

DRILLING CONTRACTOR Mudpuppy

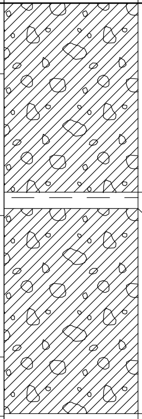
ELEVATION (Sediment Surface) 568.2 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 6.5

CORE RECOVERY (ft) 5.8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-44-0001				
1	24	CT	CI13-44-0103		CL	SILTY CLAY: dark gray silty semi-soft clay with some twigs/leave pieces 2cm in top 2" (20%). Brown sheen in some places -- STRONG hydrocarbon odor, possibly NAPL	
2							2.7
3	24	CT	CI13-44-0305		OL	PEAT: dense organic material in dark gray silt. STRONG hydrocarbon odor.	2.9
4					CL	CLAY: dark gray semi-soft clay with little wood pieces 2x3 cm in size (10%). STRONG hydrocarbon odor.	
5	10	CT	CI13-44-0507				5.8
6						End of Boring at 5.8 ft.	
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-45

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/26/2013 11:05:00 AM

LATITUDE (D D.M) 42° 04.1038

DATE LOGGED 9/28/2013 10:30:00 AM

LONGITUDE (D D.M) 83° 11.8008

DRILLING CONTRACTOR Mudpuppy

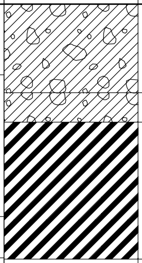
ELEVATION (Sediment Surface) 568.8 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 4.5

CORE RECOVERY (ft) 3.6

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0							
1	12	CT	CI13-45-0001		CL	SILTY CLAY: dark gray silty semi-soft clay with small twigs 2-3 cm	1.3
					CL	SILTY CLAY: gray silty clay with some small white shells (1 mm) and some fine sand (20%). Faint hydrocarbon odor	1.7
2	24	CT	CI13-45-0103		CH	CLAY: stiff gray clay with reddish/yellow streaks, some fine sand (20%), little angular gravel (10%)	
3	7	CT	CI13-45-0305				3.6
4						End of Boring at 3.6 ft.	
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

SEDIMENT BORING CI13-46

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/26/2013 2:16:00 PM

LATITUDE (D D.M) 42° 05.0465

DATE LOGGED 9/27/2013 3:15:00 PM

LONGITUDE (D D.M) 83° 11.0186

DRILLING CONTRACTOR Mudpuppy

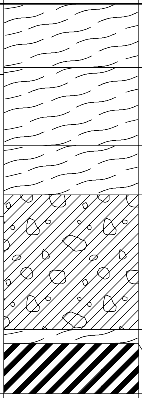
ELEVATION (Sediment Surface) 568.1 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 7.4

CORE RECOVERY (ft) 5.5



DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-46-0001		SC	SANDY CLAY: sandy clay, high moisture content with twigs/organic debris up to 6 cm long	0.9
1 2	24	CT	CI13-46-0103		SC	CLAYEY SAND: gray clayey medium-coarse sand with some shell pieces <1 cm (20%), little gravel (10%)	2.0
					SC	SANDY CLAY: gray clay and fine sand (25%) with trace shell pieces (1 mm) (10%)	2.7
3 4	30	CT	CI13-46-0305		CL	CLAY: gray semi-soft clay with little wood pieces, up to 2x2x2 cm (10%)	4.6
5					SC	SANDY CLAY: gray clay and fine-medium sand (30%) with some woody debris reddish brown in color (35%)	4.8
					CH	CLAY: gray stiff clay with reddish/yellow streaks. @64-66": some pebbles and coarse gravel (25%)	5.5
6							
7						End of Boring at 5.5 ft.	
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-47

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/26/2013 1:48:00 PM

LATITUDE (D D.M) 42° 05.1468

DATE LOGGED 9/27/2013 4:20:00 PM

LONGITUDE (D D.M) 83° 11.9006

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 568 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 6.3

CORE RECOVERY (ft) 5.7

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	CT	CI13-47-0001	▨	CL	CLAY: dark gray semi-soft clay with some wood pieces 1-3 cm (20%) and some small white shells (<1 mm) (20%)	3.7
1 2 3	24	CT	CI13-47-0103				
4 5	24	CT	CI13-47-0305	▤	OL	PEAT: drier, brown/gray fibrous, organic with trace small shells (< 1 mm) (10%)	5.7
	8	CT	CI13-47-0507				
6						End of Boring at 5.7 ft.	
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

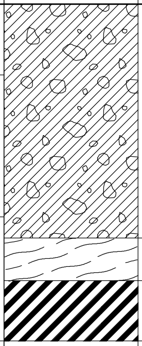
NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-48

PROJECT NUMBER 62561.14
PROJECT NAME Celeron Island
LOCATION Celeron Island, MI
DATE COLLECTED 9/26/2013 4:25:00 PM
LATITUDE (D D.M) 42° 05.1454
DATE LOGGED 9/28/2013 11:15:00 AM
LONGITUDE (D D.M) 83° 11.7157
DRILLING CONTRACTOR Mudpuppy
ELEVATION (Sediment Surface) 568.4 ft IGLD 1985
DRILLING METHOD Vibracore
LOGGED BY M. Gelinas
WATER DEPTH (ft) 5
CORE RECOVERY (ft) 4.8

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0							
	12	CT	CI13-48-0001		CL	CLAY: dark gray semi-soft clay with trace small (1 mm) white shells (5%)	
1							
2	24	CT	CI13-48-0103				
3							
					SC	SANDY CLAY: dark gray sandy (fine-medium) semi-soft clay. Hydrocarbon odor	3.3
4	21	CT	CI13-48-0305		CH	CLAY: stiff gray clay with reddish/yellow farving, some angular gravel (20%), little sand (10%)	3.9
						End of Boring at 4.8 ft.	4.8
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-49

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 6/20/2013 7:55:00 AM

LATITUDE (D D.M) 42° 05.2779

DATE LOGGED 9/29/2013 10:40:00 AM

LONGITUDE (D D.M) 83° 11.5562

DRILLING CONTRACTOR Mudpuppy

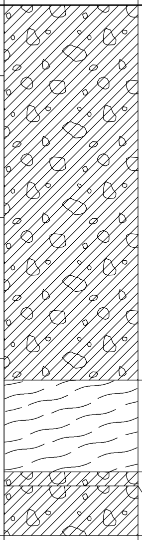
ELEVATION (Sediment Surface) 568.5 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 5.75

CORE RECOVERY (ft) 7.5



DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0 1	12	CT	CI13-49-0001		CL	CLAY: dark gray semi-soft clay and stringy roots, reddish in color, up to 4 cm long (60%). Hydrocarbon odor.	5.3
2 3	24	CT	CI13-49-0103				
4 5	24	CT	CI13-49-0305				
6	30	CT	CI13-49-0507		SC	CLAYEY SAND: dark gray highly organic clayey sand (fine)	6.6
7					CL	CLAY: dark gray semi-soft clay with little coarse sand/fine semi-angular gravel (10%)	6.8
					CL	CLAY: light gray semi-soft clay with some angular fine gravel (20%)	7.5
8 9 10 11 12 13 14 15 16						End of Boring at 7.5 ft.	

NOTES:

CT=Core Tube
GB=Grab Sample

EA Engineering, Science, and Technology, Inc.

SEDIMENT BORING CI13-50

PROJECT NUMBER 62561.14

PROJECT NAME Celeron Island

LOCATION Celeron Island, MI

DATE COLLECTED 9/30/2013 8:50:00 AM

LATITUDE (D D.M) 42° 04.2185

DATE LOGGED 9/30/2013 4:20:00 PM

LONGITUDE (D D.M) 83° 10.7641

DRILLING CONTRACTOR Mudpuppy

ELEVATION (Sediment Surface) 563.8 ft IGLD 1985

DRILLING METHOD Vibracore

LOGGED BY M. Gelinas

WATER DEPTH (ft) 10.166

CORE RECOVERY (ft) 6.6

DEPTH (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0					SW	SAND: black/dark gray fine-medium sand	0.3
	12	CT	CI13-50-0001				
1							
2	24	CT	CI13-50-0103				
3							
					SC	SANDY CLAY: gray semi-stiff clay and fine sand (35%), organic roots <2 cm visible with trace angular pebbles (5%)	
4	24	CT	CI13-50-0305				
5							
	19	CT	CI13-50-0507				
6							6.6
7						End of Boring at 6.6 ft.	
8							
9							
10							
11							
12							
13							
14							
15							
16							

NOTES:

CT=Core Tube
GB=Grab Sample

Appendix C:

Core Photos

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/23/13

CI13-01

Photographic Record

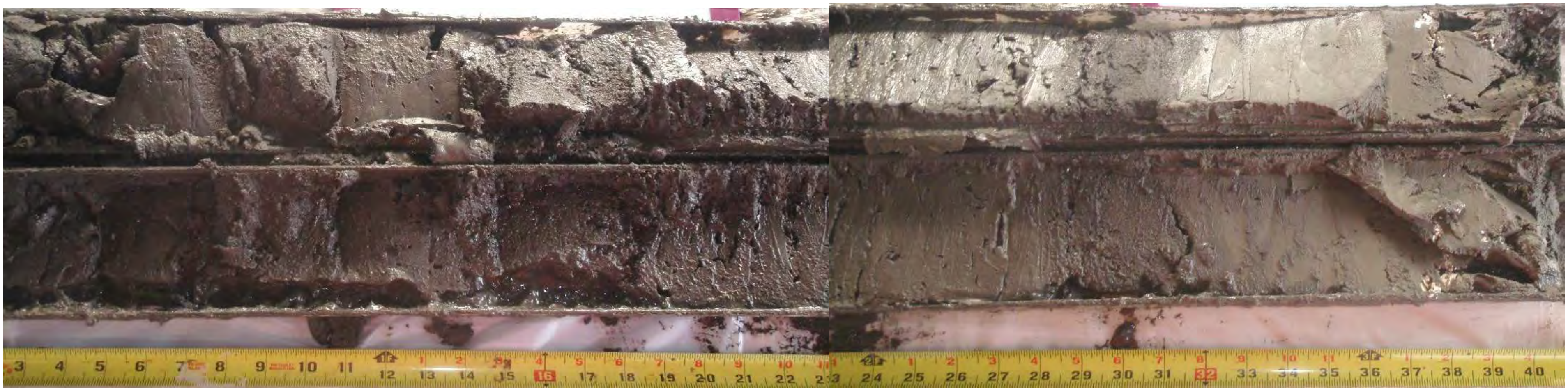
Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-03

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/24/13

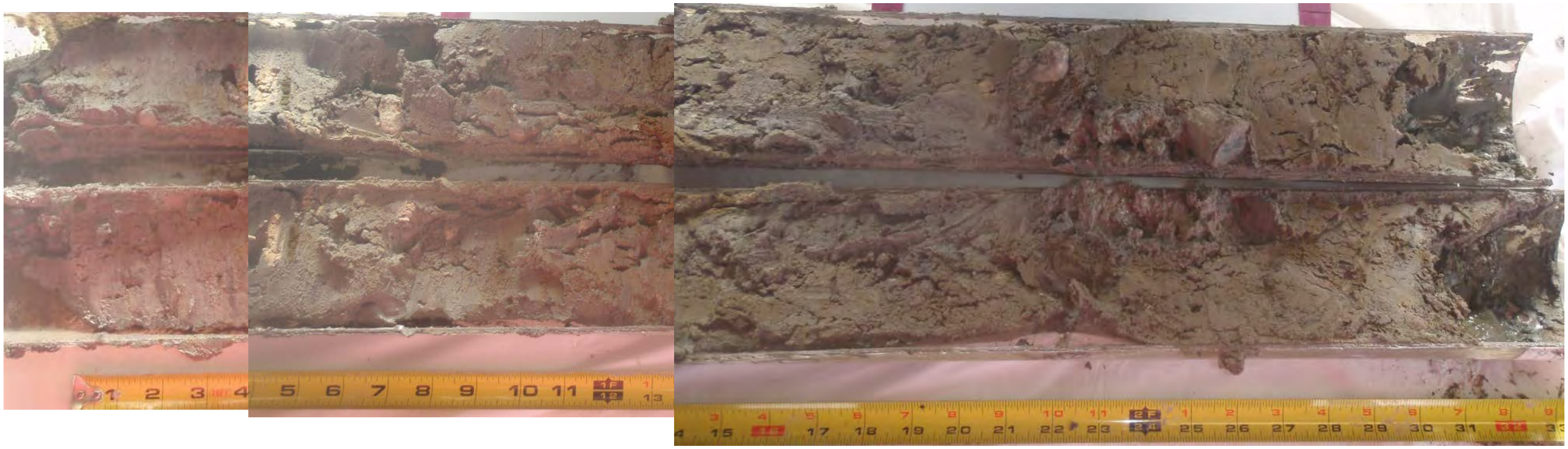
CI13-04



Photographic Record

Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-05



Photographic Record

Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-06

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-07

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-09

Photographic Record

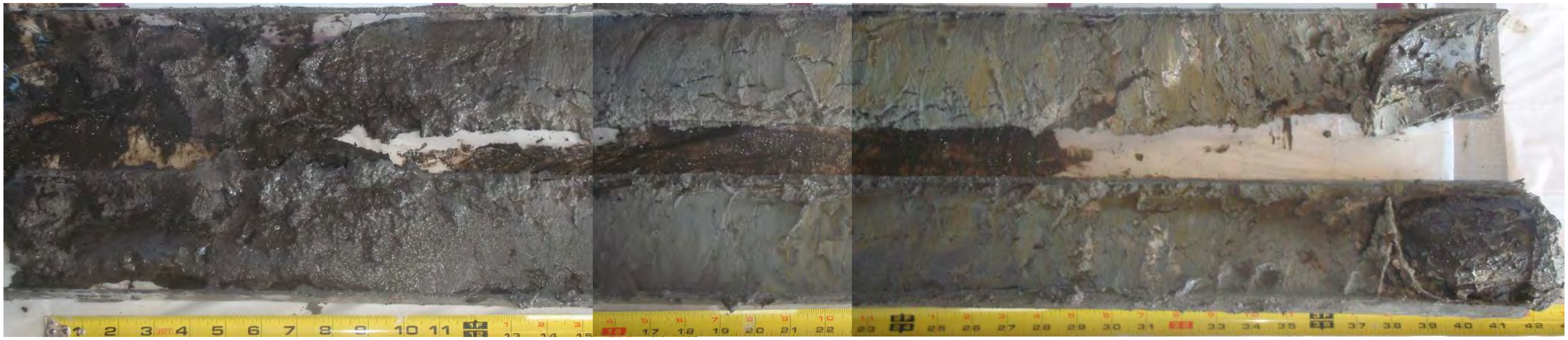
Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-10

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-11



Photographic Record

Celeron Island
Grosse Ile, Michigan
9/24/13

CI13-13

Photographic Record

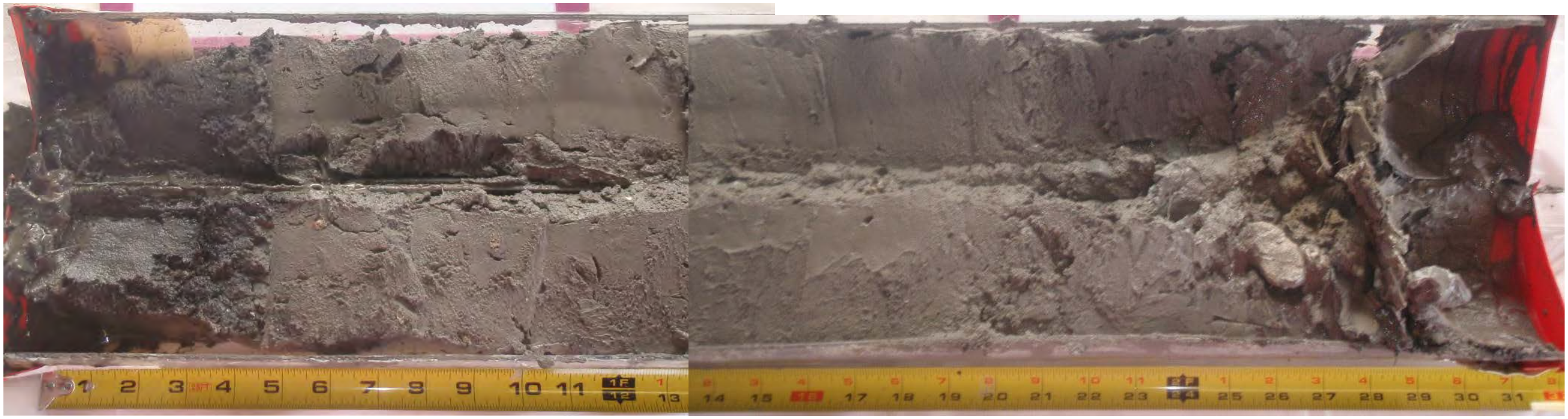
Celeron Island
Grosse Ile, Michigan
9/25/13

CI13-14

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/25/13

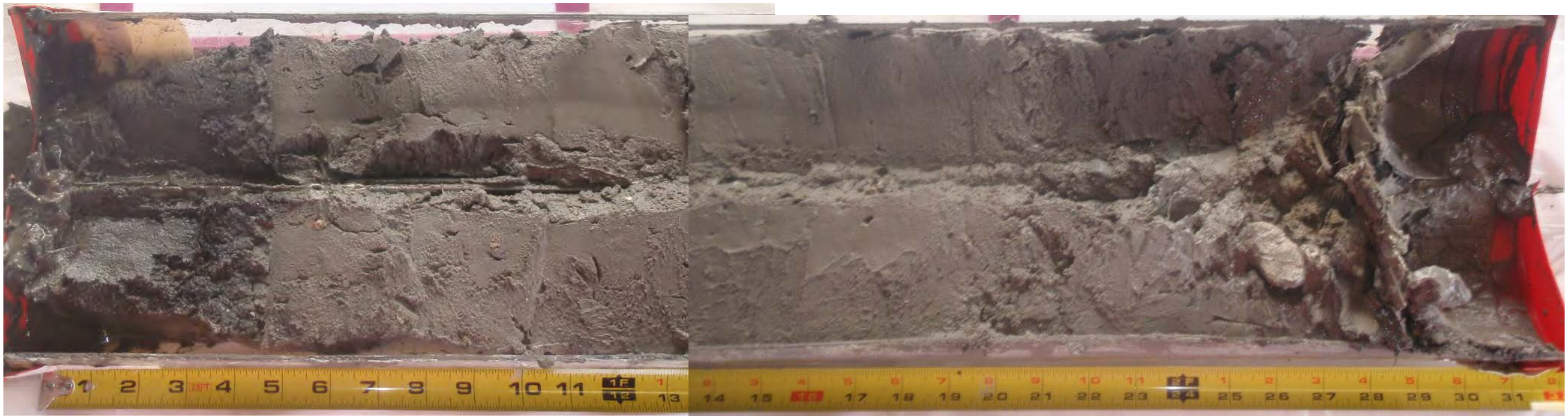
CI13-15



Photographic Record

Celeron Island
Grosse Ile, Michigan
9/25/13

CI13-16



Photographic Record

Celeron Island
Grosse Ile, Michigan
9/25/13

CI13-17

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/25/13

CI13-18A

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/25/13

CI13-20

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/25/13

CI13-23

Photographic Record

Celeron Island
Grosse Ile, Michigan
10/1/13

CI13-26

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-27A

Photographic Record

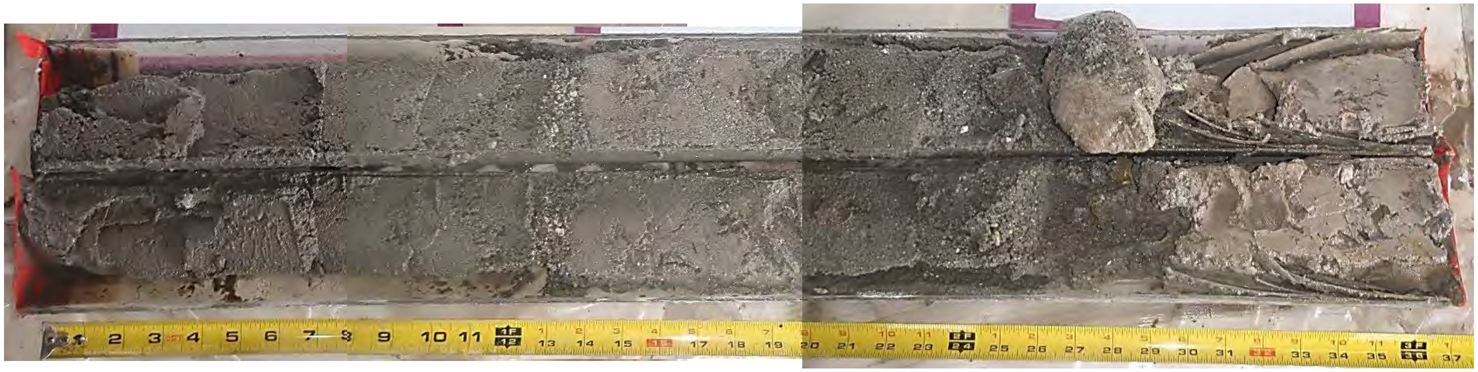
Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-28

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-29A



Photographic Record

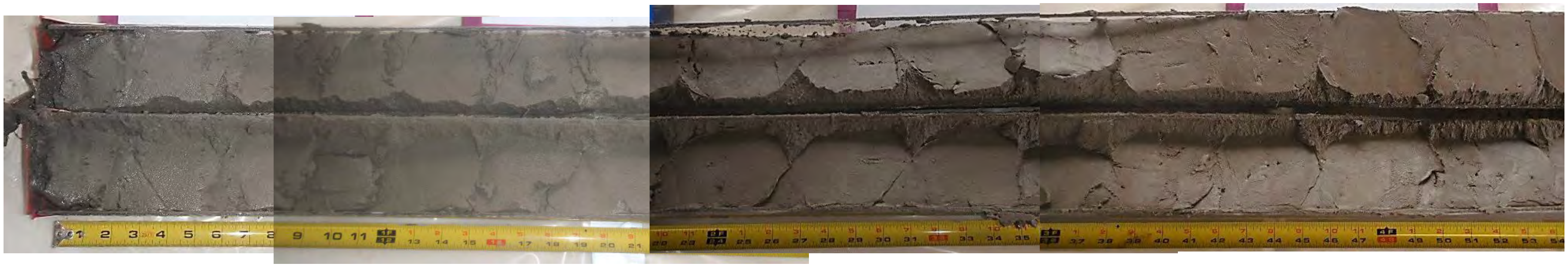
Celeron Island
Grosse Ile, Michigan
9/25/13

CI13-30

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/29/13

CI13-31



Photographic Record

Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-32

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-33

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/29/13

CI13-34

EA Engineering, Science, and Technology, Inc.

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/26/13

CI13-36

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-37

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-38

EA Engineering, Science,
and Technology, Inc.

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/27/13

CI13-40

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/27/13

CI13-41

EA Engineering, Science,
and Technology, Inc.

Photographic Record

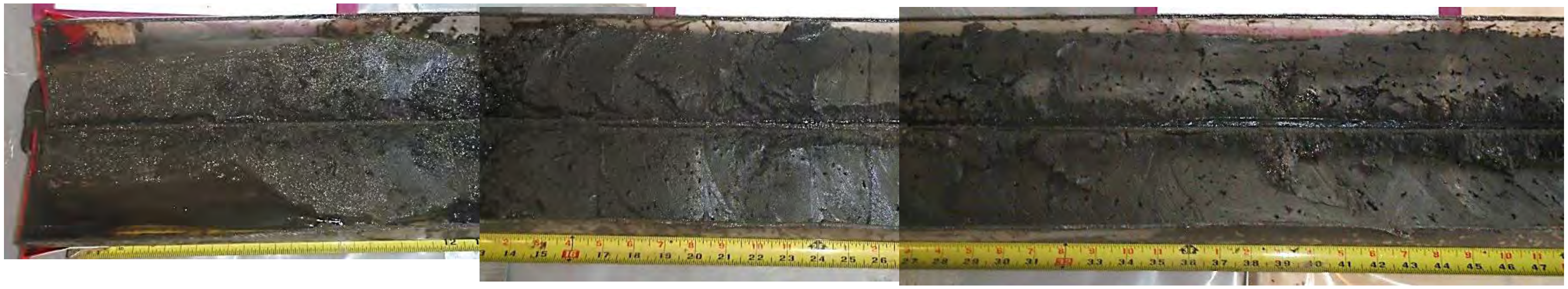
Celeron Island
Grosse Ile, Michigan
9/27/13

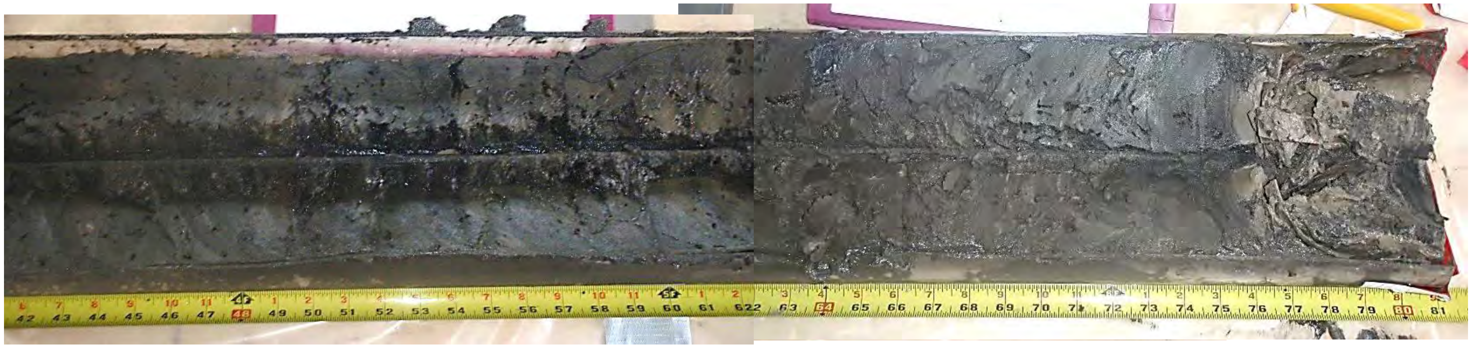
CI13-42

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/29/13

CI13-43





Photographic Record

Celeron Island
Grosse Ile, Michigan
9/28/13

CI13-44

Photographic Record

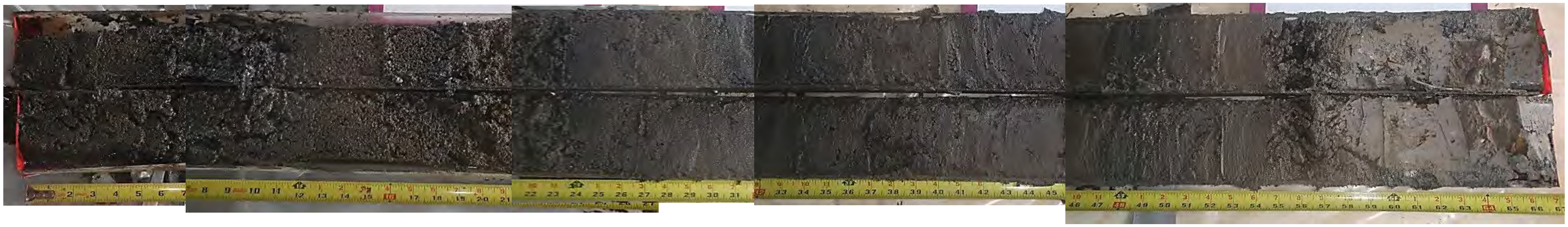
Celeron Island
Grosse Ile, Michigan
9/28/13

CI13-45

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/27/13

CI13-46



EA Engineering, Science, and Technology, Inc.

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/27/13

CI13-47

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/28/13

CI13-48

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/29/13

CI13-49

Photographic Record

Celeron Island
Grosse Ile, Michigan
9/30/13

CI13-50

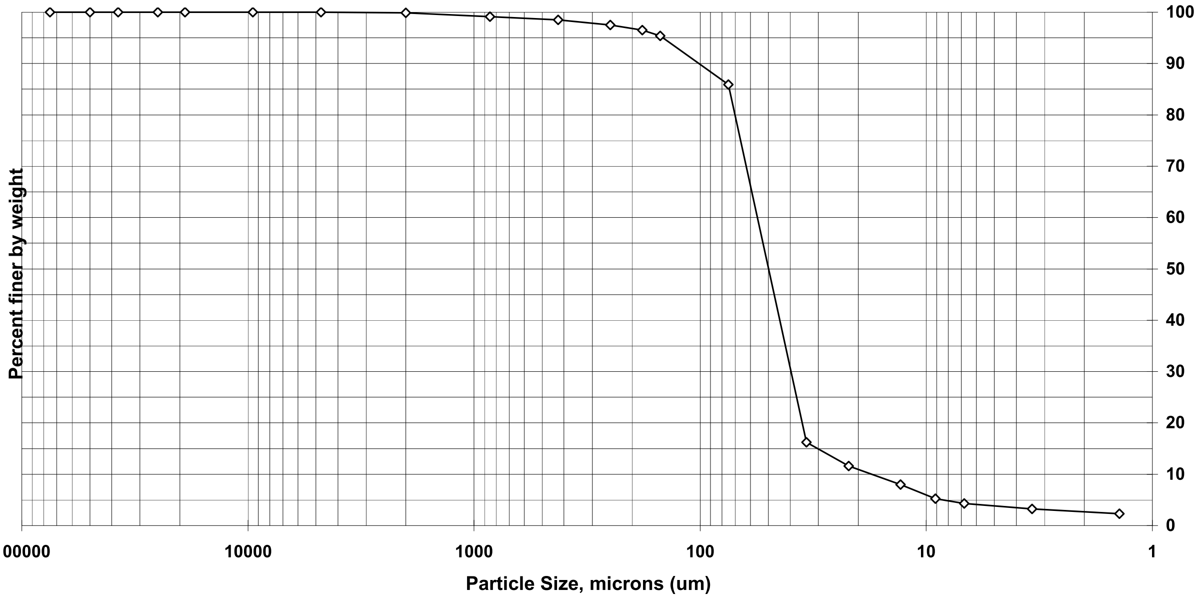
Appendix D:

Particle Size Charts

Particle Size of Soils by ASTM D422

Date Received: 9/27/2013
Sample ID: CI13-36-SURF **Percent Solids:** 48.5% **Start Date:** 10/7/2013
Lab ID: 200-18631-E-1 **Specific Gravity:** 2.650 **End Date:** 10/10/2013

Shape (> #10): n/a **Non-soil material:** plant, shell
Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	99.1	0.8
#40	425	98.5	0.6
#60	250	97.5	1.0
#80	180	96.5	1.0
#100	150	95.4	1.1
#200	75	85.9	9.5
Hyd1	33.9	16.2	69.7
Hyd2	22	11.6	4.6
Hyd3	13	8.0	3.6
Hyd4	9.1	5.2	2.8
Hyd5	6.8	4.3	0.9
Hyd6	3.4	3.2	1.1
Hyd7	1.4	2.3	0.9

Soil Classification	Percent of sample
Gravel	0.0
Sand	14.1
Coarse Sand	0.1
Medium Sand	1.4
Fine Sand	12.6
Silt	81.6
Clay	4.3

Particle Size of Soils by ASTM D422

Date Received: 9/27/2013

Sample ID: CI13-46-SURF

Percent Solids: 55.6%

Start Date: 10/8/2013

Lab ID: 200-18631-E-13

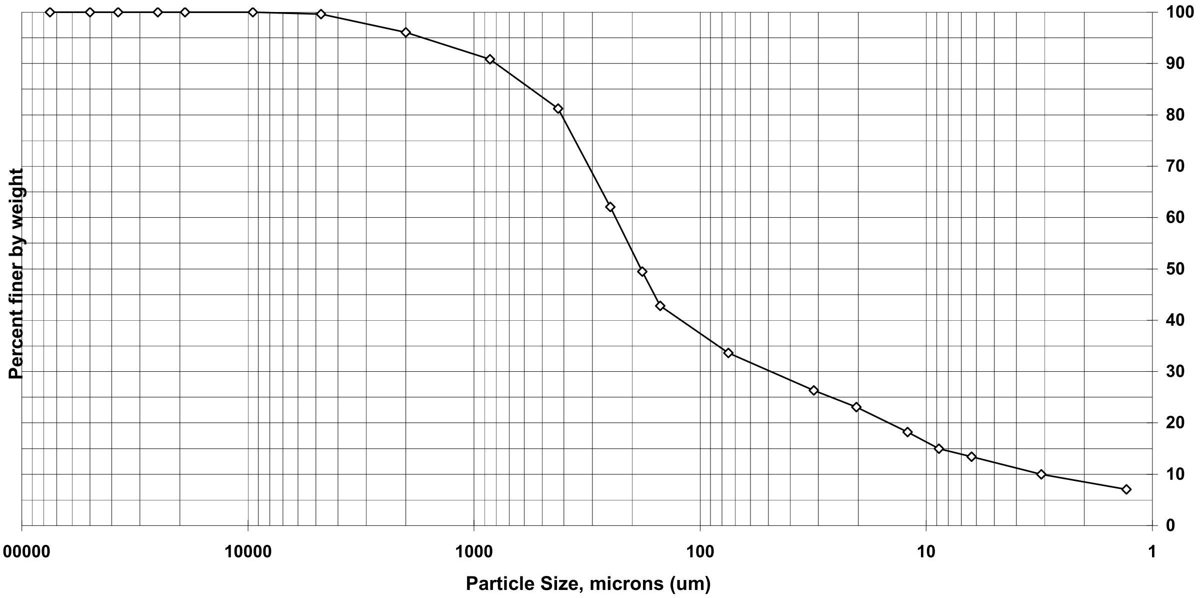
Specific Gravity: 2.650

End Date: 10/13/2013

Shape (> #10): angular

Non-soil material: shell, plant, wood

Hardness (> #10): hard



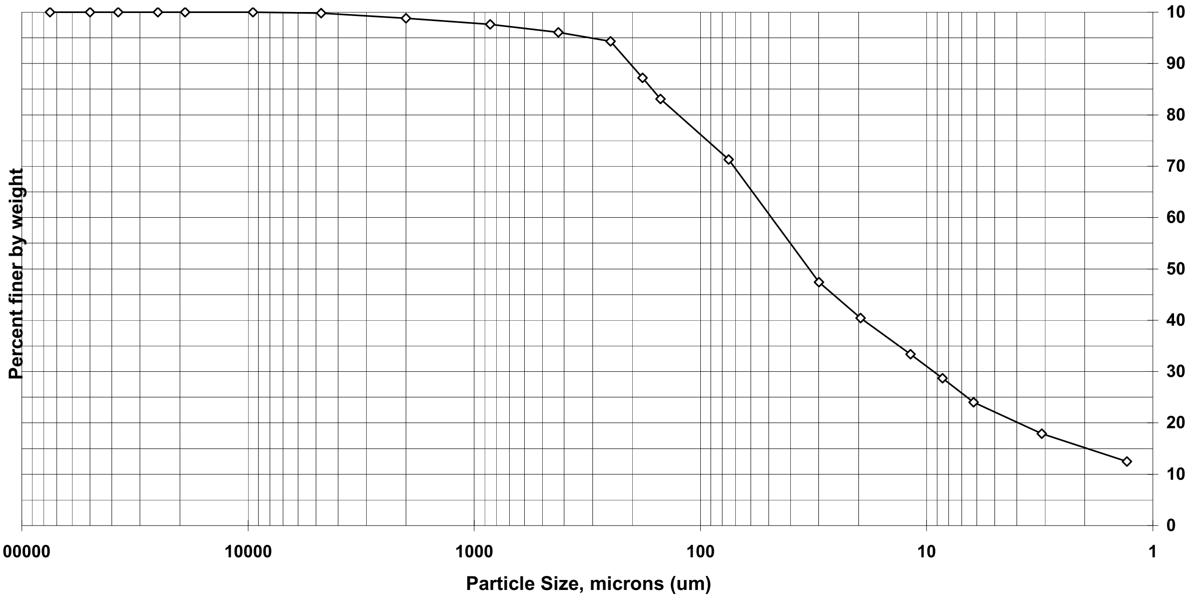
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.6	0.4
#10	2000	96.1	3.5
#20	850	90.8	5.3
#40	425	81.2	9.6
#60	250	62.1	19.1
#80	180	49.5	12.6
#100	150	42.8	6.7
#200	75	33.6	9.2
Hyd1	31.4	26.3	7.3
Hyd2	20.4	23.1	3.2
Hyd3	12.1	18.2	4.9
Hyd4	8.8	15.0	3.2
Hyd5	6.3	13.4	1.6
Hyd6	3.1	10.0	3.4
Hyd7	1.3	7.0	3.0

Soil Classification	Percent of sample
Gravel	0.4
Sand	66.0
Coarse Sand	3.5
Medium Sand	14.9
Fine Sand	47.6
Silt	20.2
Clay	13.4

Particle Size of Soils by ASTM D422

Date Received: 9/27/2013
Sample ID: CI13-47-SURF
Percent Solids: 39.1%
Start Date: 10/8/2013
Lab ID: 200-18631-E-14
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): n/a
Non-soil material: plant, wood, shell
Hardness (> #10): n/a



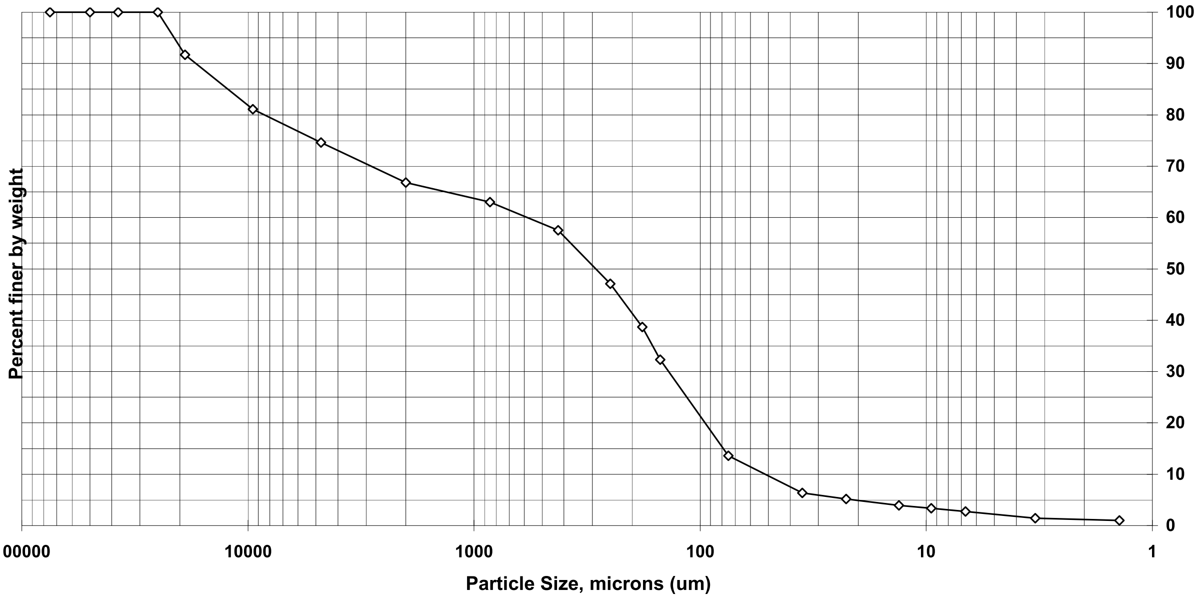
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.8	0.2
#10	2000	98.8	1.0
#20	850	97.6	1.2
#40	425	96.1	1.5
#60	250	94.3	1.8
#80	180	87.2	7.1
#100	150	83.1	4.1
#200	75	71.3	11.8
Hyd1	29.9	47.4	23.9
Hyd2	19.6	40.4	7.0
Hyd3	11.8	33.4	7.0
Hyd4	8.5	28.7	4.7
Hyd5	6.2	24.0	4.7
Hyd6	3.1	17.9	6.1
Hyd7	1.3	12.5	5.4

Soil Classification	Percent of sample
Gravel	0.2
Sand	28.5
Coarse Sand	1.0
Medium Sand	2.7
Fine Sand	24.8
Silt	47.3
Clay	24.0

Particle Size of Soils by ASTM D422

Date Received: 9/27/2013
Sample ID: CI13-35-SURF
Percent Solids: 57.6%
Start Date: 10/8/2013
Lab ID: 200-18631-E-15
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): angular
Non-soil material: shell, plant, wood
Hardness (> #10): hard



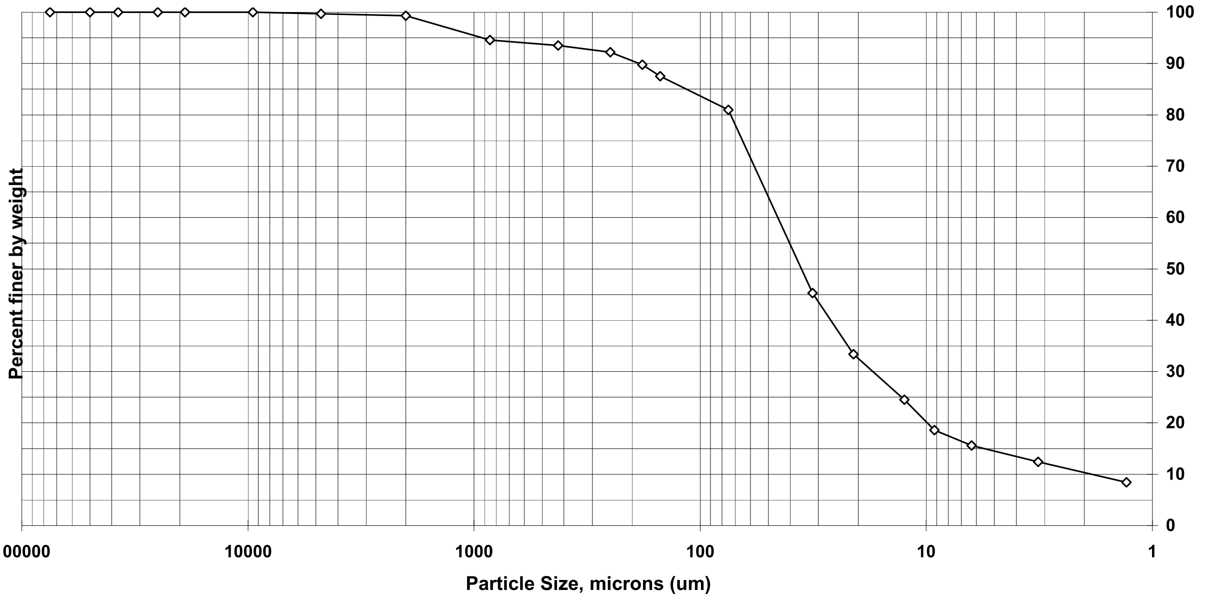
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	91.7	8.3
3/8 inch	9500	81.1	10.6
#4	4750	74.6	6.5
#10	2000	66.8	7.8
#20	850	63.0	3.8
#40	425	57.5	5.5
#60	250	47.1	10.4
#80	180	38.7	8.4
#100	150	32.3	6.4
#200	75	13.6	18.7
Hyd1	35.3	6.4	7.2
Hyd2	22.6	5.2	1.2
Hyd3	13.2	4.0	1.2
Hyd4	9.5	3.4	0.6
Hyd5	6.7	2.7	0.6
Hyd6	3.3	1.4	1.3
Hyd7	1.4	1.0	0.4

Soil Classification	Percent of sample
Gravel	25.4
Sand	61.0
Coarse Sand	7.8
Medium Sand	9.3
Fine Sand	43.9
Silt	10.9
Clay	2.7

Particle Size of Soils by ASTM D422

Date Received: 9/27/2013
Sample ID: CI13-39-SURF
Percent Solids: 33.1%
Start Date: 10/8/2013
Lab ID: 200-18631-E-16
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): angular
Non-soil material: plant, wood, shell
Hardness (> #10): hard



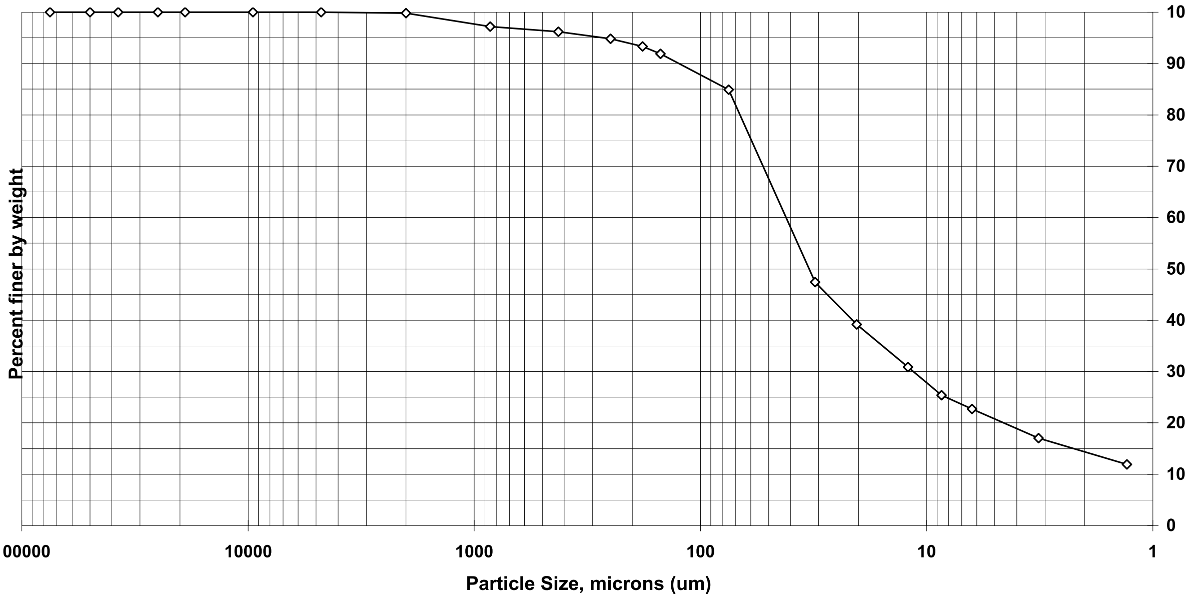
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.7	0.3
#10	2000	99.3	0.4
#20	850	94.6	4.7
#40	425	93.5	1.1
#60	250	92.2	1.3
#80	180	89.8	2.4
#100	150	87.5	2.3
#200	75	81.0	6.5
Hyd1	31.8	45.3	35.7
Hyd2	21	33.4	11.9
Hyd3	12.5	24.5	8.9
Hyd4	9.2	18.6	5.9
Hyd5	6.3	15.6	3.0
Hyd6	3.2	12.4	3.2
Hyd7	1.3	8.4	4.0

Soil Classification	Percent of sample
Gravel	0.3
Sand	18.7
Coarse Sand	0.4
Medium Sand	5.8
Fine Sand	12.5
Silt	65.4
Clay	15.6

Particle Size of Soils by ASTM D422

Date Received: 9/27/2013
Sample ID: CI13-43-SURF
Percent Solids: 35.9%
Start Date: 10/8/2013
Lab ID: 200-18631-E-17
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): n/a
Non-soil material: shell, plant, wood
Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.8	0.2
#20	850	97.2	2.6
#40	425	96.2	1.0
#60	250	94.8	1.4
#80	180	93.3	1.5
#100	150	91.9	1.4
#200	75	84.9	7.0
Hyd1	31.1	47.4	37.5
Hyd2	20.4	39.2	8.2
Hyd3	12.1	30.9	8.3
Hyd4	8.6	25.4	5.5
Hyd5	6.3	22.7	2.7
Hyd6	3.2	17.0	5.7
Hyd7	1.3	11.9	5.1

Soil Classification	Percent of sample
Gravel	0.0
Sand	15.1
Coarse Sand	0.2
Medium Sand	3.6
Fine Sand	11.3
Silt	62.2
Clay	22.7

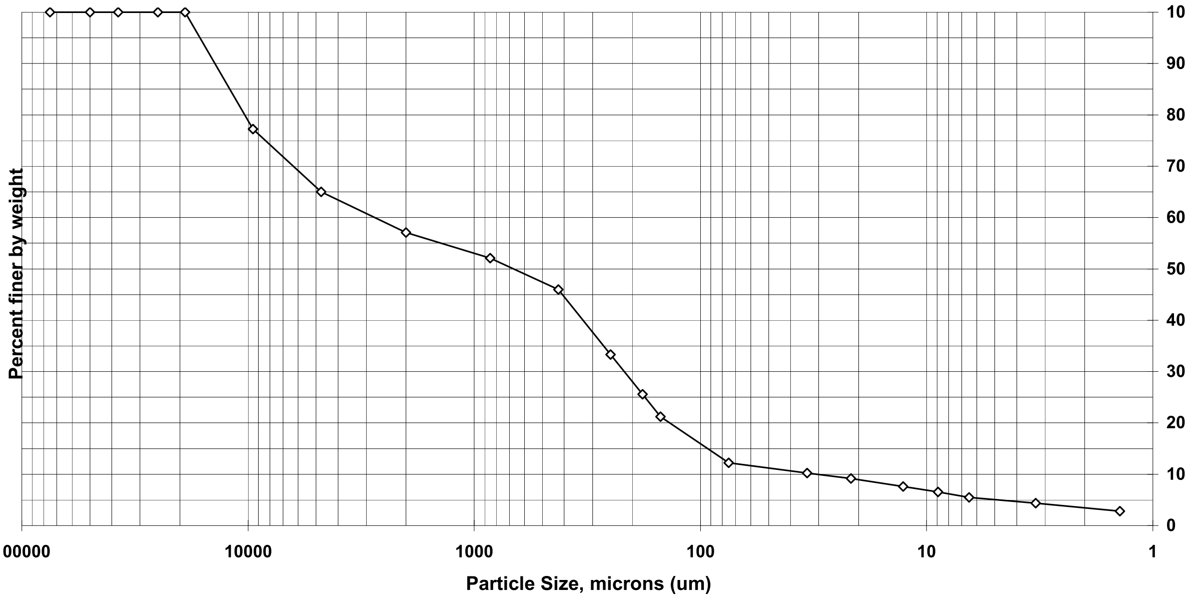
Particle Size of Soils by ASTM D422

				Date Received:	9/28/2013
Sample ID:	CI13-21-SURF	**Percent Solids:**	74.6%	**Start Date:**	10/8/2013
Lab ID:	200-18652-E-1	**Specific Gravity:**	2.650	**End Date:**	10/13/2013

Shape (> #10): subangular

Non-soil material: plant

Hardness (> #10): hard



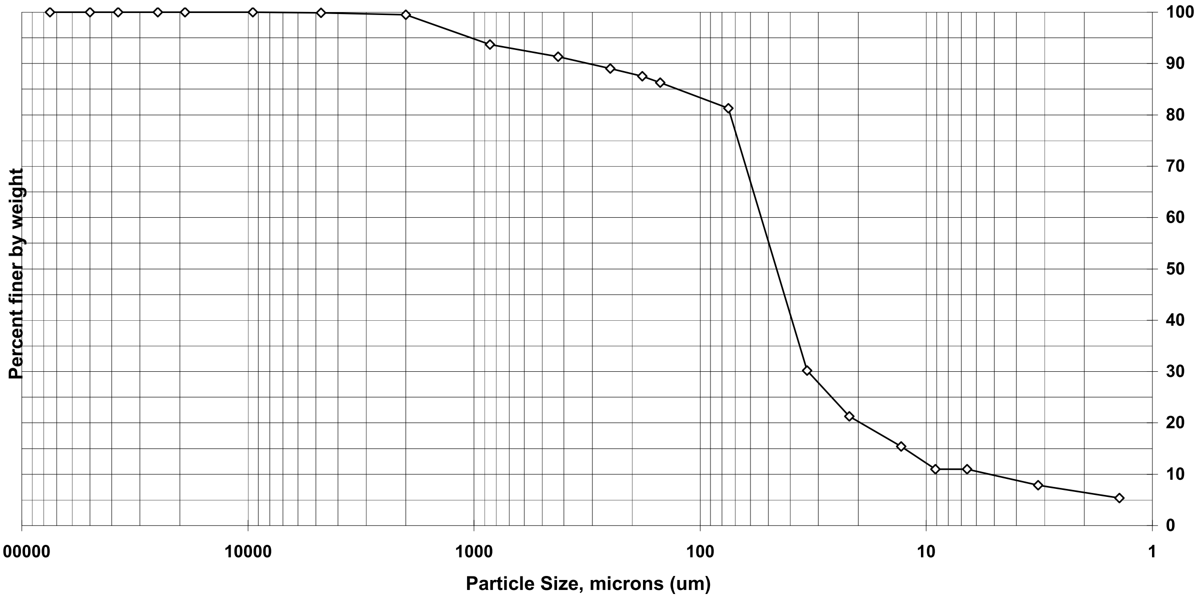
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	77.2	22.8
#4	4750	65.0	12.2
#10	2000	57.1	7.9
#20	850	52.1	5.0
#40	425	46.0	6.1
#60	250	33.3	12.7
#80	180	25.6	7.7
#100	150	21.2	4.4
#200	75	12.2	9.0
Hyd1	33.8	10.2	2.0
Hyd2	21.6	9.2	1.0
Hyd3	12.7	7.6	1.6
Hyd4	8.9	6.6	1.1
Hyd5	6.5	5.5	1.1
Hyd6	3.3	4.4	1.1
Hyd7	1.4	2.8	1.6

Soil Classification	Percent of sample
Gravel	35.0
Sand	52.8
Coarse Sand	7.9
Medium Sand	11.1
Fine Sand	33.8
Silt	6.7
Clay	5.5

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-42-SURF
Percent Solids: 32.1%
Start Date: 10/8/2013
Lab ID: 200-18652-E-2
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): n/a
Non-soil material: plant, shell
Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.9	0.1
#10	2000	99.5	0.4
#20	850	93.7	5.8
#40	425	91.3	2.4
#60	250	89.0	2.3
#80	180	87.5	1.5
#100	150	86.3	1.2
#200	75	81.3	5.0
Hyd1	33.6	30.2	51.1
Hyd2	21.9	21.3	8.9
Hyd3	12.9	15.4	5.9
Hyd4	9.1	11.0	4.4
Hyd5	6.6	11.0	0.0
Hyd6	3.2	7.8	3.2
Hyd7	1.4	5.4	2.5

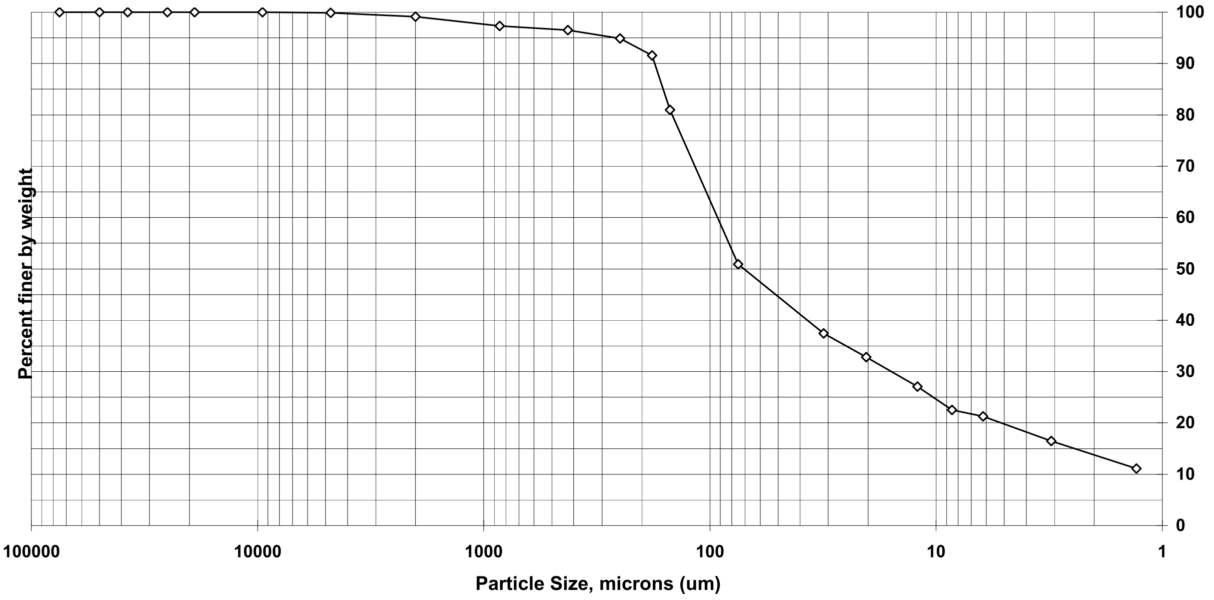
Soil Classification	Percent of sample
Gravel	0.1
Sand	18.6
Coarse Sand	0.4
Medium Sand	8.2
Fine Sand	10.0
Silt	70.3
Clay	11.0

Particle Size of Soils by ASTM D422

				Date Received:	9/28/2013
Sample ID:	CI13-44-SURF	**Percent Solids:**	50.4%	**Start Date:**	10/8/2013
Lab ID:	200-18652-E-3	**Specific Gravity:**	2.650	**End Date:**	10/13/2013

Shape (> #10): n/a

Non-soil material: shell, plant, wood
Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.9	0.1
#10	2000	99.1	0.8
#20	850	97.3	1.8
#40	425	96.5	0.8
#60	250	94.9	1.6
#80	180	91.6	3.3
#100	150	81.0	10.6
#200	75	50.9	30.1
Hyd1	31.4	37.4	13.5
Hyd2	20.4	32.8	4.6
Hyd3	12.1	27.1	5.7
Hyd4	8.5	22.5	4.6
Hyd5	6.2	21.3	1.2
Hyd6	3.1	16.5	4.8
Hyd7	1.3	11.1	5.4

Soil Classification	Percent of sample
Gravel	0.1
Sand	49.0
Coarse Sand	0.8
Medium Sand	2.6
Fine Sand	45.6
Silt	29.6
Clay	21.3

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013

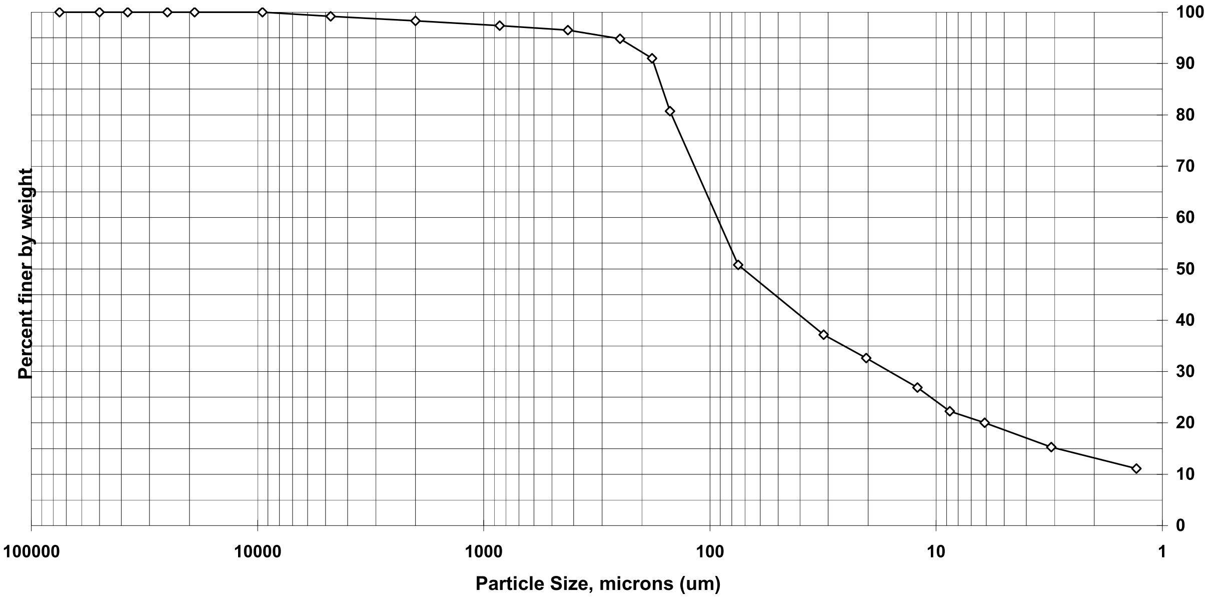
Sample ID: CI13-44-SURF **Percent Solids:** 51.3% **Start Date:** 10/8/2013

Lab ID: 200-18652-C-3 DU **Specific Gravity:** 2.650 **End Date:** 10/13/2013

Shape (> #10): n/a

Non-soil material: shell, plant, wood

Hardness (> #10): n/a



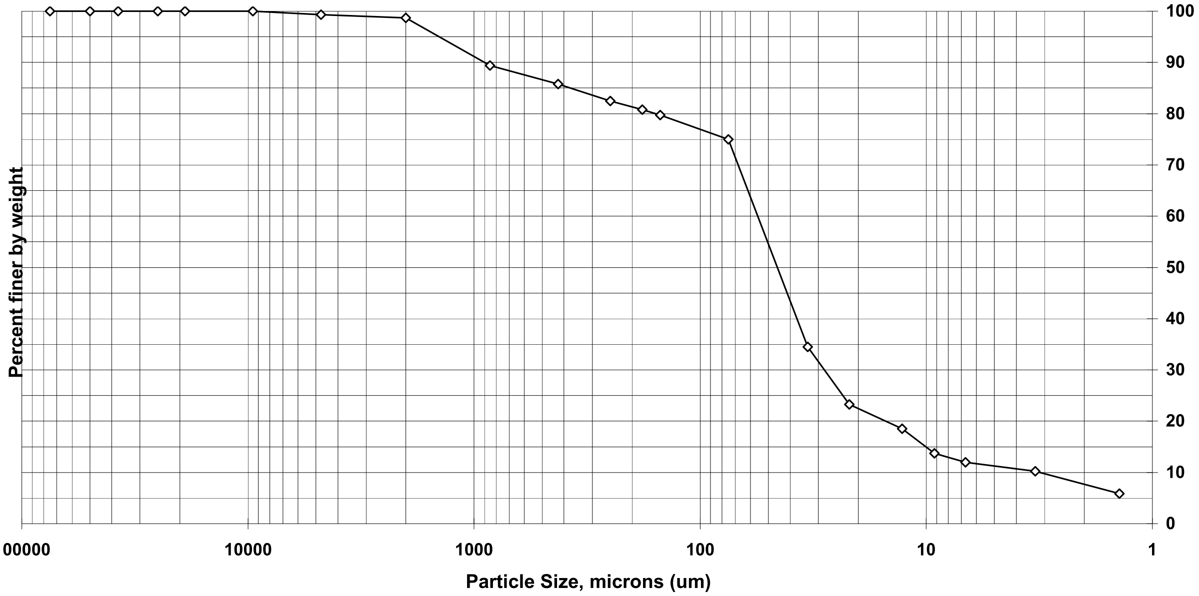
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.2	0.8
#10	2000	98.3	0.9
#20	850	97.4	0.9
#40	425	96.5	0.9
#60	250	94.8	1.7
#80	180	91.0	3.8
#100	150	80.7	10.3
#200	75	50.8	29.9
Hyd1	31.4	37.2	13.6
Hyd2	20.4	32.6	4.6
Hyd3	12.1	26.9	5.7
Hyd4	8.7	22.3	4.6
Hyd5	6.1	20.0	2.3
Hyd6	3.1	15.3	4.7
Hyd7	1.3	11.1	4.2

Soil Classification	Percent of sample
Gravel	0.8
Sand	48.4
Coarse Sand	0.9
Medium Sand	1.8
Fine Sand	45.7
Silt	30.8
Clay	20.0

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-48-SURF
Percent Solids: 25.9%
Start Date: 10/8/2013
Lab ID: 200-18653-E-1
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): subangular
Non-soil material: plant
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.3	0.7
#10	2000	98.7	0.6
#20	850	89.4	9.3
#40	425	85.8	3.6
#60	250	82.5	3.3
#80	180	80.8	1.7
#100	150	79.7	1.1
#200	75	75.0	4.7
Hyd1	33.4	34.5	40.5
Hyd2	21.9	23.3	11.2
Hyd3	12.8	18.5	4.8
Hyd4	9.2	13.7	4.8
Hyd5	6.7	12.0	1.7
Hyd6	3.3	10.2	1.8
Hyd7	1.4	5.9	4.3

Soil Classification	Percent of sample
Gravel	0.7
Sand	24.3
Coarse Sand	0.6
Medium Sand	12.9
Fine Sand	10.8
Silt	63.0
Clay	12.0

Particle Size of Soils by ASTM D422

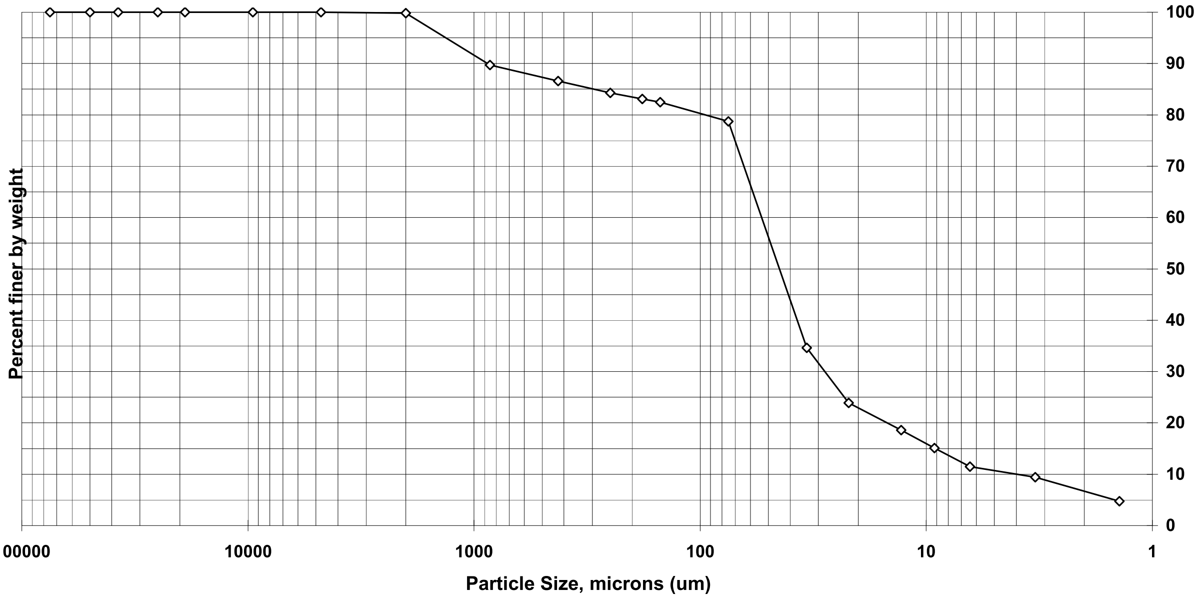
Date Received: 9/28/2013

Sample ID: CI13-49-SURF
Percent Solids: 26.2%
Start Date: 10/8/2013

Lab ID: 200-18653-E-2
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): n/a

Non-soil material: plant, wood
Hardness (> #10): n/a



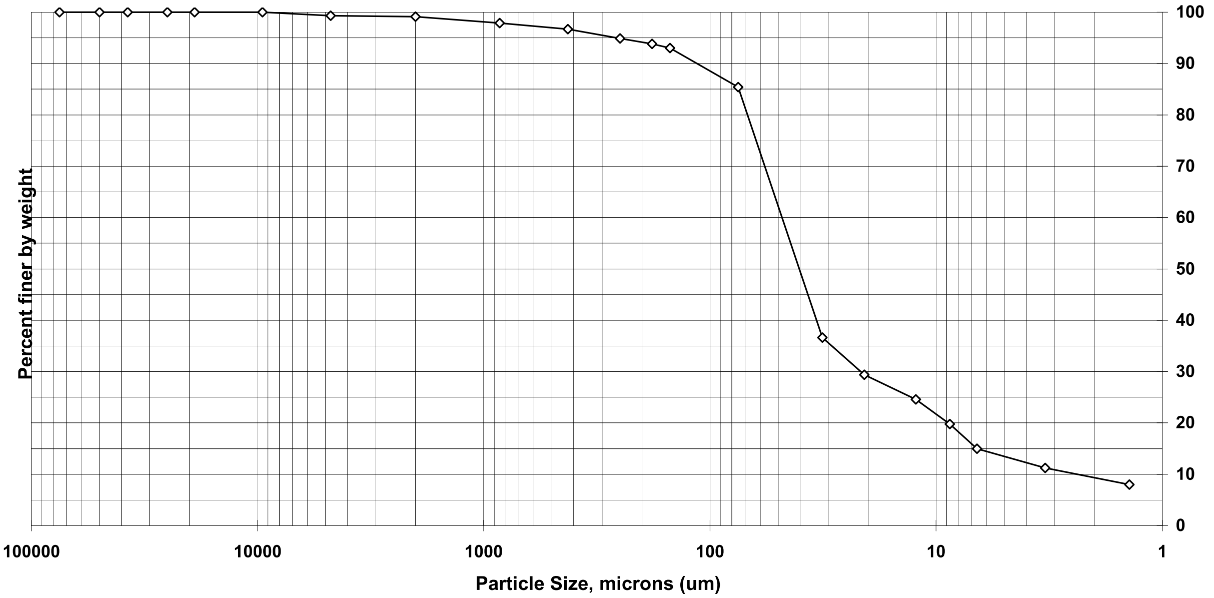
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.8	0.2
#20	850	89.7	10.1
#40	425	86.6	3.1
#60	250	84.3	2.3
#80	180	83.1	1.2
#100	150	82.5	0.6
#200	75	78.7	3.8
Hyd1	33.8	34.6	44.1
Hyd2	22	23.9	10.7
Hyd3	12.9	18.6	5.3
Hyd4	9.2	15.1	3.5
Hyd5	6.4	11.5	3.6
Hyd6	3.3	9.5	2.1
Hyd7	1.4	4.7	4.7

Soil Classification	Percent of sample
Gravel	0.0
Sand	21.3
Coarse Sand	0.2
Medium Sand	13.2
Fine Sand	7.9
Silt	67.2
Clay	11.5

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-41-SURF
Percent Solids: 40.1%
Start Date: 10/8/2013
Lab ID: 200-18653-E-3
Specific Gravity: 2.650
End Date: 10/13/2013

Shape (> #10): n/a
Non-soil material: plant, wood
Hardness (> #10): n/a



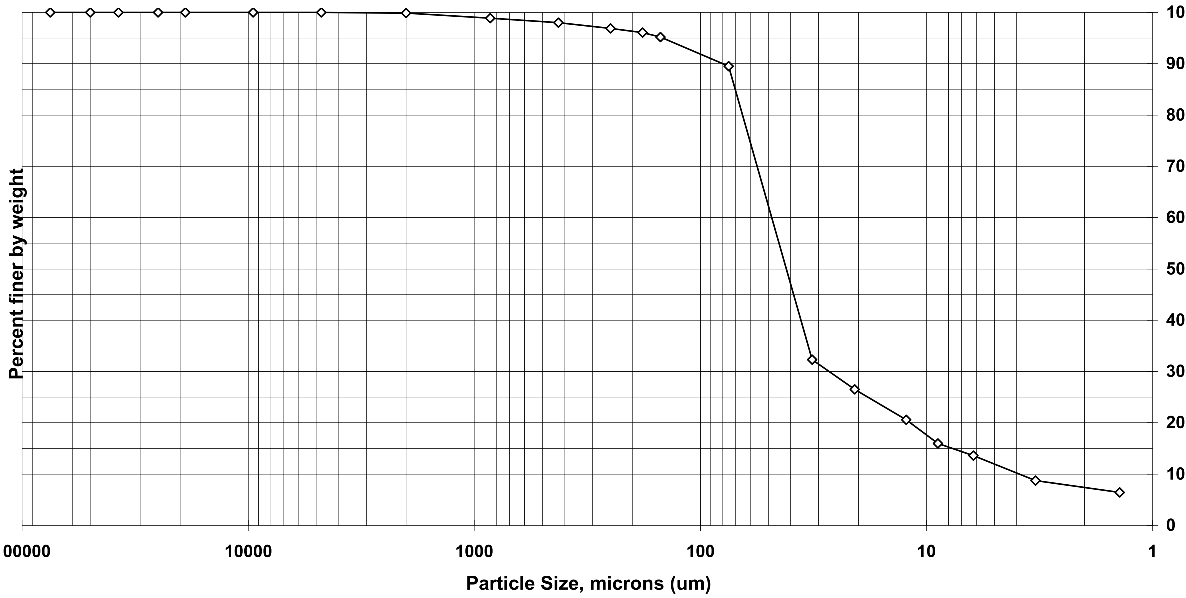
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.3	0.7
#10	2000	99.1	0.2
#20	850	97.9	1.2
#40	425	96.7	1.2
#60	250	94.9	1.8
#80	180	93.8	1.1
#100	150	93.0	0.8
#200	75	85.4	7.6
Hyd1	31.8	36.6	48.8
Hyd2	20.8	29.4	7.2
Hyd3	12.3	24.6	4.8
Hyd4	8.7	19.8	4.8
Hyd5	6.6	15.0	4.8
Hyd6	3.3	11.2	3.8
Hyd7	1.4	8.0	3.2

Soil Classification	Percent of sample
Gravel	0.7
Sand	13.9
Coarse Sand	0.2
Medium Sand	2.4
Fine Sand	11.3
Silt	70.4
Clay	15.0

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-40-SURF
Percent Solids: 37.4%
Start Date: 10/8/2013
Lab ID: 200-18653-E-5
Specific Gravity: 2.650
End Date: 10/11/2013

Shape (> #10): n/a
Non-soil material: shell, plant, wood
Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	98.9	1.0
#40	425	98.0	0.9
#60	250	96.9	1.1
#80	180	96.1	0.8
#100	150	95.2	0.9
#200	75	89.5	5.7
Hyd1	32	32.3	57.2
Hyd2	20.8	26.5	5.8
Hyd3	12.3	20.6	5.9
Hyd4	8.9	16.0	4.6
Hyd5	6.2	13.6	2.4
Hyd6	3.3	8.8	4.8
Hyd7	1.4	6.4	2.3

Soil Classification	Percent of sample
Gravel	0.0
Sand	10.5
Coarse Sand	0.1
Medium Sand	1.9
Fine Sand	8.5
Silt	75.9
Clay	13.6

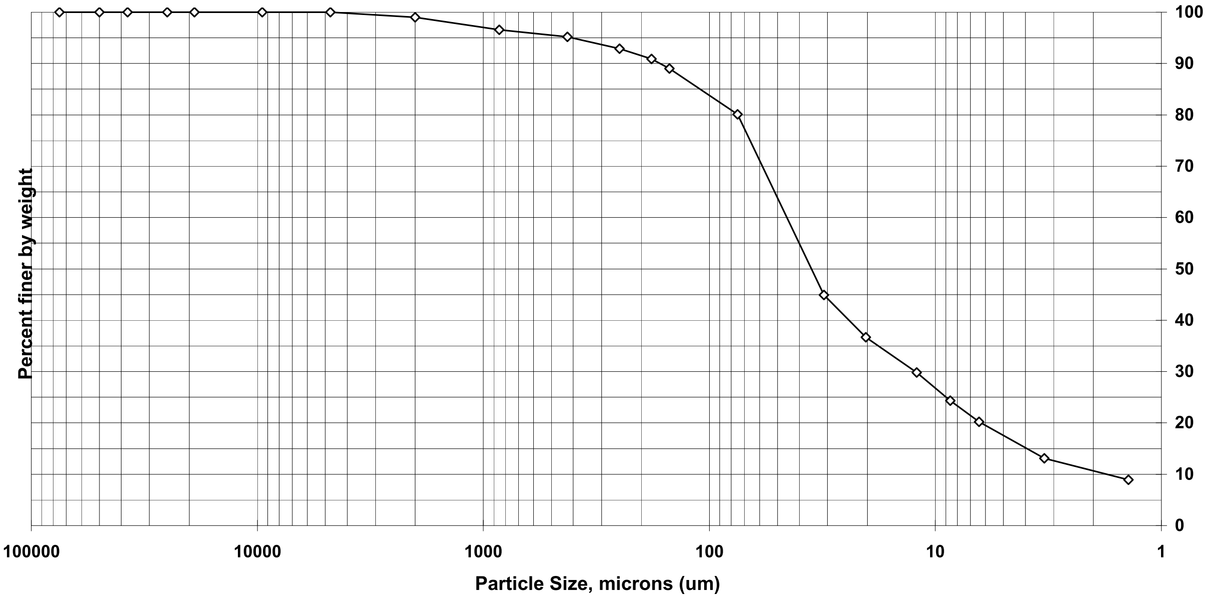
Particle Size of Soils by ASTM D422

				Date Received:	9/28/2013
Sample ID:	CI13-45-SURF	**Percent Solids:**	38.7%	**Start Date:**	10/8/2013
Lab ID:	200-18653-E-6	**Specific Gravity:**	2.650	**End Date:**	10/11/2013

Shape (> #10): angular

Non-soil material: shell, plant, wood

Hardness (> #10): hard



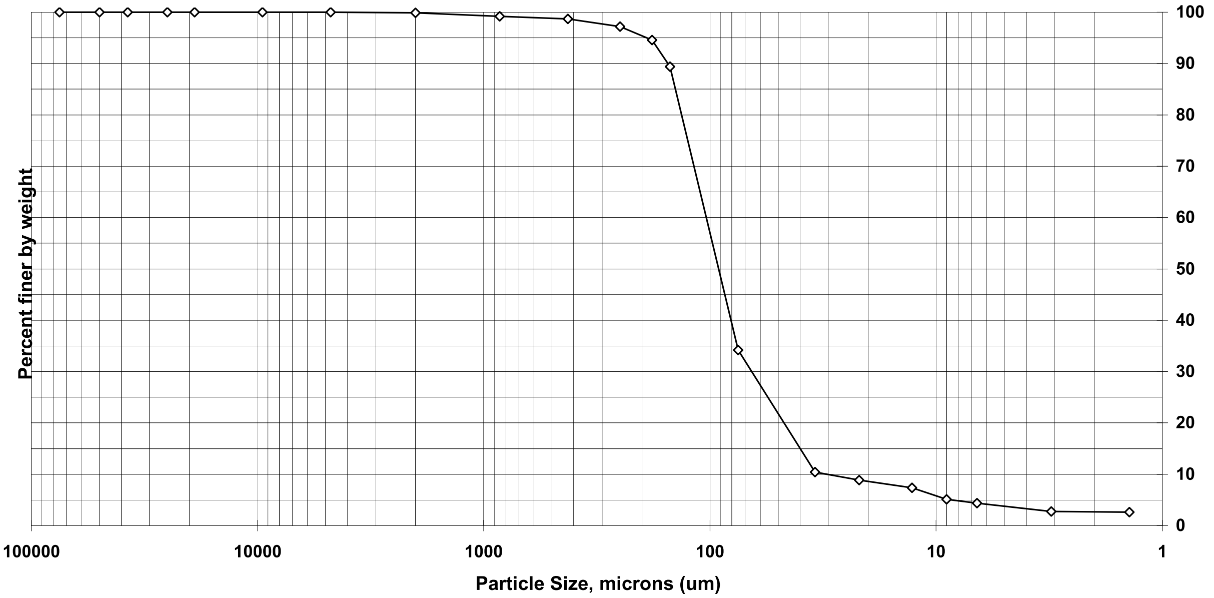
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.0	1.0
#20	850	96.6	2.4
#40	425	95.2	1.4
#60	250	92.9	2.3
#80	180	90.9	2.0
#100	150	89.0	1.9
#200	75	80.1	8.9
Hyd1	31.1	44.9	35.2
Hyd2	20.3	36.7	8.2
Hyd3	12.1	29.8	6.9
Hyd4	8.6	24.3	5.5
Hyd5	6.4	20.2	4.1
Hyd6	3.3	13.1	7.1
Hyd7	1.4	8.9	4.2

Soil Classification	Percent of sample
Gravel	0.0
Sand	19.9
Coarse Sand	1.0
Medium Sand	3.8
Fine Sand	15.1
Silt	59.9
Clay	20.2

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-31-SURF
Percent Solids: 63.0%
Start Date: 10/10/2013
Lab ID: 200-18654-E-3
Specific Gravity: 2.650
End Date: 10/14/2013

Shape (> #10): n/a
Non-soil material: plant, shell
Hardness (> #10): n/a



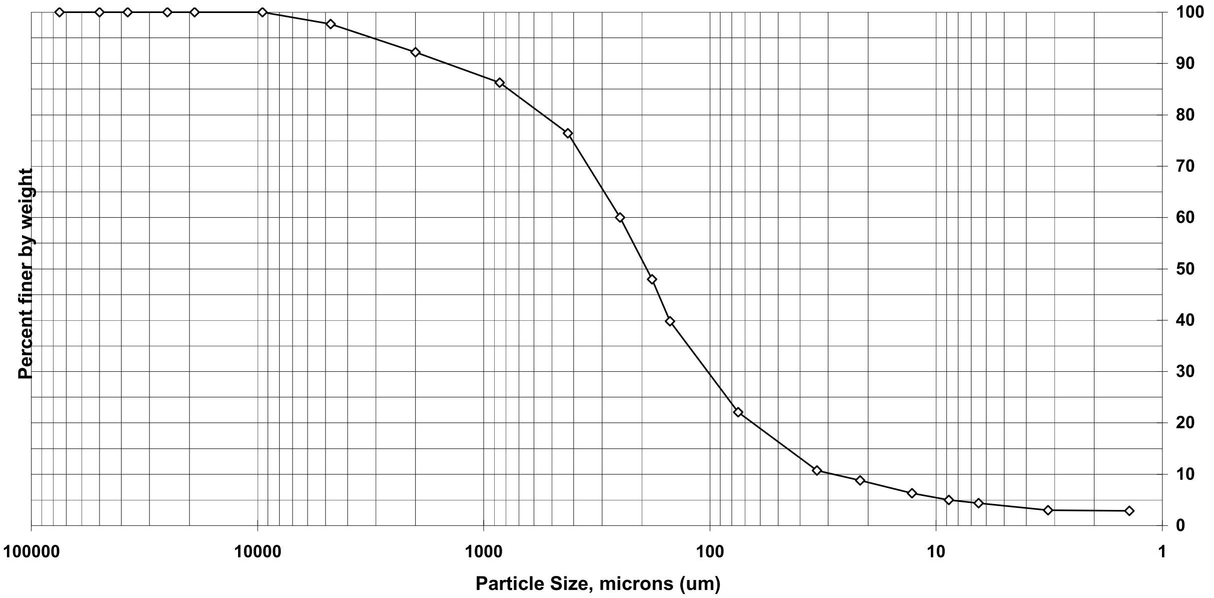
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	99.2	0.7
#40	425	98.7	0.5
#60	250	97.2	1.5
#80	180	94.6	2.6
#100	150	89.4	5.2
#200	75	34.2	55.2
Hyd1	34.3	10.4	23.8
Hyd2	21.9	8.9	1.5
Hyd3	12.8	7.4	1.5
Hyd4	9	5.1	2.3
Hyd5	6.6	4.4	0.8
Hyd6	3.1	2.8	1.6
Hyd7	1.4	2.6	0.1

Soil Classification	Percent of sample
Gravel	0.0
Sand	65.8
Coarse Sand	0.1
Medium Sand	1.2
Fine Sand	64.5
Silt	29.8
Clay	4.4

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-32-SURF
Percent Solids: 62.5%
Start Date: 10/10/2013
Lab ID: 200-18654-E-5
Specific Gravity: 2.650
End Date: 10/14/2013

Shape (> #10): angular
Non-soil material: plant, shell, wood
Hardness (> #10): hard



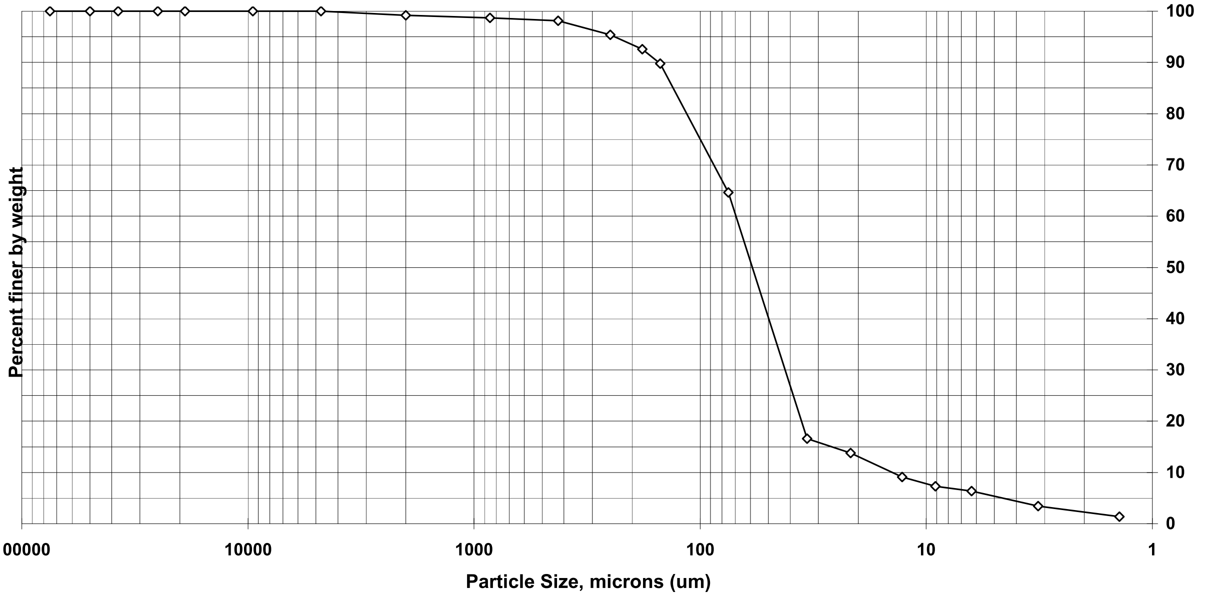
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	97.7	2.3
#10	2000	92.2	5.5
#20	850	86.3	5.9
#40	425	76.4	9.9
#60	250	60.0	16.4
#80	180	48.0	12.0
#100	150	39.8	8.2
#200	75	22.1	17.7
Hyd1	33.7	10.7	11.4
Hyd2	21.7	8.8	1.9
Hyd3	12.8	6.3	2.6
Hyd4	8.8	5.0	1.3
Hyd5	6.5	4.4	0.6
Hyd6	3.2	3.0	1.4
Hyd7	1.4	2.9	0.1

Soil Classification	Percent of sample
Gravel	2.3
Sand	75.6
Coarse Sand	5.5
Medium Sand	15.8
Fine Sand	54.3
Silt	17.7
Clay	4.4

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-33-SURF
Percent Solids: 50.9%
Start Date: 10/10/2013
Lab ID: 200-18654-E-6
Specific Gravity: 2.650
End Date: 10/14/2013

Shape (> #10): n/a
Non-soil material: plant, shell
Hardness (> #10): n/a



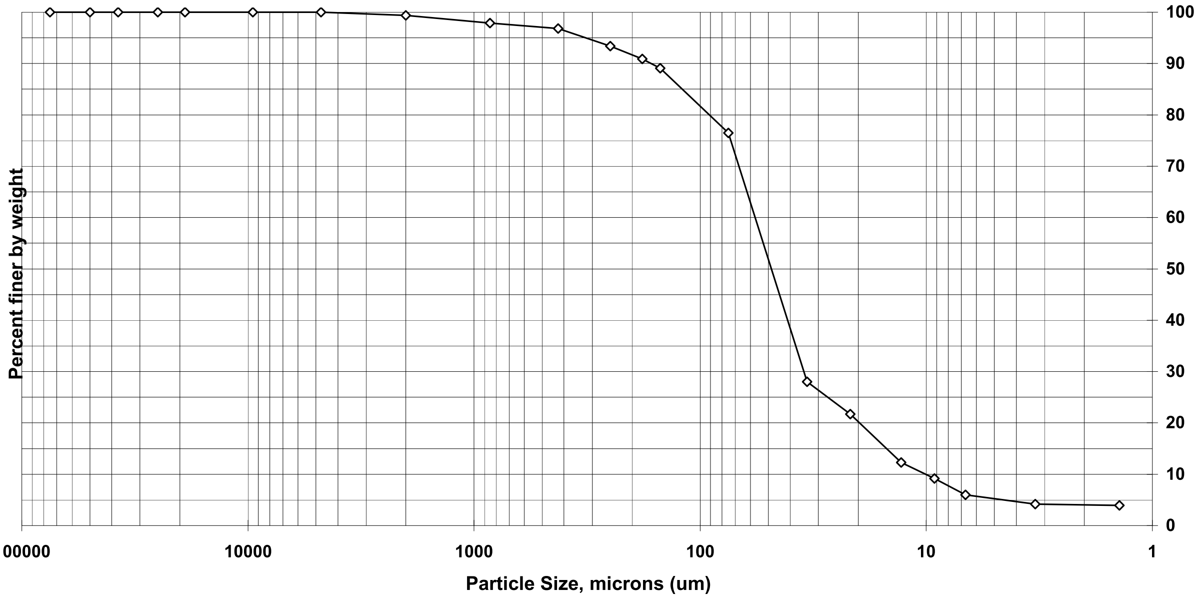
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.2	0.8
#20	850	98.7	0.5
#40	425	98.1	0.6
#60	250	95.4	2.7
#80	180	92.6	2.8
#100	150	89.8	2.8
#200	75	64.6	25.2
Hyd1	33.6	16.6	48.0
Hyd2	21.6	13.8	2.8
Hyd3	12.8	9.1	4.7
Hyd4	9.1	7.3	1.9
Hyd5	6.3	6.3	0.9
Hyd6	3.2	3.4	2.9
Hyd7	1.4	1.4	2.0

Soil Classification	Percent of sample
Gravel	0.0
Sand	35.4
Coarse Sand	0.8
Medium Sand	1.1
Fine Sand	33.5
Silt	58.3
Clay	6.3

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-34-SURF
Percent Solids: 33.5%
Start Date: 10/10/2013
Lab ID: 200-18654-E-7
Specific Gravity: 2.650
End Date: 10/14/2013

Shape (> #10): n/a
Non-soil material: plant, shell
Hardness (> #10): n/a



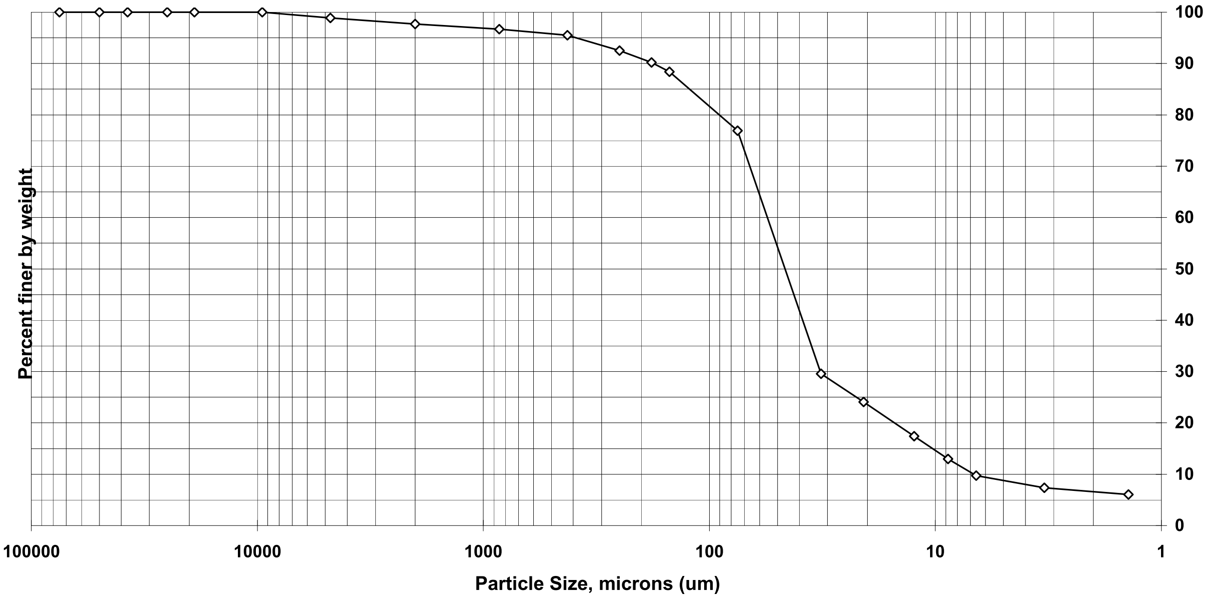
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.4	0.6
#20	850	97.9	1.5
#40	425	96.8	1.1
#60	250	93.4	3.4
#80	180	90.9	2.5
#100	150	89.1	1.8
#200	75	76.5	12.6
Hyd1	33.6	28.0	48.5
Hyd2	21.7	21.7	6.3
Hyd3	12.9	12.3	9.4
Hyd4	9.2	9.2	3.1
Hyd5	6.7	6.0	3.1
Hyd6	3.3	4.2	1.8
Hyd7	1.4	3.9	0.3

Soil Classification	Percent of sample
Gravel	0.0
Sand	23.5
Coarse Sand	0.6
Medium Sand	2.6
Fine Sand	20.3
Silt	70.5
Clay	6.0

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-37-SURF **Percent Solids:** 40.9% **Start Date:** 10/10/2013
Lab ID: 200-18654-E-8 **Specific Gravity:** 2.650 **End Date:** 10/14/2013

Shape (> #10): n/a **Non-soil material:** plant, shell
Hardness (> #10): n/a



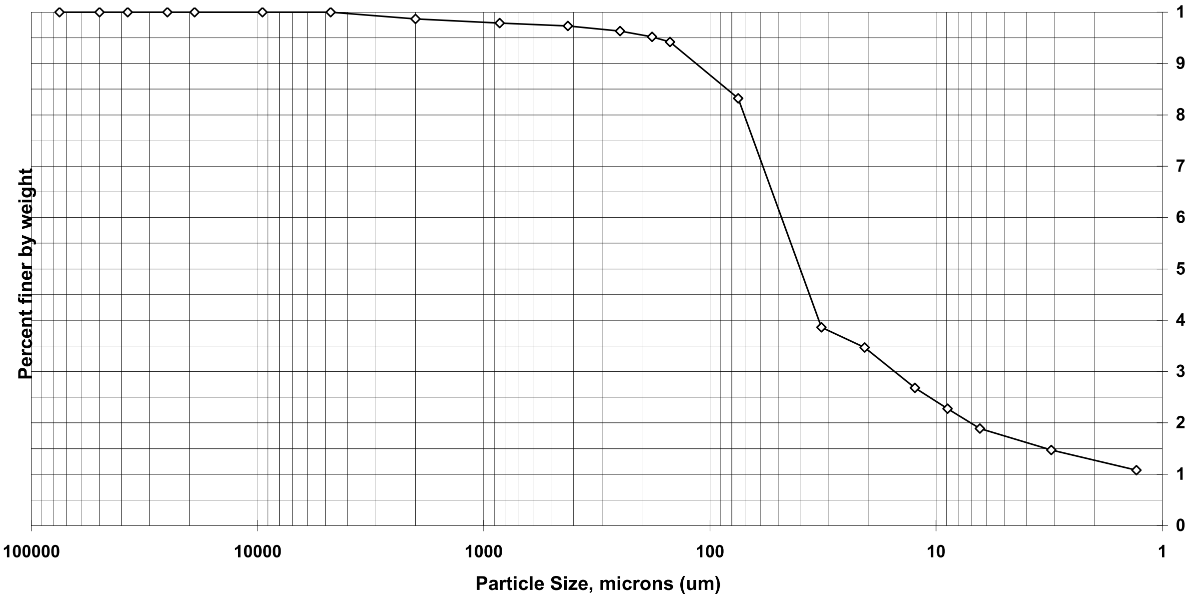
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	98.9	1.1
#10	2000	97.7	1.2
#20	850	96.7	1.0
#40	425	95.5	1.2
#60	250	92.5	3.0
#80	180	90.2	2.3
#100	150	88.4	1.8
#200	75	76.9	11.5
Hyd1	32	29.6	47.3
Hyd2	20.8	24.1	5.5
Hyd3	12.4	17.4	6.7
Hyd4	8.8	13.0	4.4
Hyd5	6.6	9.7	3.3
Hyd6	3.3	7.3	2.4
Hyd7	1.4	6.1	1.3

Soil Classification	Percent of sample
Gravel	1.1
Sand	22.0
Coarse Sand	1.2
Medium Sand	2.2
Fine Sand	18.6
Silt	67.2
Clay	9.7

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-38-SURF **Percent Solids:** 32.7% **Start Date:** 10/11/2013
Lab ID: 200-18654-E-9 **Specific Gravity:** 2.650 **End Date:** 10/16/2013

Shape (> #10): n/a **Non-soil material:** shell,plant
Hardness (> #10): n/a



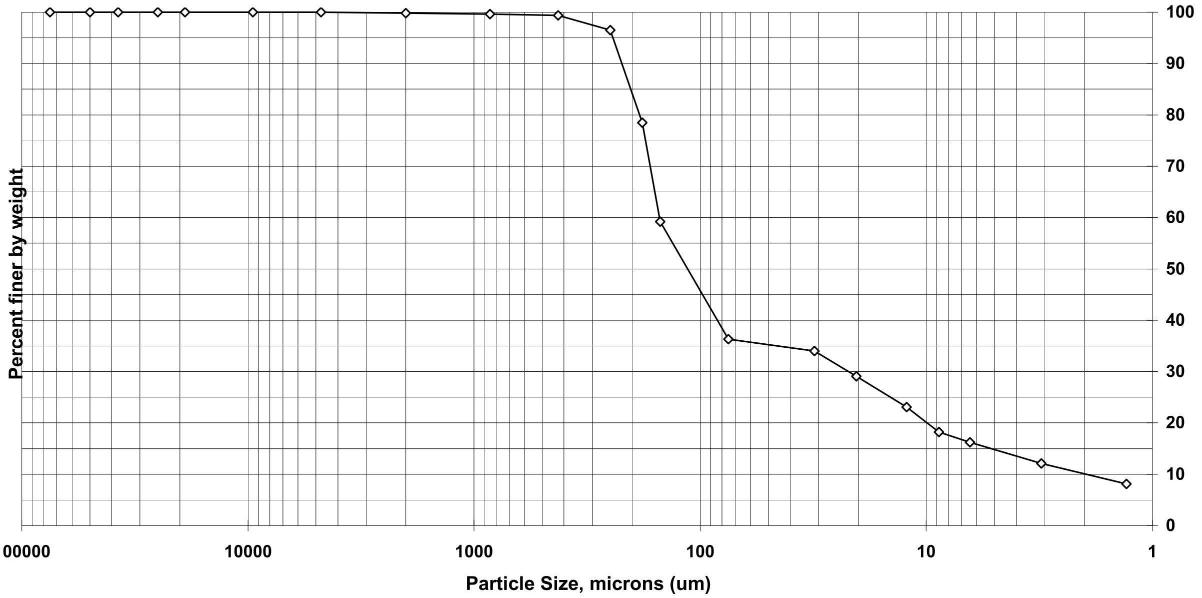
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	98.7	1.3
#20	850	97.9	0.8
#40	425	97.3	0.6
#60	250	96.3	1.0
#80	180	95.2	1.1
#100	150	94.2	1.0
#200	75	83.2	11.0
Hyd1	32.2	38.6	44.6
Hyd2	20.7	34.7	3.9
Hyd3	12.4	26.8	7.9
Hyd4	8.9	22.8	4.0
Hyd5	6.4	18.9	3.9
Hyd6	3.1	14.7	4.2
Hyd7	1.3	10.8	3.9

Soil Classification	Percent of sample
Gravel	0.0
Sand	16.8
Coarse Sand	1.3
Medium Sand	1.4
Fine Sand	14.1
Silt	64.3
Clay	18.9

Particle Size of Soils by ASTM D422

Date Received: 9/28/2013
Sample ID: CI13-50-SURF
Percent Solids: 45.2%
Start Date: 10/11/2013
Lab ID: 200-18654-E-11
Specific Gravity: 2.650
End Date: 10/16/2013

Shape (> #10): angular
Non-soil material: plant,shell
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.8	0.2
#20	850	99.6	0.2
#40	425	99.4	0.2
#60	250	96.5	2.9
#80	180	78.5	18.0
#100	150	59.2	19.3
#200	75	36.3	22.9
Hyd1	31.2	34.0	2.3
Hyd2	20.4	29.1	4.9
Hyd3	12.2	23.1	6.0
Hyd4	8.8	18.2	4.9
Hyd5	6.4	16.2	2.0
Hyd6	3.1	12.1	4.1
Hyd7	1.3	8.1	4.0

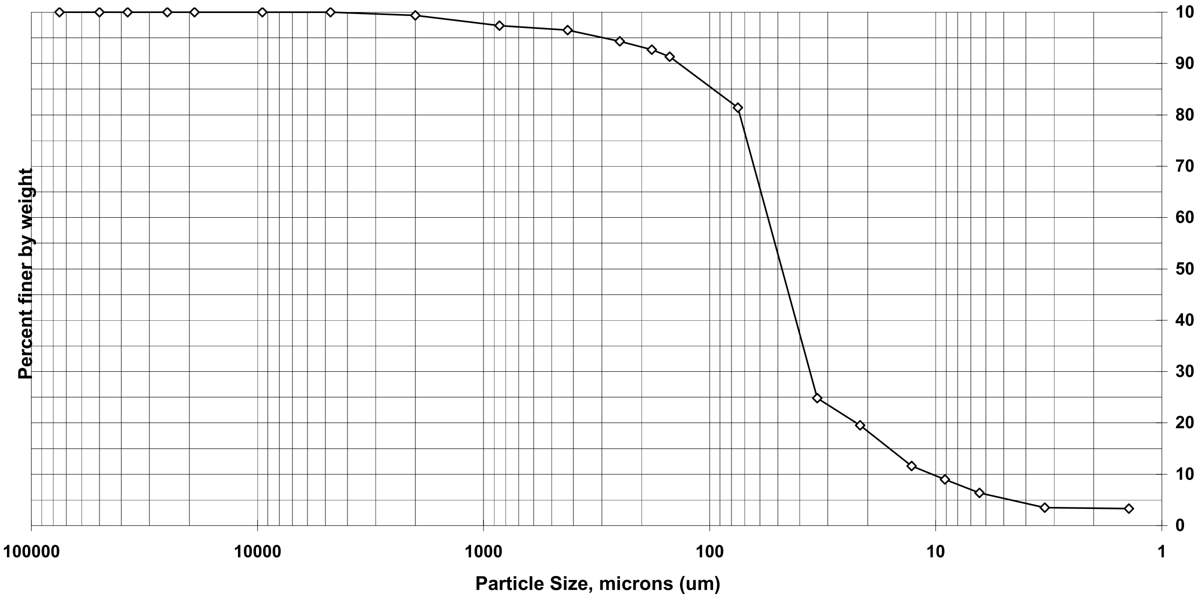
Soil Classification	Percent of sample
Gravel	0.0
Sand	63.7
Coarse Sand	0.2
Medium Sand	0.4
Fine Sand	63.1
Silt	20.1
Clay	16.2

Particle Size of Soils by ASTM D422

				Date Received:	9/28/2013
Sample ID:	CI13-34-SURF	**Percent Solids:**	39.4%	**Start Date:**	10/10/2013
Lab ID:	200-18654-C-7 DU	**Specific Gravity:**	2.650	**End Date:**	10/14/2013

Shape (> #10): n/a

Non-soil material: plant, shell
Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.4	0.6
#20	850	97.4	2.0
#40	425	96.5	0.9
#60	250	94.3	2.2
#80	180	92.7	1.6
#100	150	91.3	1.4
#200	75	81.4	9.9
Hyd1	33.4	24.8	56.6
Hyd2	21.6	19.5	5.3
Hyd3	12.8	11.6	7.9
Hyd4	9.1	9.0	2.6
Hyd5	6.4	6.4	2.6
Hyd6	3.3	3.5	2.8
Hyd7	1.4	3.3	0.2

Soil Classification	Percent of sample
Gravel	0.0
Sand	18.6
Coarse Sand	0.6
Medium Sand	2.9
Fine Sand	15.1
Silt	75.0
Clay	6.4

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013

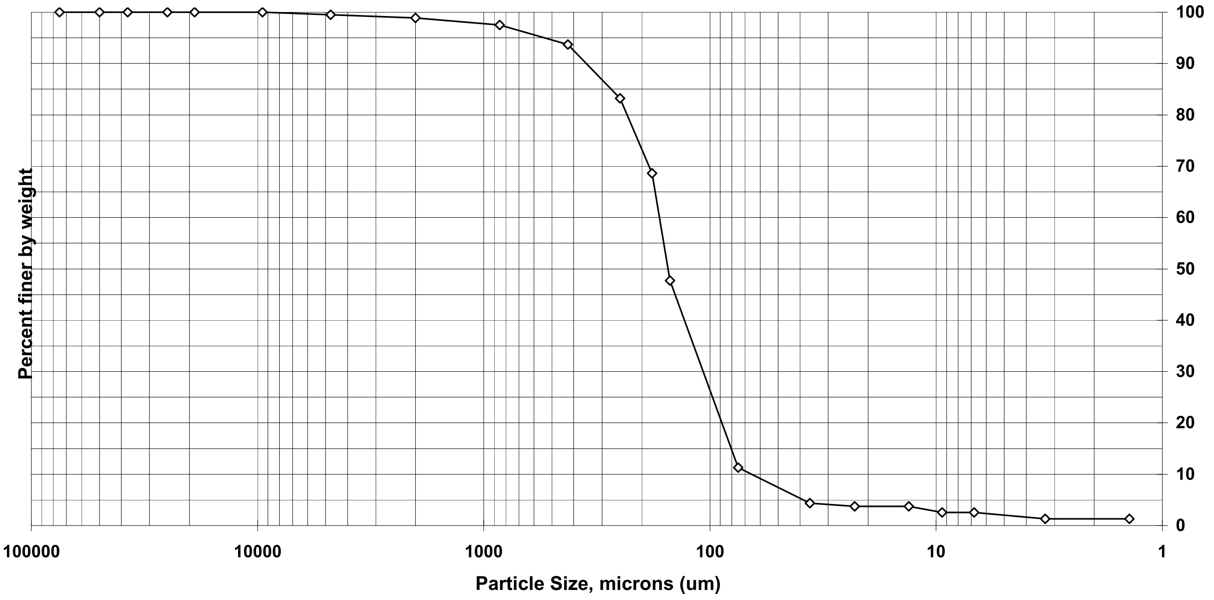
Sample ID: CI13-10-SURF
Percent Solids: 69.4%
Start Date: 10/14/2013

Lab ID: 200-18729-E-1
Specific Gravity: 2.650
End Date: 10/17/2013

Shape (> #10): subangular

Non-soil material: shell,plant

Hardness (> #10): hard



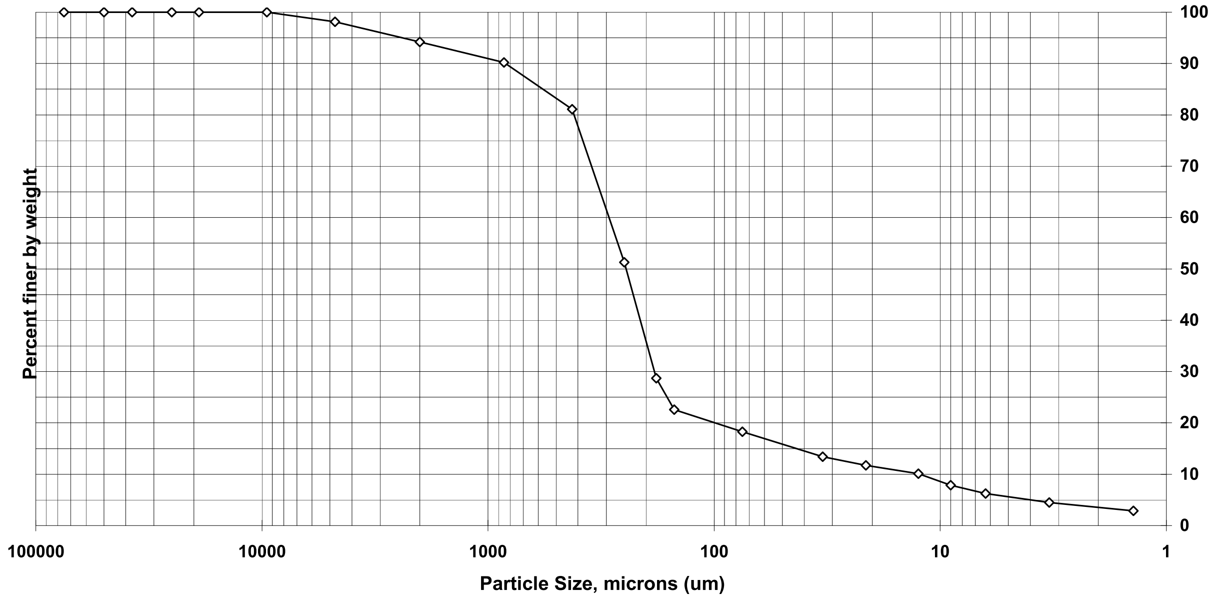
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.5	0.5
#10	2000	98.9	0.6
#20	850	97.5	1.4
#40	425	93.7	3.8
#60	250	83.2	10.5
#80	180	68.6	14.6
#100	150	47.7	20.9
#200	75	11.3	36.4
Hyd1	36.1	4.4	6.9
Hyd2	22.9	3.8	0.6
Hyd3	13.2	3.8	0.0
Hyd4	9.4	2.6	1.2
Hyd5	6.8	2.6	0.0
Hyd6	3.3	1.3	1.3
Hyd7	1.4	1.3	0.0

Soil Classification	Percent of sample
Gravel	0.5
Sand	88.2
Coarse Sand	0.6
Medium Sand	5.2
Fine Sand	82.4
Silt	8.7
Clay	2.6

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-11-SURF **Percent Solids:** 68.0% **Start Date:** 10/14/2013
Lab ID: 200-18729-E-2 **Specific Gravity:** 2.650 **End Date:** 10/17/2013

Shape (> #10): subrounded **Non-soil material:** plant,shell
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	98.1	1.9
#10	2000	94.2	3.9
#20	850	90.2	4.0
#40	425	81.1	9.1
#60	250	51.3	29.8
#80	180	28.7	22.6
#100	150	22.6	6.1
#200	75	18.3	4.3
Hyd1	33.1	13.4	4.9
Hyd2	21.3	11.7	1.7
Hyd3	12.5	10.1	1.6
Hyd4	9	7.9	2.2
Hyd5	6.3	6.2	1.6
Hyd6	3.3	4.5	1.7
Hyd7	1.4	2.8	1.6

Soil Classification	Percent of sample
Gravel	1.9
Sand	79.8
Coarse Sand	3.9
Medium Sand	13.1
Fine Sand	62.8
Silt	12.1
Clay	6.2

Particle Size of Soils by ASTM D422

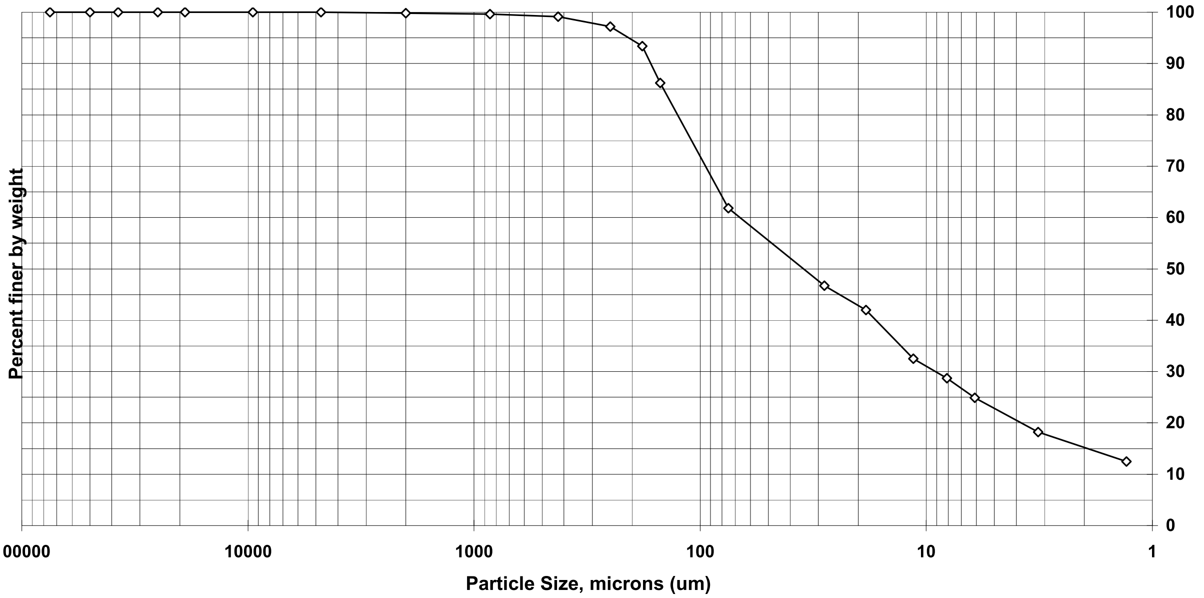
Date Received: 10/2/2013

Sample ID: CI13-12-SURF **Percent Solids:** 46.6% **Start Date:** 10/14/2013

Lab ID: 200-18729-E-3 **Specific Gravity:** 2.650 **End Date:** 10/17/2013

Shape (> #10): subangular **Non-soil material:** plant,shell

Hardness (> #10): hard



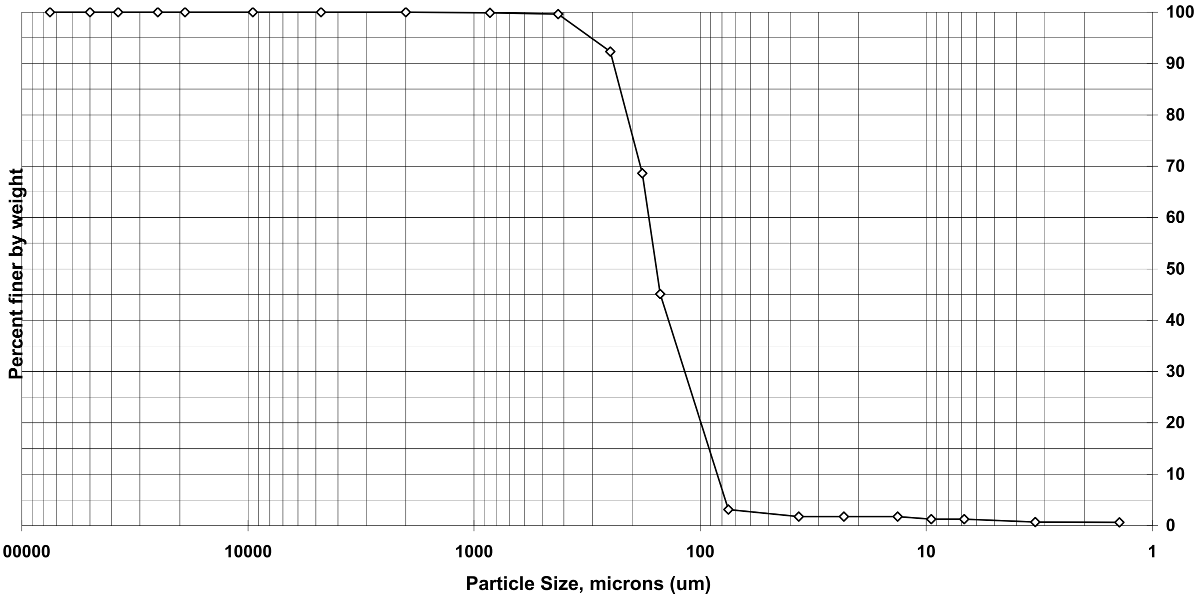
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.8	0.2
#20	850	99.6	0.2
#40	425	99.1	0.5
#60	250	97.2	1.9
#80	180	93.4	3.8
#100	150	86.2	7.2
#200	75	61.8	24.4
Hyd1	28.2	46.7	15.1
Hyd2	18.5	42.0	4.7
Hyd3	11.4	32.5	9.5
Hyd4	8.1	28.7	3.8
Hyd5	6.1	24.9	3.8
Hyd6	3.2	18.2	6.7
Hyd7	1.3	12.5	5.7

Soil Classification	Percent of sample
Gravel	0.0
Sand	38.2
Coarse Sand	0.2
Medium Sand	0.7
Fine Sand	37.3
Silt	36.9
Clay	24.9

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-17-SURF
Percent Solids: 76.3%
Start Date: 10/14/2013
Lab ID: 200-18729-E-4
Specific Gravity: 2.650
End Date: 10/17/2013

Shape (> #10): n/a
Non-soil material: plant
Hardness (> #10): n/a



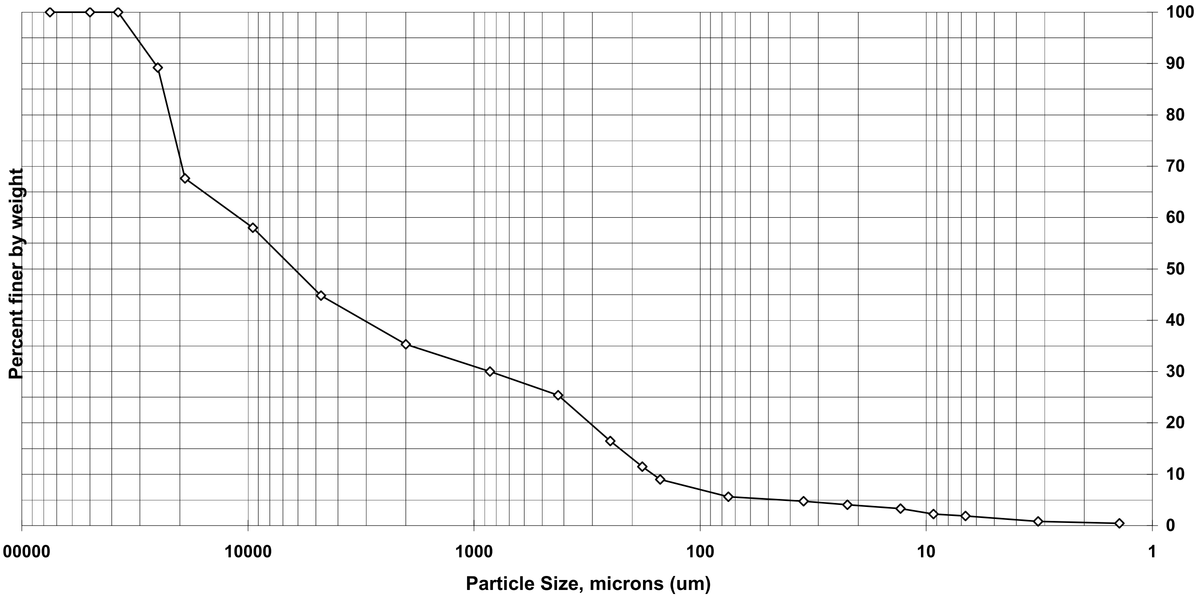
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.1
#40	425	99.6	0.3
#60	250	92.3	7.3
#80	180	68.6	23.7
#100	150	45.1	23.5
#200	75	3.1	42.0
Hyd1	36.6	1.7	1.4
Hyd2	23.1	1.7	0.0
Hyd3	13.4	1.7	0.0
Hyd4	9.5	1.2	0.5
Hyd5	6.8	1.2	0.0
Hyd6	3.3	0.7	0.5
Hyd7	1.4	0.6	0.1

Soil Classification	Percent of sample
Gravel	0.0
Sand	96.9
Coarse Sand	0.0
Medium Sand	0.4
Fine Sand	96.5
Silt	1.9
Clay	1.2

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-18A-SURF
Percent Solids: 76.2%
Start Date: 10/14/2013
Lab ID: 200-18729-E-5
Specific Gravity: 2.650
End Date: 10/17/2013

Shape (> #10): subangular
Non-soil material: plant,shell
Hardness (> #10): hard



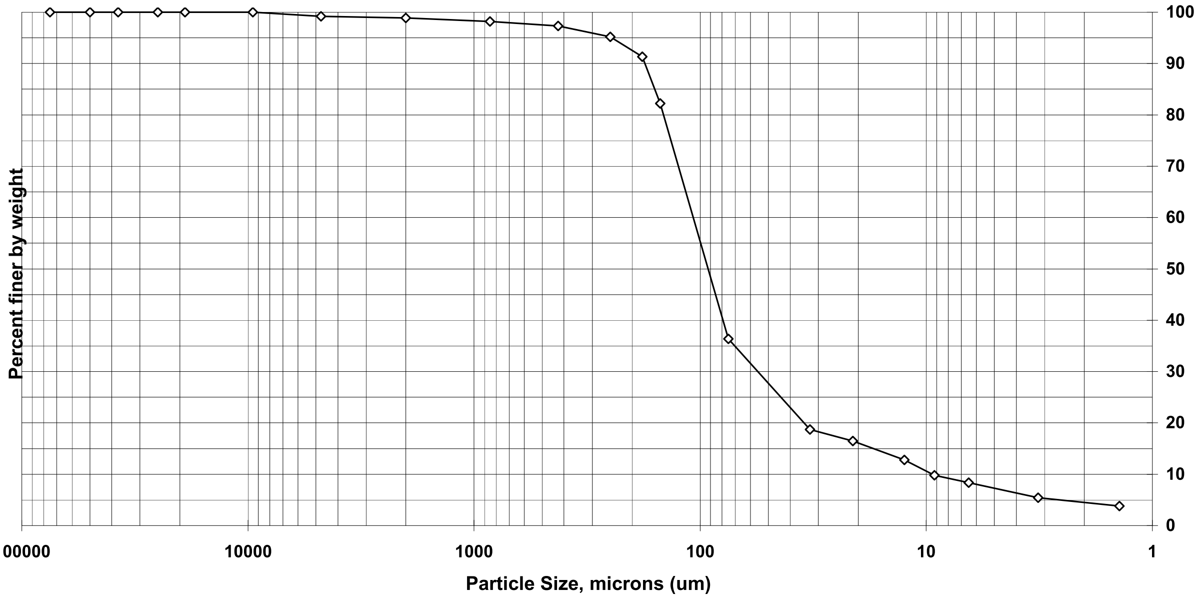
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	89.2	10.8
3/4 inch	19000	67.6	21.6
3/8 inch	9500	58.0	9.6
#4	4750	44.8	13.2
#10	2000	35.3	9.5
#20	850	30.0	5.3
#40	425	25.4	4.6
#60	250	16.5	8.9
#80	180	11.5	5.0
#100	150	9.0	2.5
#200	75	5.6	3.3
Hyd1	34.9	4.7	0.9
Hyd2	22.3	4.0	0.7
Hyd3	13	3.3	0.7
Hyd4	9.3	2.3	1.1
Hyd5	6.7	1.9	0.3
Hyd6	3.2	0.8	1.1
Hyd7	1.4	0.4	0.4

Soil Classification	Percent of sample
Gravel	55.2
Sand	39.2
Coarse Sand	9.5
Medium Sand	9.9
Fine Sand	19.8
Silt	3.7
Clay	1.9

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-30-SURF
Percent Solids: 54.5%
Start Date: 10/14/2013
Lab ID: 200-18729-E-6
Specific Gravity: 2.650
End Date: 10/17/2013

Shape (> #10): subangular
Non-soil material: plant,shell
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.2	0.8
#10	2000	98.9	0.3
#20	850	98.2	0.7
#40	425	97.3	0.9
#60	250	95.2	2.1
#80	180	91.3	3.9
#100	150	82.2	9.1
#200	75	36.4	45.8
Hyd1	32.7	18.7	17.7
Hyd2	21.1	16.5	2.2
Hyd3	12.5	12.8	3.7
Hyd4	9.2	9.8	3.0
Hyd5	6.5	8.4	1.5
Hyd6	3.2	5.4	2.9
Hyd7	1.4	3.8	1.6

Soil Classification	Percent of sample
Gravel	0.8
Sand	62.8
Coarse Sand	0.3
Medium Sand	1.6
Fine Sand	60.9
Silt	28.1
Clay	8.3

Particle Size of Soils by ASTM D422

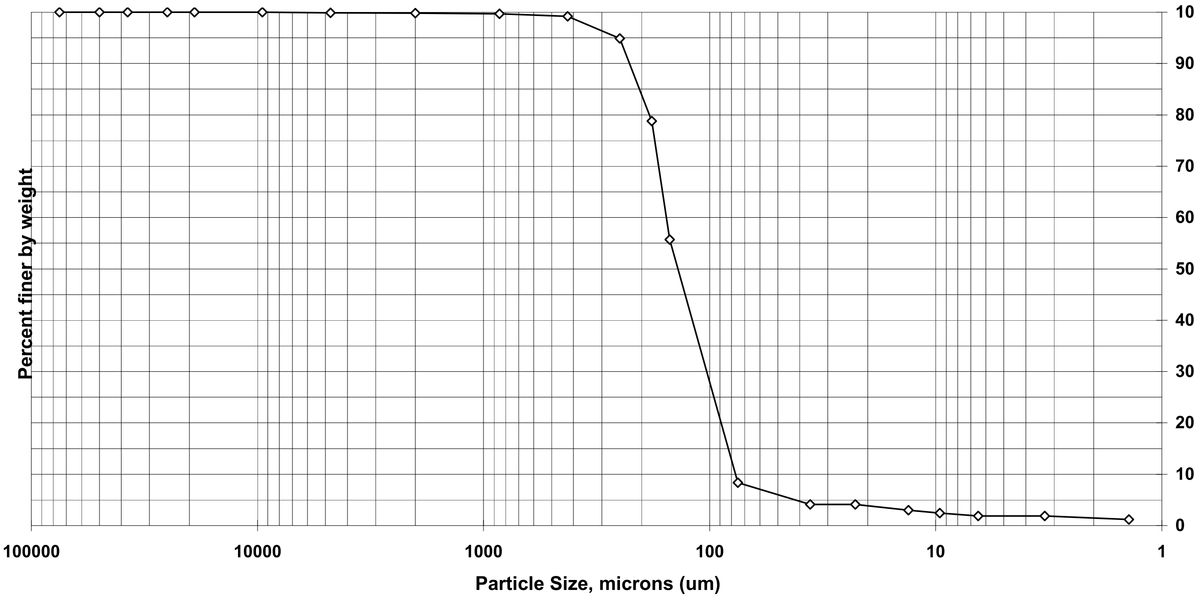
Date Received: 10/2/2013

Sample ID: CI13-20-SURF **Percent Solids:** 72.4% **Start Date:** 10/14/2013

Lab ID: 200-18729-E-7 **Specific Gravity:** 2.650 **End Date:** 10/17/2013

Shape (> #10): subangular **Non-soil material:** plant,shell

Hardness (> #10): hard



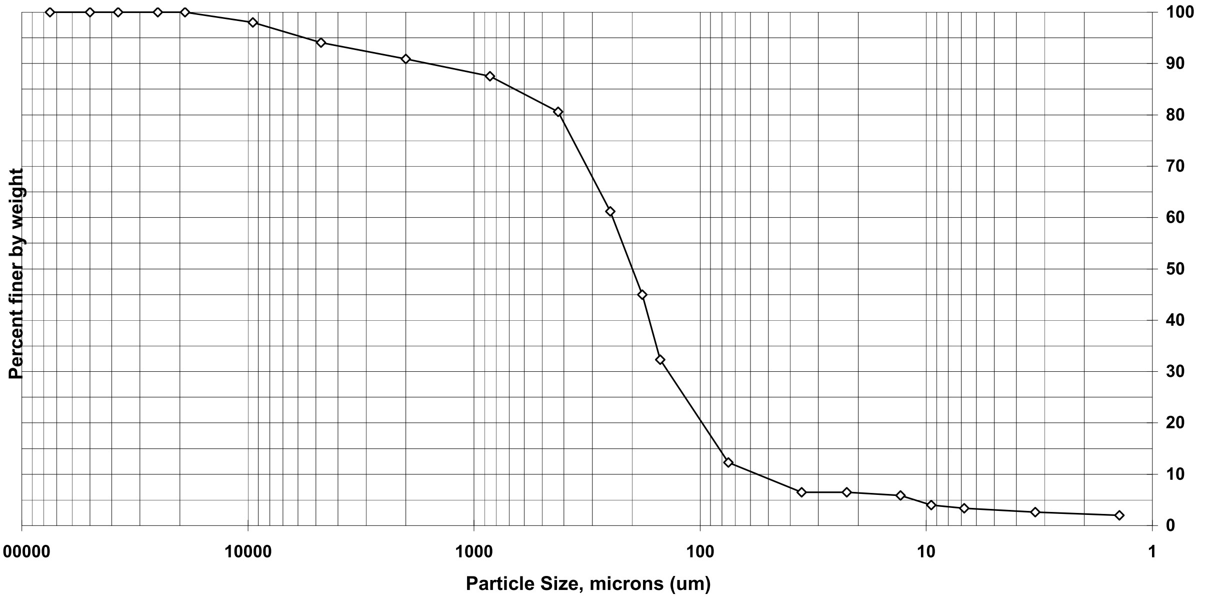
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.9	0.1
#10	2000	99.8	0.1
#20	850	99.7	0.1
#40	425	99.2	0.5
#60	250	94.9	4.3
#80	180	78.8	16.1
#100	150	55.7	23.1
#200	75	8.3	47.4
Hyd1	35.9	4.1	4.2
Hyd2	22.7	4.1	0.0
Hyd3	13.2	3.0	1.1
Hyd4	9.6	2.4	0.5
Hyd5	6.5	1.9	0.6
Hyd6	3.3	1.9	0.0
Hyd7	1.4	1.2	0.7

Soil Classification	Percent of sample
Gravel	0.1
Sand	91.6
Coarse Sand	0.1
Medium Sand	0.6
Fine Sand	90.9
Silt	6.5
Clay	1.9

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-01-SURF
Percent Solids: 72.3%
Start Date: 10/11/2013
Lab ID: 200-18702-E-1
Specific Gravity: 2.650
End Date: 10/16/2013

Shape (> #10): subrounded
Non-soil material: shell,plant
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	98.0	2.0
#4	4750	94.1	3.9
#10	2000	90.9	3.2
#20	850	87.5	3.4
#40	425	80.6	6.9
#60	250	61.2	19.4
#80	180	45.0	16.2
#100	150	32.3	12.7
#200	75	12.3	20.0
Hyd1	35.6	6.5	5.8
Hyd2	22.5	6.5	0.0
Hyd3	13	5.9	0.6
Hyd4	9.5	4.0	1.9
Hyd5	6.8	3.4	0.6
Hyd6	3.3	2.6	0.7
Hyd7	1.4	2.0	0.6

Soil Classification	Percent of sample
Gravel	5.9
Sand	81.8
Coarse Sand	3.2
Medium Sand	10.3
Fine Sand	68.3
Silt	9.0
Clay	3.4

Particle Size of Soils by ASTM D422

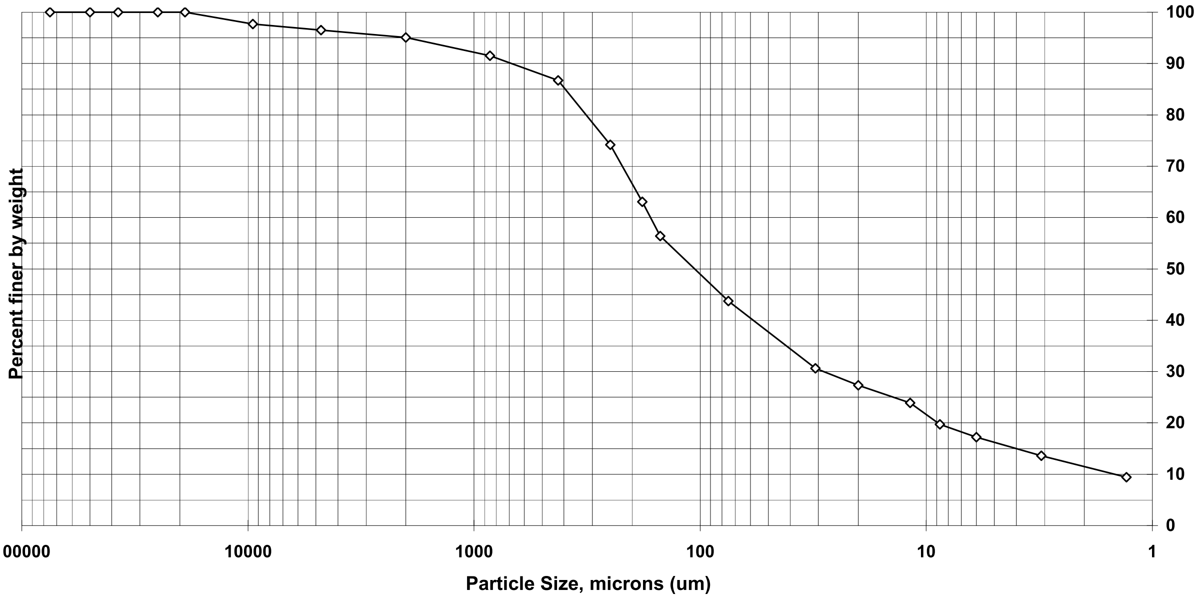
Date Received: 10/1/2013

Sample ID: CI13-02-SURF **Percent Solids:** 48.0% **Start Date:** 10/11/2013

Lab ID: 200-18702-E-2 **Specific Gravity:** 2.650 **End Date:** 10/16/2013

Shape (> #10): subangular **Non-soil material:** shell,plant

Hardness (> #10): hard



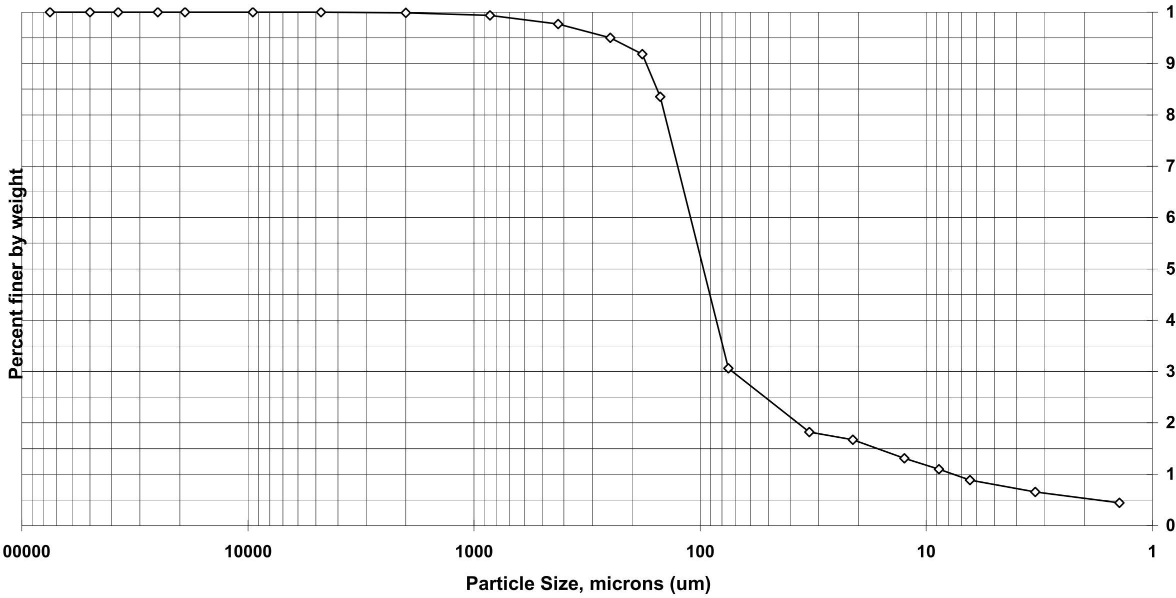
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	97.7	2.3
#4	4750	96.5	1.2
#10	2000	95.1	1.4
#20	850	91.5	3.6
#40	425	86.7	4.8
#60	250	74.2	12.5
#80	180	63.1	11.1
#100	150	56.4	6.7
#200	75	43.7	12.7
Hyd1	30.9	30.6	13.1
Hyd2	20	27.3	3.3
Hyd3	11.8	23.9	3.4
Hyd4	8.7	19.7	4.2
Hyd5	6	17.2	2.5
Hyd6	3.1	13.6	3.6
Hyd7	1.3	9.4	4.2

Soil Classification	Percent of sample
Gravel	3.5
Sand	52.8
Coarse Sand	1.4
Medium Sand	8.4
Fine Sand	43.0
Silt	26.5
Clay	17.2

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-03-SURF
Percent Solids: 58.1%
Start Date: 10/11/2013
Lab ID: 200-18702-E-3
Specific Gravity: 2.650
End Date: 10/16/2013

Shape (> #10): angular
Non-soil material: plant,shell
Hardness (> #10): hard



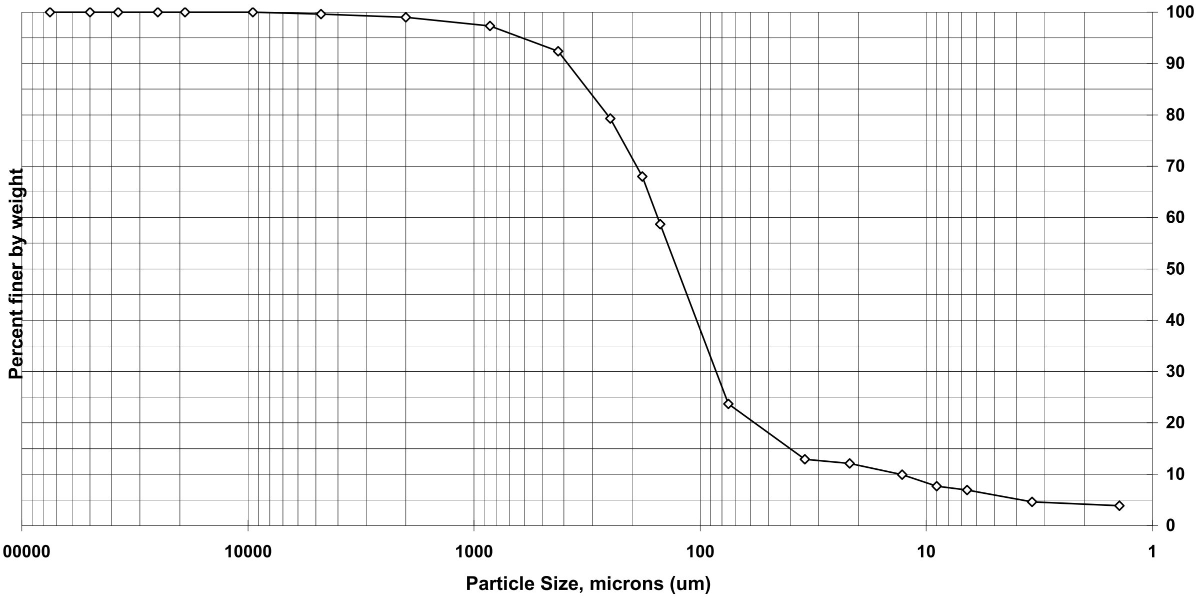
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	99.4	0.5
#40	425	97.7	1.7
#60	250	95.0	2.7
#80	180	91.8	3.2
#100	150	83.5	8.3
#200	75	30.6	52.9
Hyd1	32.9	18.2	12.4
Hyd2	21.1	16.7	1.5
Hyd3	12.5	13.1	3.6
Hyd4	8.8	11.0	2.1
Hyd5	6.4	8.8	2.2
Hyd6	3.3	6.6	2.3
Hyd7	1.4	4.4	2.1

Soil Classification	Percent of sample
Gravel	0.0
Sand	69.4
Coarse Sand	0.1
Medium Sand	2.2
Fine Sand	67.1
Silt	21.8
Clay	8.8

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-05-SURF
Percent Solids: 60.1%
Start Date: 10/11/2013
Lab ID: 200-18702-E-4
Specific Gravity: 2.650
End Date: 10/16/2013

Shape (> #10): subangular
Non-soil material: plant,shell
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.6	0.4
#10	2000	99.0	0.6
#20	850	97.3	1.7
#40	425	92.4	4.9
#60	250	79.3	13.1
#80	180	68.0	11.3
#100	150	58.7	9.3
#200	75	23.7	35.0
Hyd1	34.4	12.9	10.8
Hyd2	21.8	12.1	0.8
Hyd3	12.8	9.9	2.2
Hyd4	9	7.7	2.2
Hyd5	6.6	6.9	0.7
Hyd6	3.4	4.6	2.3
Hyd7	1.4	3.8	0.8

Soil Classification	Percent of sample
Gravel	0.4
Sand	75.9
Coarse Sand	0.6
Medium Sand	6.6
Fine Sand	68.7
Silt	16.8
Clay	6.9

Particle Size of Soils by ASTM D422

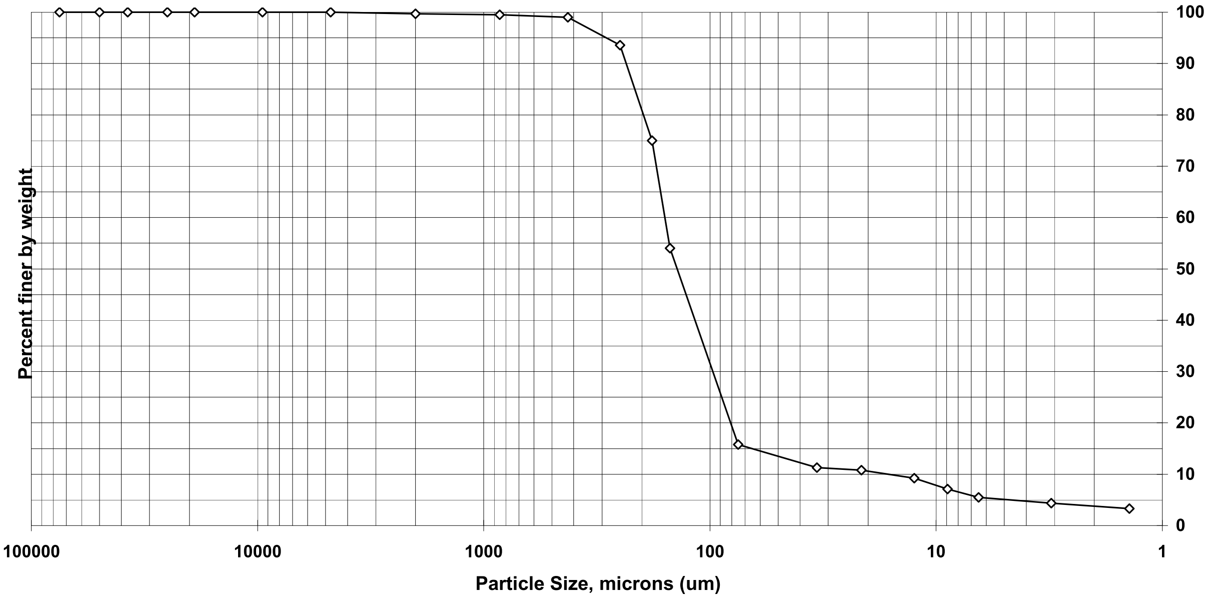
Date Received: 10/1/2013

Sample ID: CI13-04-SURF **Percent Solids:** 67.7% **Start Date:** 10/11/2013

Lab ID: 200-18702-E-6 **Specific Gravity:** 2.650 **End Date:** 10/16/2013

Shape (> #10): n/a **Non-soil material:** plant,shell

Hardness (> #10): n/a



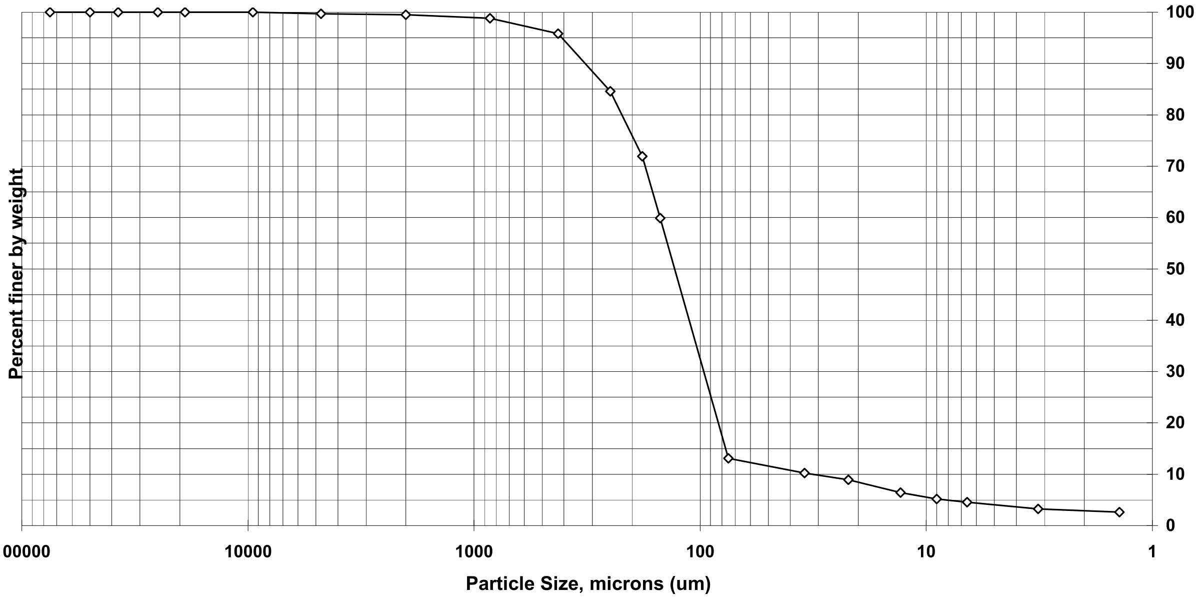
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.7	0.3
#20	850	99.5	0.2
#40	425	99.0	0.5
#60	250	93.6	5.4
#80	180	75.0	18.6
#100	150	54.0	21.0
#200	75	15.8	38.2
Hyd1	33.7	11.3	4.5
Hyd2	21.4	10.8	0.5
Hyd3	12.5	9.2	1.6
Hyd4	8.9	7.1	2.1
Hyd5	6.5	5.5	1.6
Hyd6	3.1	4.3	1.2
Hyd7	1.4	3.3	1.1

Soil Classification	Percent of sample
Gravel	0.0
Sand	84.2
Coarse Sand	0.3
Medium Sand	0.7
Fine Sand	83.2
Silt	10.3
Clay	5.5

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-06-SURF
Percent Solids: 62.9%
Start Date: 10/11/2013
Lab ID: 200-18702-E-7
Specific Gravity: 2.650
End Date: 10/16/2013

Shape (> #10): subangular
Non-soil material: plant,shell
Hardness (> #10): hard



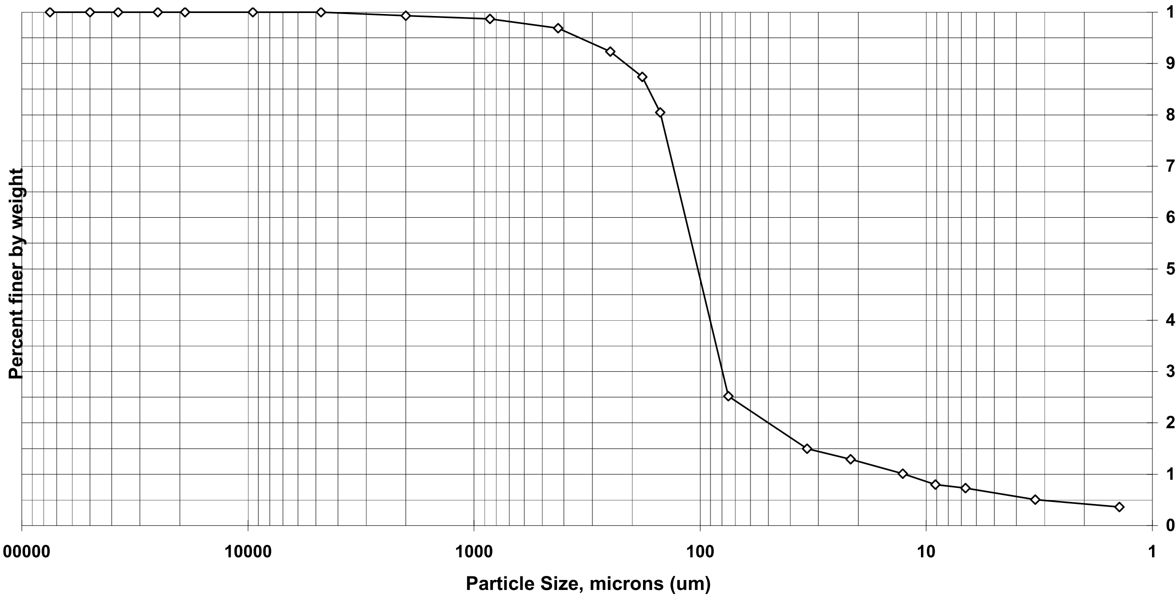
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.7	0.3
#10	2000	99.5	0.2
#20	850	98.8	0.7
#40	425	95.8	3.0
#60	250	84.6	11.2
#80	180	71.9	12.7
#100	150	59.9	12.0
#200	75	13.1	46.8
Hyd1	34.5	10.2	2.9
Hyd2	22.1	8.9	1.3
Hyd3	13	6.4	2.5
Hyd4	9	5.2	1.2
Hyd5	6.6	4.6	0.6
Hyd6	3.2	3.2	1.3
Hyd7	1.4	2.6	0.6

Soil Classification	Percent of sample
Gravel	0.3
Sand	86.6
Coarse Sand	0.2
Medium Sand	3.7
Fine Sand	82.7
Silt	8.5
Clay	4.6

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-07-SURF
Percent Solids: 60.4%
Start Date: 10/11/2013
Lab ID: 200-18702-E-8
Specific Gravity: 2.650
End Date: 10/16/2013

Shape (> #10): subrounded
Non-soil material: plant,shell
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.3	0.7
#20	850	98.7	0.6
#40	425	96.9	1.8
#60	250	92.3	4.6
#80	180	87.4	4.9
#100	150	80.5	6.9
#200	75	25.2	55.3
Hyd1	33.7	15.0	10.2
Hyd2	21.6	12.9	2.1
Hyd3	12.7	10.1	2.8
Hyd4	9.1	8.0	2.1
Hyd5	6.7	7.3	0.7
Hyd6	3.3	5.1	2.2
Hyd7	1.4	3.6	1.4

Soil Classification	Percent of sample
Gravel	0.0
Sand	74.8
Coarse Sand	0.7
Medium Sand	2.4
Fine Sand	71.7
Silt	17.9
Clay	7.3

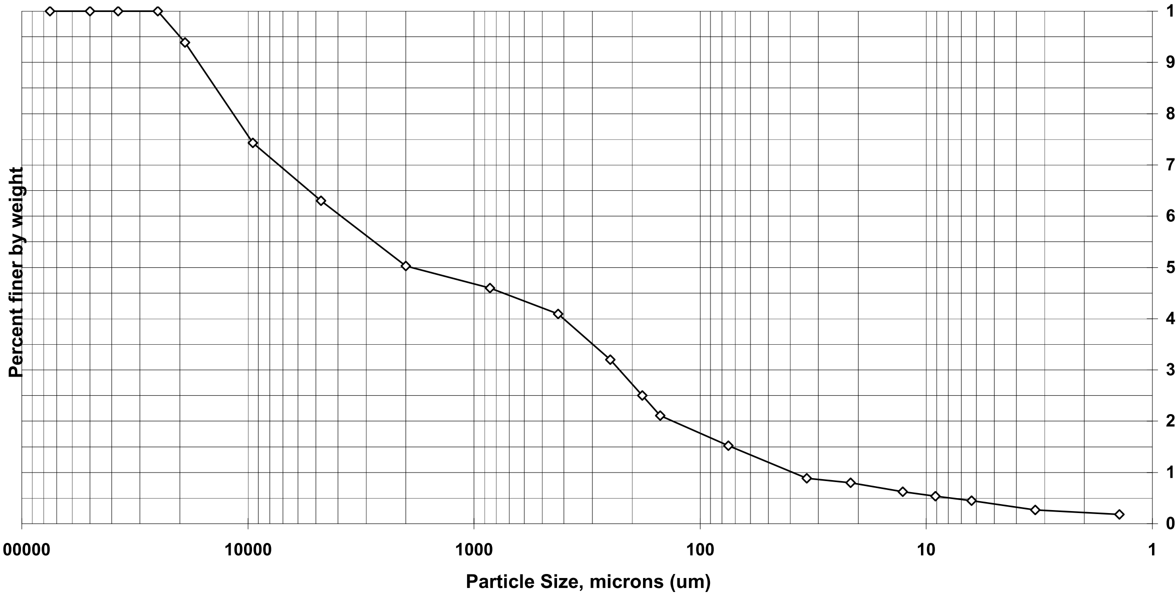
Particle Size of Soils by ASTM D422

				Date Received:	10/1/2013
Sample ID:	CI13-08-SURF	**Percent Solids:**	71.4%	**Start Date:**	10/11/2013
Lab ID:	200-18702-E-9	**Specific Gravity:**	2.650	**End Date:**	10/16/2013

Shape (> #10): subangular

Non-soil material: plant,shell

Hardness (> #10): hard



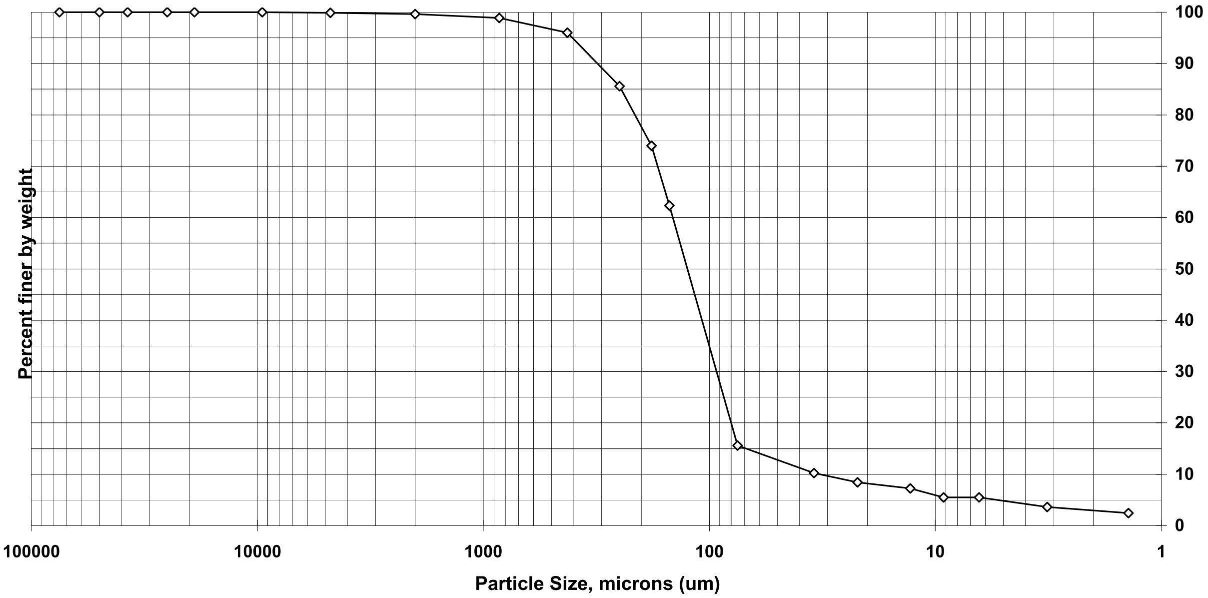
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	93.9	6.1
3/8 inch	9500	74.3	19.6
#4	4750	63.0	11.3
#10	2000	50.3	12.7
#20	850	46.0	4.3
#40	425	40.9	5.1
#60	250	32.0	8.9
#80	180	25.0	7.0
#100	150	21.1	3.9
#200	75	15.2	5.9
Hyd1	33.8	8.8	6.4
Hyd2	21.6	8.0	0.9
Hyd3	12.7	6.2	1.7
Hyd4	9.1	5.4	0.9
Hyd5	6.3	4.5	0.9
Hyd6	3.3	2.7	1.8
Hyd7	1.4	1.8	0.9

Soil Classification	Percent of sample
Gravel	37.0
Sand	47.8
Coarse Sand	12.7
Medium Sand	9.4
Fine Sand	25.7
Silt	10.7
Clay	4.5

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-06-SURF
Percent Solids: 65.7%
Start Date: 10/11/2013
Lab ID: 200-18702-E-7DU
Specific Gravity: 2.650
End Date: 10/16/2013

Shape (> #10): subangular
Non-soil material: plant, shell
Hardness (> #10): hard



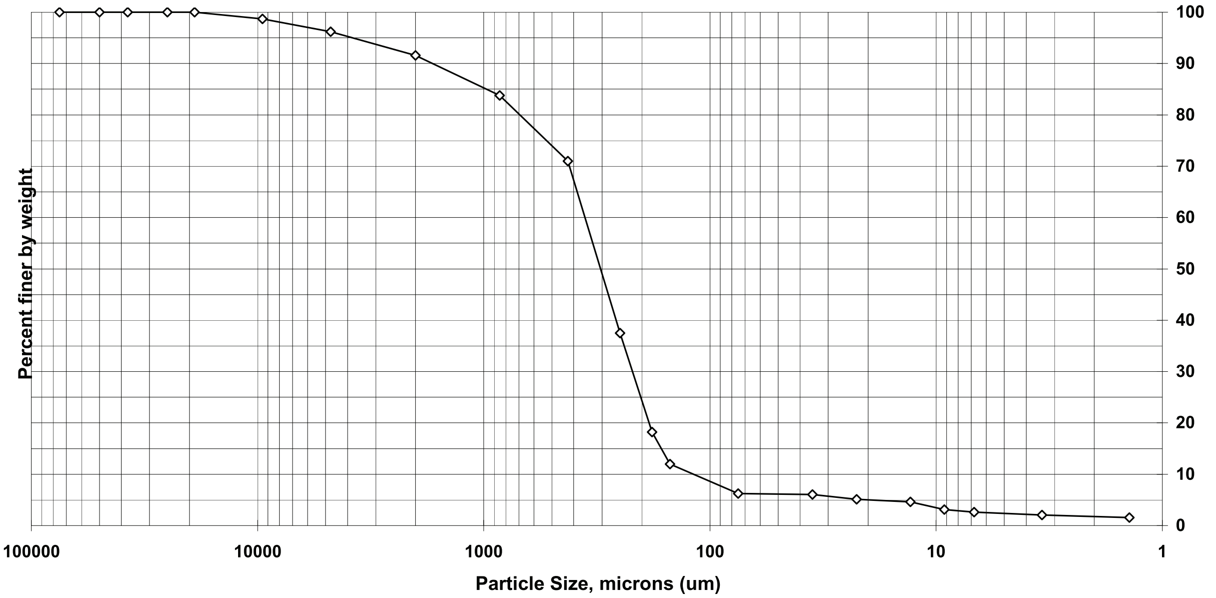
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.9	0.1
#10	2000	99.6	0.3
#20	850	98.9	0.7
#40	425	96.0	2.9
#60	250	85.6	10.4
#80	180	74.0	11.6
#100	150	62.3	11.7
#200	75	15.6	46.7
Hyd1	34.4	10.2	5.4
Hyd2	22.1	8.4	1.8
Hyd3	12.9	7.2	1.2
Hyd4	9.2	5.5	1.8
Hyd5	6.4	5.5	0.0
Hyd6	3.2	3.6	1.9
Hyd7	1.4	2.4	1.2

Soil Classification	Percent of sample
Gravel	0.1
Sand	84.3
Coarse Sand	0.3
Medium Sand	3.6
Fine Sand	80.4
Silt	10.1
Clay	5.5

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-25-SURF **Percent Solids:** 76.8% **Start Date:** 10/11/2013
Lab ID: 200-18711-E-16 **Specific Gravity:** 2.650 **End Date:** 10/16/2013

Shape (> #10): subangular **Non-soil material:** shell
Hardness (> #10): hard



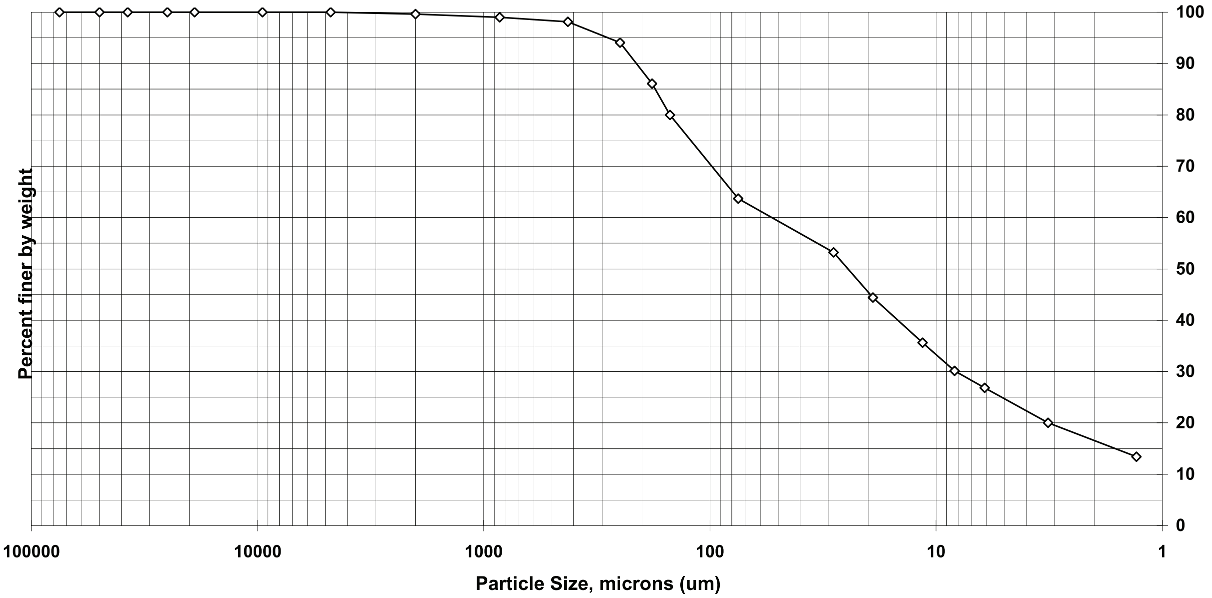
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	98.7	1.3
#4	4750	96.2	2.5
#10	2000	91.6	4.6
#20	850	83.8	7.8
#40	425	71.0	12.8
#60	250	37.5	33.5
#80	180	18.2	19.3
#100	150	12.0	6.2
#200	75	6.3	5.7
Hyd1	35.2	6.1	0.2
Hyd2	22.5	5.1	1.0
Hyd3	13	4.6	0.5
Hyd4	9.2	3.1	1.5
Hyd5	6.8	2.6	0.5
Hyd6	3.4	2.1	0.6
Hyd7	1.4	1.6	0.5

Soil Classification	Percent of sample
Gravel	3.8
Sand	89.9
Coarse Sand	4.6
Medium Sand	20.6
Fine Sand	64.7
Silt	3.6
Clay	2.6

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-26-SURF
Percent Solids: 42.4%
Start Date: 10/14/2013
Lab ID: 200-18711-E-17
Specific Gravity: 2.650
End Date: 10/17/2013

Shape (> #10): subangular
Non-soil material: plant
Hardness (> #10): hard



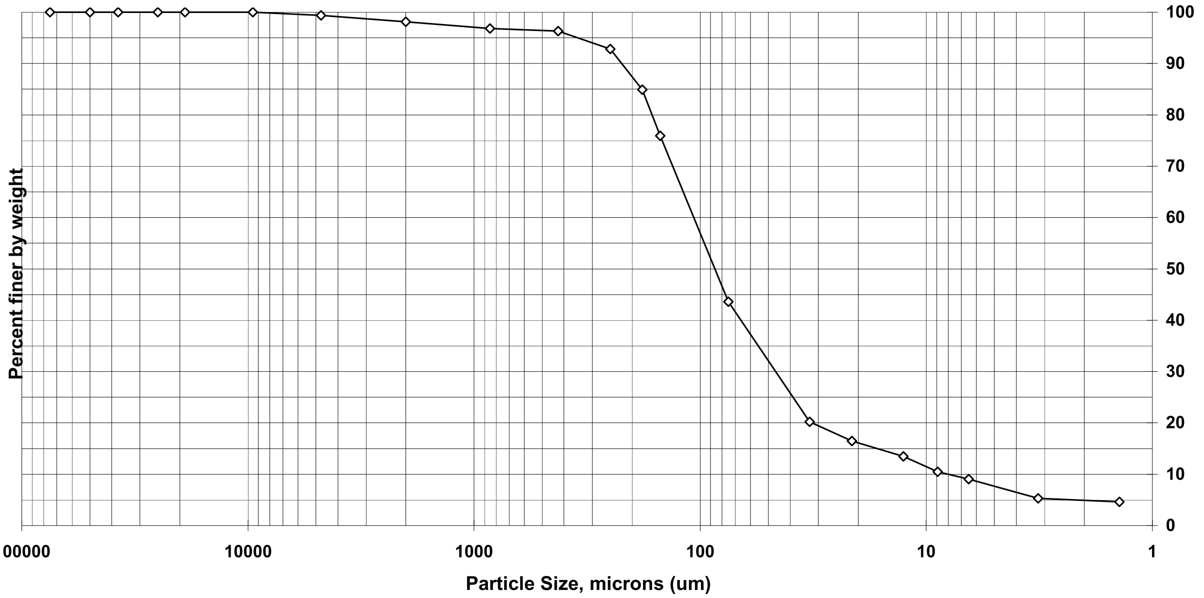
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.6	0.4
#20	850	99.0	0.6
#40	425	98.1	0.9
#60	250	94.1	4.0
#80	180	86.1	8.0
#100	150	80.0	6.1
#200	75	63.7	16.3
Hyd1	28.4	53.2	10.5
Hyd2	19	44.4	8.8
Hyd3	11.5	35.6	8.8
Hyd4	8.3	30.1	5.5
Hyd5	6.1	26.8	3.3
Hyd6	3.2	20.0	6.8
Hyd7	1.3	13.4	6.6

Soil Classification	Percent of sample
Gravel	0.0
Sand	36.3
Coarse Sand	0.4
Medium Sand	1.5
Fine Sand	34.4
Silt	36.9
Clay	26.8

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-27A-SURF
Percent Solids: 53.7%
Start Date: 10/14/2013
Lab ID: 200-18711-E-18
Specific Gravity: 2.650
End Date: 10/17/2013

Shape (> #10): subangular
Non-soil material: plant,shell
Hardness (> #10): hard



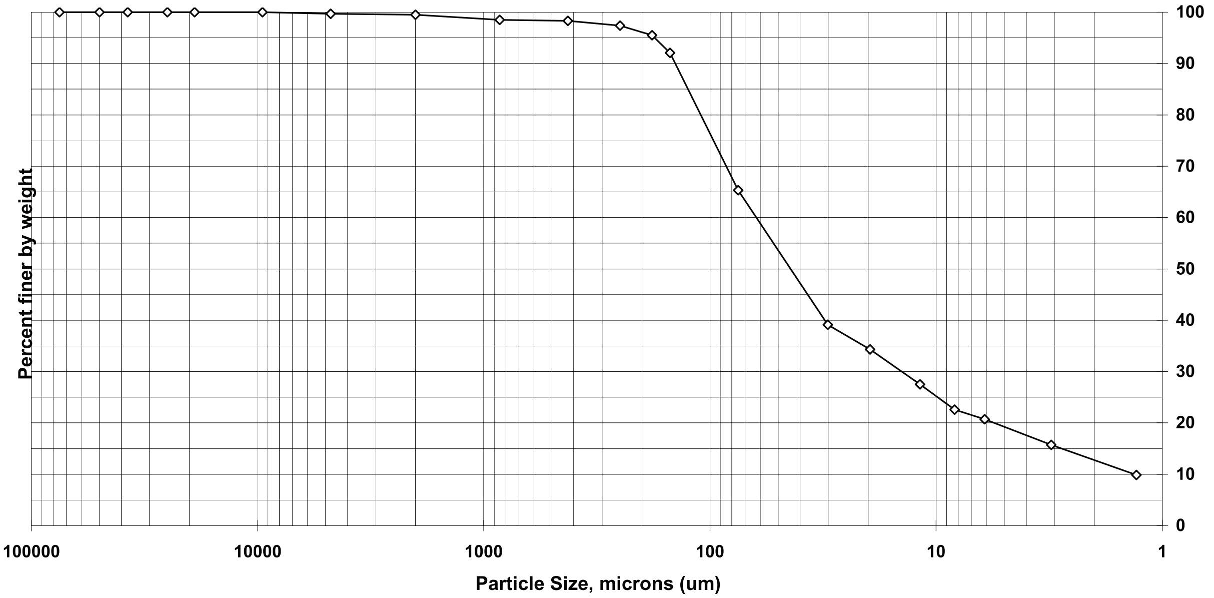
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.4	0.6
#10	2000	98.1	1.3
#20	850	96.8	1.3
#40	425	96.3	0.5
#60	250	92.8	3.5
#80	180	84.9	7.9
#100	150	75.9	9.0
#200	75	43.6	32.3
Hyd1	32.8	20.2	23.4
Hyd2	21.3	16.5	3.7
Hyd3	12.6	13.5	3.0
Hyd4	8.9	10.5	3.0
Hyd5	6.5	9.1	1.5
Hyd6	3.2	5.3	3.7
Hyd7	1.4	4.6	0.7

Soil Classification	Percent of sample
Gravel	0.6
Sand	55.8
Coarse Sand	1.3
Medium Sand	1.8
Fine Sand	52.7
Silt	34.6
Clay	9.1

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-28-SURF **Percent Solids:** 47.2% **Start Date:** 10/14/2013
Lab ID: 200-18711-E-19 **Specific Gravity:** 2.650 **End Date:** 10/17/2013

Shape (> #10): subangular **Non-soil material:** plant,shell
Hardness (> #10): hard



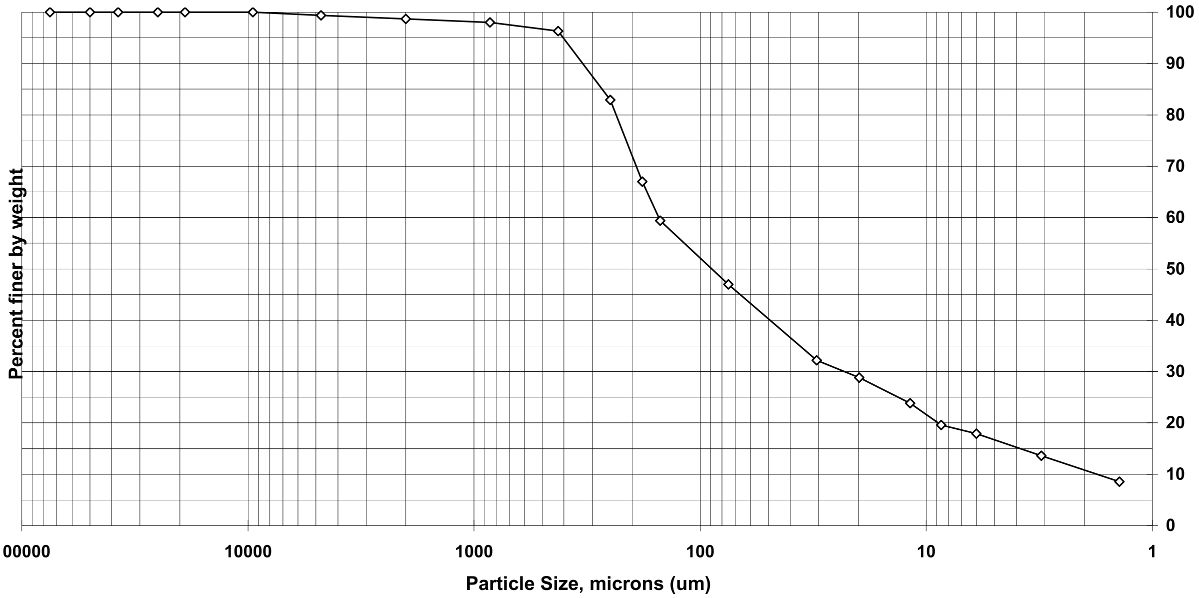
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.7	0.3
#10	2000	99.5	0.2
#20	850	98.5	1.0
#40	425	98.3	0.2
#60	250	97.4	0.9
#80	180	95.5	1.9
#100	150	92.1	3.4
#200	75	65.3	26.8
Hyd1	30.1	39.1	26.2
Hyd2	19.6	34.3	4.8
Hyd3	11.8	27.5	6.8
Hyd4	8.3	22.6	4.9
Hyd5	6.1	20.7	1.9
Hyd6	3.1	15.7	5.0
Hyd7	1.3	9.9	5.8

Soil Classification	Percent of sample
Gravel	0.3
Sand	34.4
Coarse Sand	0.2
Medium Sand	1.2
Fine Sand	33.0
Silt	44.6
Clay	20.7

Particle Size of Soils by ASTM D422

Date Received: 10/1/2013
Sample ID: CI13-29A-SURF **Percent Solids:** 50.4% **Start Date:** 10/14/2013
Lab ID: 200-18711-E-20 **Specific Gravity:** 2.650 **End Date:** 10/17/2013

Shape (> #10): subangular **Non-soil material:** plant
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.4	0.6
#10	2000	98.7	0.7
#20	850	98.0	0.7
#40	425	96.3	1.7
#60	250	82.9	13.4
#80	180	67.0	15.9
#100	150	59.4	7.6
#200	75	47.0	12.4
Hyd1	30.5	32.2	14.8
Hyd2	19.8	28.8	3.4
Hyd3	11.8	23.8	5.0
Hyd4	8.6	19.6	4.2
Hyd5	6	17.9	1.7
Hyd6	3.1	13.6	4.3
Hyd7	1.4	8.5	5.1

Soil Classification	Percent of sample
Gravel	0.6
Sand	52.4
Coarse Sand	0.7
Medium Sand	2.4
Fine Sand	49.3
Silt	29.1
Clay	17.9

Particle Size of Soils by ASTM D422

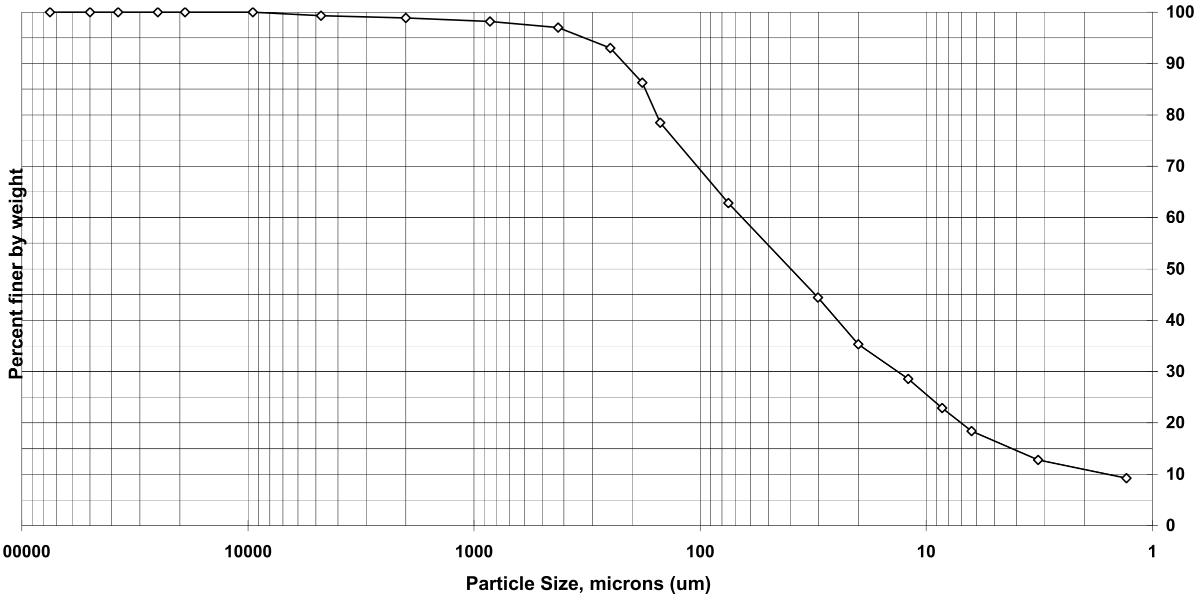
Sample ID: CI13-13-SURF
Lab ID: 200-18733-E-7

Percent Solids: 40.6%
Specific Gravity: 2.650

Date Received: 10/2/2013
Start Date: 10/14/2013
End Date: 10/17/2013

Shape (> #10): subangular

Non-soil material: plant,shell,tar
Hardness (> #10): hard



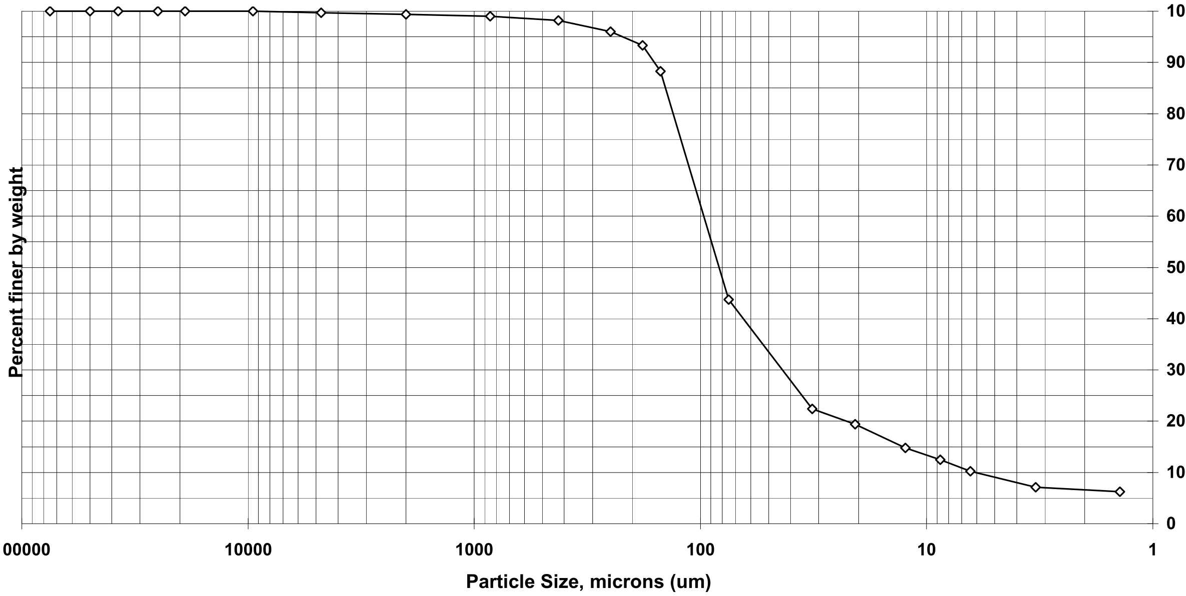
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.3	0.7
#10	2000	98.9	0.4
#20	850	98.2	0.7
#40	425	97.0	1.2
#60	250	93.0	4.0
#80	180	86.3	6.7
#100	150	78.5	7.8
#200	75	62.8	15.7
Hyd1	30.1	44.4	18.4
Hyd2	20	35.3	9.1
Hyd3	12	28.6	6.7
Hyd4	8.5	22.9	5.7
Hyd5	6.3	18.4	4.5
Hyd6	3.2	12.8	5.6
Hyd7	1.3	9.2	3.6

Soil Classification	Percent of sample
Gravel	0.7
Sand	36.5
Coarse Sand	0.4
Medium Sand	1.9
Fine Sand	34.2
Silt	44.4
Clay	18.4

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-14-SURF
Percent Solids: 56.1%
Start Date: 10/14/2013
Lab ID: 200-18733-E-8
Specific Gravity: 2.650
End Date: 10/17/2013

Shape (> #10): subangular
Non-soil material: plant,shell
Hardness (> #10): hard



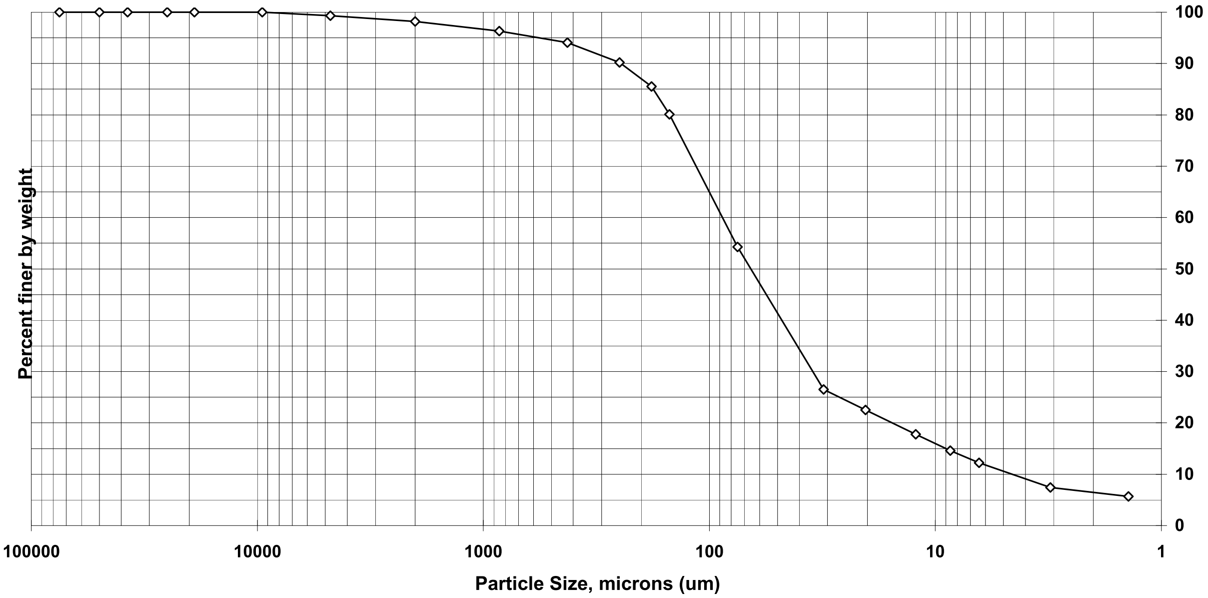
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.7	0.3
#10	2000	99.4	0.3
#20	850	99.0	0.4
#40	425	98.2	0.8
#60	250	96.0	2.2
#80	180	93.3	2.7
#100	150	88.3	5.0
#200	75	43.7	44.6
Hyd1	32	22.4	21.3
Hyd2	20.7	19.4	3.0
Hyd3	12.4	14.8	4.6
Hyd4	8.7	12.5	2.3
Hyd5	6.4	10.2	2.3
Hyd6	3.3	7.1	3.1
Hyd7	1.4	6.3	0.9

Soil Classification	Percent of sample
Gravel	0.3
Sand	56.0
Coarse Sand	0.3
Medium Sand	1.2
Fine Sand	54.5
Silt	33.5
Clay	10.2

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-15-SURF **Percent Solids:** 52.2% **Start Date:** 10/14/2013
Lab ID: 200-18733-E-9 **Specific Gravity:** 2.650 **End Date:** 10/18/2013

Shape (> #10): subangular **Non-soil material:** plant,shell
Hardness (> #10): hard



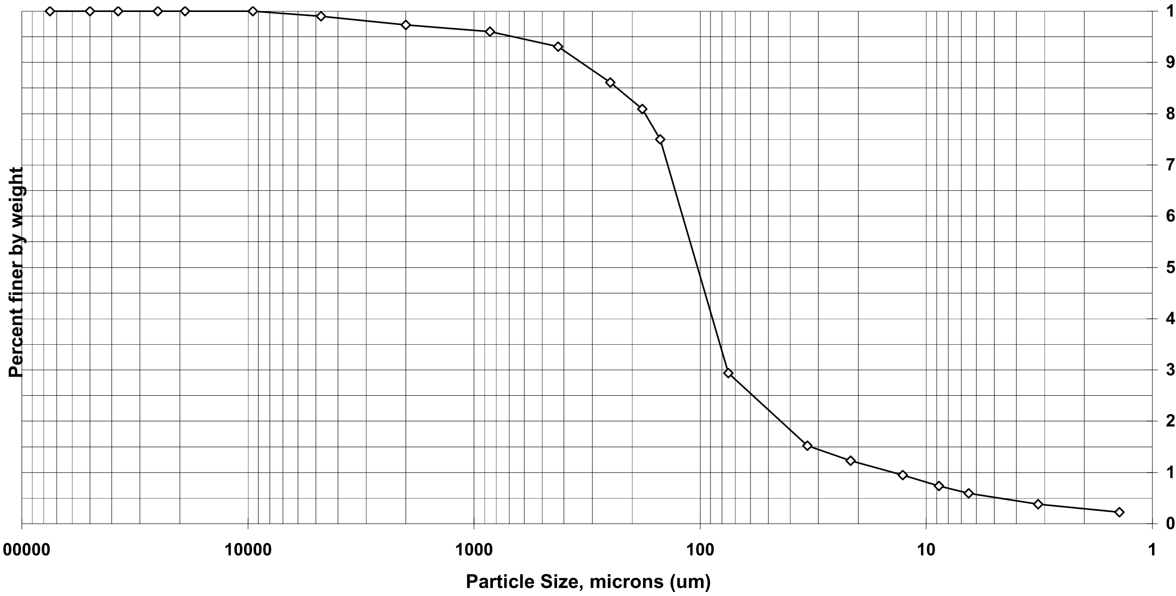
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.3	0.7
#10	2000	98.2	1.1
#20	850	96.3	1.9
#40	425	94.1	2.2
#60	250	90.2	3.9
#80	180	85.5	4.7
#100	150	80.1	5.4
#200	75	54.3	25.8
Hyd1	31.2	26.5	27.8
Hyd2	20.4	22.5	4.0
Hyd3	12.2	17.8	4.7
Hyd4	8.6	14.6	3.2
Hyd5	6.4	12.2	2.4
Hyd6	3.1	7.4	4.8
Hyd7	1.4	5.7	1.7

Soil Classification	Percent of sample
Gravel	0.7
Sand	45.0
Coarse Sand	1.1
Medium Sand	4.1
Fine Sand	39.8
Silt	42.1
Clay	12.2

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-16-SURF
Percent Solids: 51.7%
Start Date: 10/14/2013
Lab ID: 200-18733-E-10
Specific Gravity: 2.650
End Date: 10/18/2013

Shape (> #10): subangular
Non-soil material: plant,shell
Hardness (> #10): hard



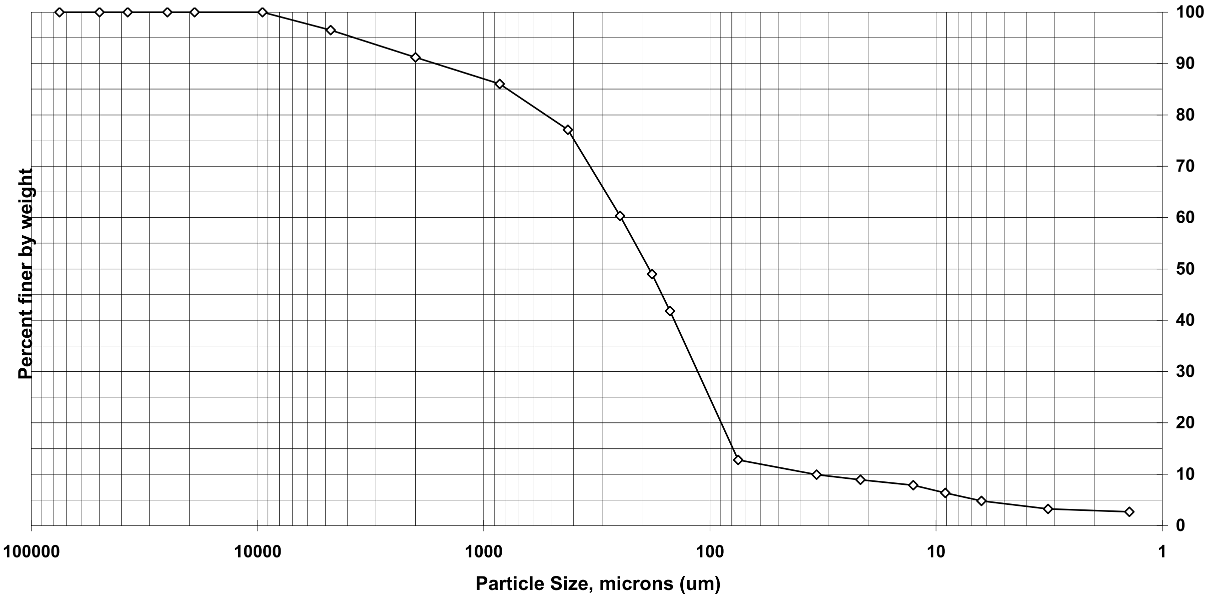
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.0	1.0
#10	2000	97.3	1.7
#20	850	96.0	1.3
#40	425	93.1	2.9
#60	250	86.1	7.0
#80	180	80.9	5.2
#100	150	75.0	5.9
#200	75	29.4	45.6
Hyd1	33.5	15.2	14.2
Hyd2	21.6	12.3	2.9
Hyd3	12.7	9.5	2.8
Hyd4	8.8	7.3	2.1
Hyd5	6.5	5.9	1.4
Hyd6	3.2	3.8	2.1
Hyd7	1.4	2.3	1.5

Soil Classification	Percent of sample
Gravel	1.0
Sand	69.6
Coarse Sand	1.7
Medium Sand	4.2
Fine Sand	63.7
Silt	23.5
Clay	5.9

Particle Size of Soils by ASTM D422

Date Received: 10/2/2013
Sample ID: CI13-09-SURF
Percent Solids: 64.7%
Start Date: 10/14/2013
Lab ID: 200-18733-E-16
Specific Gravity: 2.650
End Date: 10/18/2013

Shape (> #10): subrounded
Non-soil material: plant,shell
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	96.5	3.5
#10	2000	91.2	5.3
#20	850	86.0	5.2
#40	425	77.1	8.9
#60	250	60.3	16.8
#80	180	49.0	11.3
#100	150	41.8	7.2
#200	75	12.8	29.0
Hyd1	33.8	10.0	2.8
Hyd2	21.6	8.9	1.0
Hyd3	12.6	7.9	1.0
Hyd4	9.1	6.4	1.5
Hyd5	6.3	4.8	1.6
Hyd6	3.2	3.3	1.5
Hyd7	1.4	2.7	0.6

Soil Classification	Percent of sample
Gravel	3.5
Sand	83.7
Coarse Sand	5.3
Medium Sand	14.1
Fine Sand	64.3
Silt	8.0
Clay	4.8

Particle Size of Soils by ASTM D422

Date Received: 10/31/2013

Sample ID: CI13-22-SURF

Percent Solids: 76.3%

Start Date: 11/19/2013

Lab ID: 200-19206-E-1

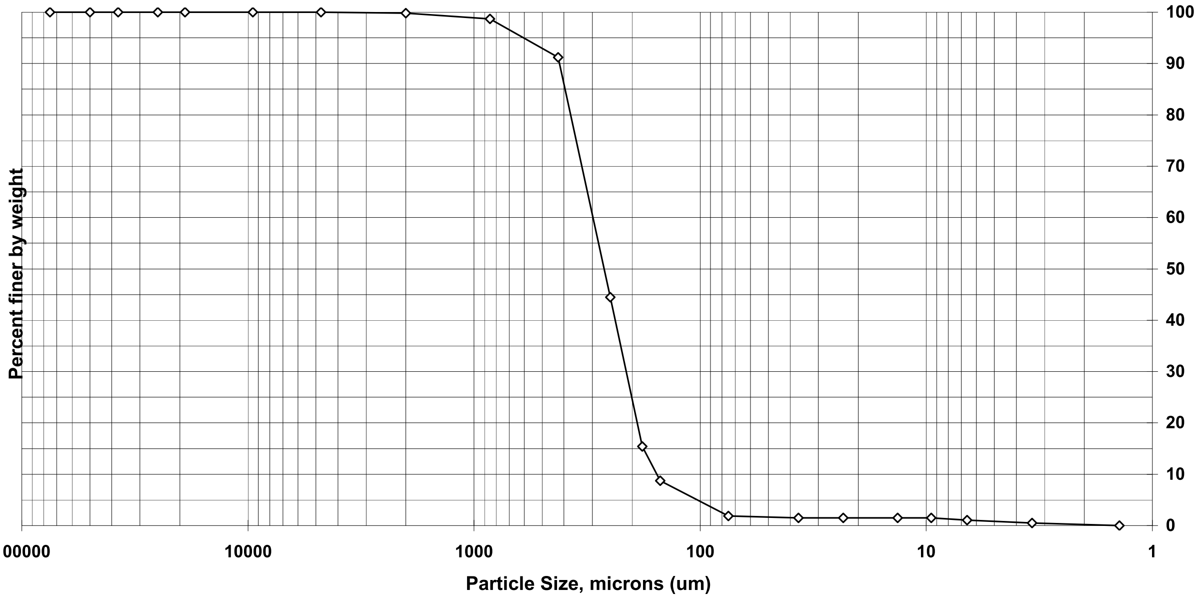
Specific Gravity: 2.650

End Date: 11/22/2013

Shape (> #10): Subangular

Non-soil material: Plant

Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.8	0.2
#20	850	98.7	1.1
#40	425	91.2	7.5
#60	250	44.5	46.7
#80	180	15.4	29.1
#100	150	8.7	6.7
#200	75	1.9	6.8
Hyd1	36.8	1.5	0.4
Hyd2	23.3	1.5	0.0
Hyd3	13.4	1.5	0.0
Hyd4	9.5	1.5	0.0
Hyd5	6.6	1.0	0.5
Hyd6	3.4	0.5	0.6
Hyd7	1.4	0.0	0.5

Soil Classification	Percent of sample
Gravel	0.0
Sand	98.1
Coarse Sand	0.2
Medium Sand	8.6
Fine Sand	89.3
Silt	0.8
Clay	1.0

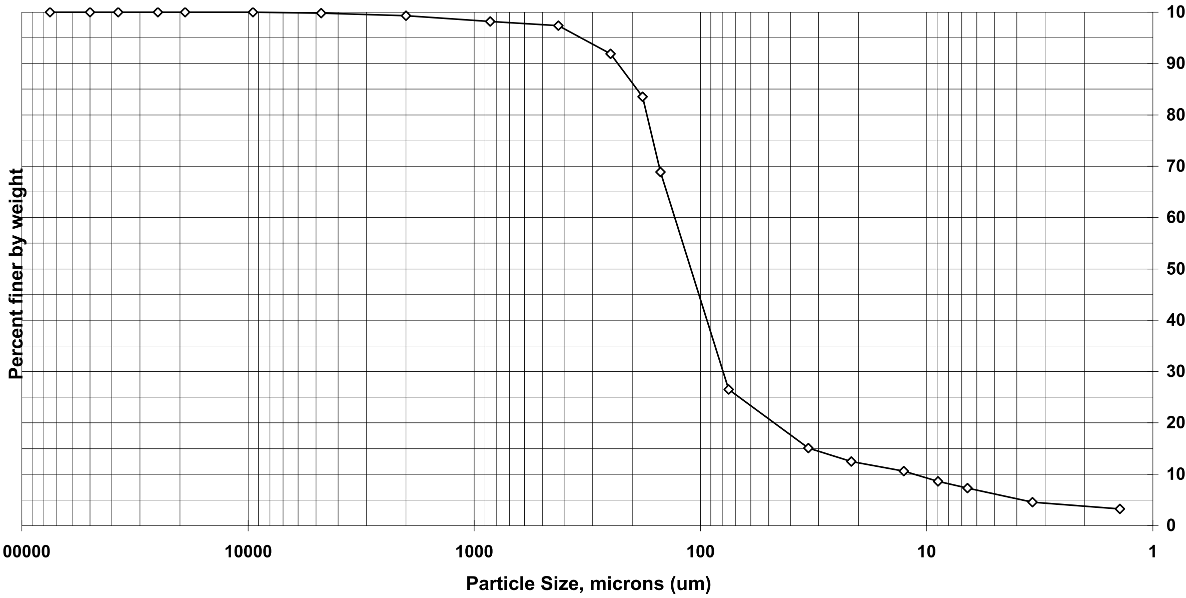
Particle Size of Soils by ASTM D422

Date Received: 10/31/2013

Sample ID: CI13-23-SURF
Percent Solids: 63.3%
Start Date: 11/19/2013

Lab ID: 200-19206-E-2
Specific Gravity: 2.650
End Date: 11/22/2013

Shape (> #10): Angular
Non-soil material: Plant
Hardness (> #10): Hard



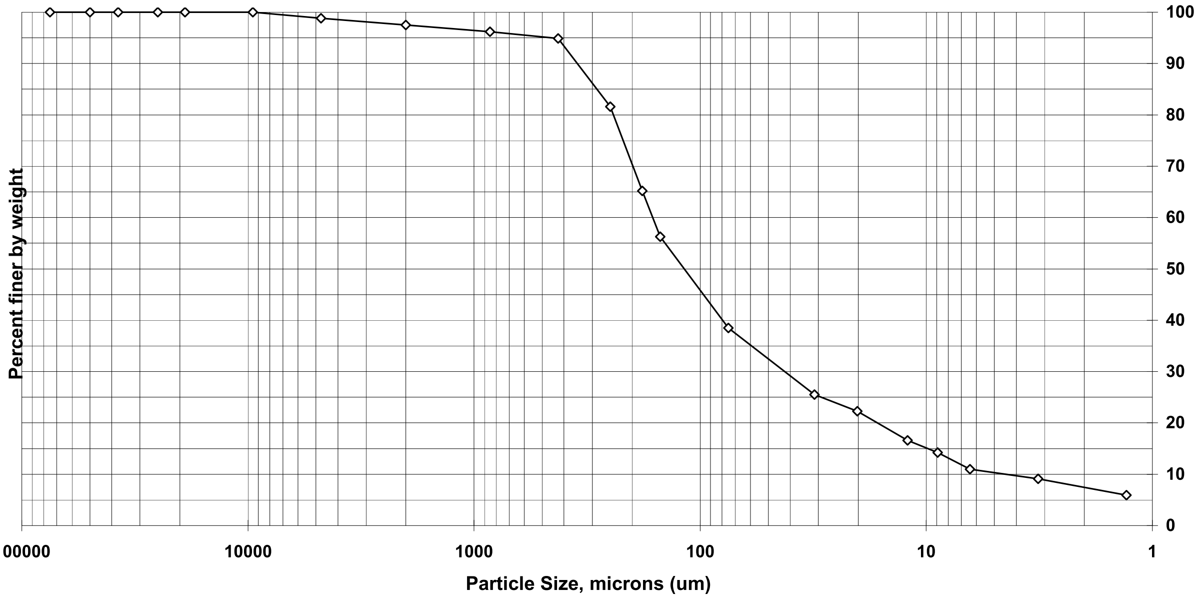
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.8	0.2
#10	2000	99.3	0.5
#20	850	98.2	1.1
#40	425	97.4	0.8
#60	250	91.9	5.5
#80	180	83.5	8.4
#100	150	68.9	14.6
#200	75	26.5	42.4
Hyd1	33.3	15.1	11.4
Hyd2	21.5	12.5	2.6
Hyd3	12.6	10.6	1.9
Hyd4	8.9	8.6	2.0
Hyd5	6.6	7.3	1.3
Hyd6	3.4	4.6	2.7
Hyd7	1.4	3.3	1.3

Soil Classification	Percent of sample
Gravel	0.2
Sand	73.3
Coarse Sand	0.5
Medium Sand	1.9
Fine Sand	70.9
Silt	19.2
Clay	7.3

Particle Size of Soils by ASTM D422

Date Received: 10/31/2013
Sample ID: CI13-24-SURF
Percent Solids: 56.5%
Start Date: 11/20/2013
Lab ID: 200-19206-E-3
Specific Gravity: 2.650
End Date: 11/23/2013

Shape (> #10): Subangular
Non-soil material: Plant
Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	98.8	1.2
#10	2000	97.5	1.3
#20	850	96.2	1.3
#40	425	94.9	1.3
#60	250	81.6	13.3
#80	180	65.2	16.4
#100	150	56.3	8.9
#200	75	38.5	17.8
Hyd1	31.2	25.5	13.0
Hyd2	20.2	22.3	3.2
Hyd3	12.1	16.6	5.7
Hyd4	8.9	14.2	2.4
Hyd5	6.4	11.0	3.2
Hyd6	3.2	9.1	1.9
Hyd7	1.3	5.9	3.2

Soil Classification	Percent of sample
Gravel	1.2
Sand	60.3
Coarse Sand	1.3
Medium Sand	2.6
Fine Sand	56.4
Silt	27.5
Clay	11.0