FINAL
Assessment of Contaminated Sediments Riverbend Area Site Characterization Report

Detroit River Area of Concern, Detroit, Michigan

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* EA Engineering, Science, and Technology, (MI) PLC is affiliated with EA Engineering, Science, and Technology, Inc., PBC who does business as EA Science and Technology in the State of Michigan.

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°C	Degrees Celsius
µg/kg	Micrograms per kilogram
µmol	Micromole
µmol/g	Micromole(s) per gram
AOC	Area of concern
AVS	Acid volatile sulfide
BUI	Beneficial use impairments
COC	Contaminant of concern
CSO	Combined sewer overflow
cy	Cubic yard(s)
DQO	Data quality objective
DRO	Diesel range organics
EA	EA Engineering, Science, and Technology (MI), PLC and its affiliate EA Science and Technology
EC_{30}	Effect Concentration for 30 percent
EC_{50}	Effect Concentration for 50 percent
EPA	U.S. Environmental Protection Agency
ESB	Equilibrium Partitioning Sediment Benchmarks
ESBTU	Equilibrium Partitioning Sediment Benchmarks Toxicity Unit
FD	Field duplicate
FSP	Field Sampling Plan
ft	Foot (feet)
g_{oc}	Gram organic carbon
GLNPO	Great Lakes National Program Office
GPS	Global positioning system
HDPE	High-density polyethylene
LRROC	Lower Rouge River Old Channel
MATECO	MATECO Drilling Company
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
mg/kg	Milligram(s) per kilogram
MS	Matrix spike

MSD	Matrix spike duplicate
NAPL	Non-aqueous phase liquid
ND	Not detected
NFG	*National Functional Guidelines*
ORO	Oil range organics
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEC	Probable effects concentration
PEC-Q	Probable effects concentration quotient
PRG	Preliminary remediation goal
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
RL	Reporting limit
SCBA	Sediment Contaminant Bioavailability Alliance
SEM	Simultaneously extracted metals
SOP	Standard operating procedure
SQG	Sediment Quality Guidelines
SSRSL	Sample-specific risk screening level
TEC	Threshold effects concentration
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons (sum of ORO and DRO)

EXECUTIVE SUMMARY

This report presents the characterization of contaminated sediments for the Riverbend Area (site), located within the Detroit River Area of Concern (AOC), Detroit, Michigan. This work was conducted by EA Engineering, Science and Technology, (MI) PLC and its affiliate EA Science and Technology (EA) for the U.S. Environmental Protection Agency's (EPA's) Great Lakes National Program Office (GLNPO) in accordance with the Quality Assurance Project Plan and the Field Sampling Plan for the Riverbend Area Site Characterization, Detroit River AOC, Detroit, Michigan (EA 2016a), finalized January 2016. To address the delisting criteria and allow for the eventual removal of the Degradation of Benthos beneficial use impairment, EPA's GLNPO, the Michigan Department of Environmental Quality, the 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 partnership conducted a content analysis of a number of contaminant studies and established six sediment target sites. The Riverbend Area is one of the six target areas.

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 conclusions of the investigation. The overall objective of this report is to identify priority areas within the Riverbend site at which remediation efforts might be warranted or where further investigation should be conducted. This Executive Summary provides a synopsis of the findings of the Site Characterization Report. Details on the site background and methodology, and further detail on the findings and conclusions are presented in Chapters 1 through 8 of the report.

E.1 SEDIMENT CHEMISTRY RESULTS

For reporting and visual presentation of the results of the sediment investigation, the Riverbend Area was divided into two separate areas. Area A, the upstream portion of the site, extends from the Joe Louis Arena west to the Detroit Terminal of the Nicholson Terminal & Dock Company, and includes sample locations near West Riverfront Park, the Ambassador Bridge, and Riverside Park. Area B, the downstream portion of the site, extends from the Detroit Terminal of the Nicholson Terminal & Dock Company to the mouth of the Rouge River old channel, and includes sample locations near the former Mistersky power plant, Revere Copper & Brass, Historic Fort Wayne and the LaFarge loading dock.

Constituent concentrations detected in sediment samples were compared to threshold effect concentrations (TECs) and probable effects concentrations (PECs). TECs typically represent concentrations below which adverse biological effects are unlikely to be observed, while PECs typically represent concentrations above which adverse effects are likely to be observed (MacDonald et al. 2000). Concentrations that are between the TEC and PEC represent the concentrations at which adverse biological effects occasionally occur.

Bulk Chemistry

Total polychlorinated biphenyls (PCBs) concentrations exceeded the TEC in most of the surface grab samples in the Riverbend Area. Concentrations exceeding the PEC were detected in surface grab samples at four locations in Area A and one location in Area B. Total PCBs concentrations exceeding the PEC were also detected in at least one depth interval in cores from six locations in Area A and three locations in Area B. Of the locations in Area A with PEC exceedances, three of the cores had at least one depth interval with a concentration exceeding three times the PEC. Two of these locations were near Joe Louis Arena and Riverfront Towers, while the third occurred near Riverside Park.

For total 17 polycyclic aromatic hydrocarbons (PAHs), all but one location had a concentration exceeding the TEC in at least one interval or the surface grab sample. Of the 28 sample locations, 23 had a concentration exceeding the PEC in at least one core interval or the surface grab sample. In Area A, concentrations exceeding three times the PEC were detected in at least one core interval at 11 locations and in the surface grab sample at 3 locations. In Area B, concentrations exceeding three times the PEC were detected in at least one depth interval at six locations, and concentrations exceeding two times the PEC occurred in at least one depth interval at three additional locations.

Arsenic concentrations in Area A did not exceed the PEC, but the majority of locations did have arsenic concentrations exceeding the TEC in at least one core interval or surface sample. No surface samples in Area B had arsenic concentrations exceeding the PEC. One location in Area B (RB15-24), located near the Delray Public Boat Access Ramp, had a subsurface core sample with an arsenic concentration exceeding three times the PEC. This was the only arsenic PEC exceedance that was detected.

Cadmium concentrations in surface grab samples were all below the PEC, and the majority were below the TEC. Cadmium concentrations in the core samples from Area A exceeded the PEC in most depth intervals at three locations between Joe Louis Arena and West Riverfront Park. In Area B, cadmium concentrations exceeding the PEC were detected in at least one core depth interval at six of the 11 locations, including four locations where concentrations exceeded three times the PEC in at least one depth interval.

Chromium concentrations were below the TEC for the majority of surface grab samples. Chromium concentrations exceeded the PEC in the surface grab sample at two locations: one in Area A near West Riverfront Park (RB15-04) and one in Area B near Zug Island (RB15-28). In the core samples, chromium concentrations exceeded the PEC in at least one depth interval from four locations in Area A and from six locations in Area B. Chromium concentrations exceeding three times the PEC were detected in two depth intervals from the core at RB15-20, near Historic Fort Wayne.

In Area A, copper concentrations exceeded the TEC for at least one core interval or the surface grab sample at the majority of locations. Concentrations of copper exceeding the PEC were detected in at least one core interval at eight locations in Area A. Concentrations of copper exceeding three times the PEC were detected in both the surface grab and one depth interval of the core sample from location RB15-04, near West Riverfront Park. In Area B, copper concentrations exceeded the PEC in the surface grab samples at three locations, including two locations where the concentration exceeded three times the PEC (RB15-18 and -20). Copper concentrations exceeding three times the PEC were detected in at least one depth interval for cores from six of the locations in Area B. Copper concentrations exceeded at least twice the PEC for all of the depth intervals that were analyzed in cores from four locations near the former Anaconda Brass and Revere Copper & Brass Companies.

Iron concentrations were below the TEC in the majority of surface grab samples and core intervals. An iron concentration exceeding the PEC was detected in one depth interval from a core collected near Riverside Park (RB15-14).

Lead concentrations exceeding the PEC were detected in surface samples as well as subsurface samples at multiple depths. In Area A, lead concentrations exceeding the PEC were detected in surface grab samples from five locations scattered throughout the area, including one location near West Riverfront Park (RB15-04) where the lead concentration exceeded three times the PEC. Core samples with lead concentrations exceeding the PEC in at least one depth interval occurred at 10 locations in Area A, including eight locations where at least one depth interval exceeded three times the PEC. In Area B, lead concentrations exceeding the PEC were detected in three surface grab samples, including one location near Zug Island where the concentration exceeded three times the PEC (RB15-28). In the core samples from Area B, lead concentrations exceeding the PEC were detected in at least one depth interval at seven locations, including five locations where the concentration exceeded three times the PEC in at least one depth interval.

Mercury concentrations exceeded the TEC in the majority of surface grab samples and core intervals. Mercury concentrations in Area A exceeded the PEC in the surface grab samples from three locations, including one location where the concentration exceeded twice the PEC (RB15-06). In the core samples in Area A, mercury concentrations exceeding the PEC were detected in at least one depth interval in cores from seven locations, including three locations where the concentration exceeded three times the PEC in at least one interval. In Area B, a mercury concentration exceeding three times the PEC was detected in the surface grab sample from one location (RB15-19). Mercury concentrations exceeding the PEC were detected in at least one depth interval for cores from five locations in Area B, all five of which had at least one depth interval where the concentration exceeded three times the PEC.

Nickel concentrations were below the TEC in the majority of surface grab samples and were below the PEC for all surface grab samples. In the core samples from Area A, nickel concentrations exceeding the PEC were detected in at least one depth interval at five locations, including one location near West Riverfront Park where a concentration exceeding three times the PEC was detected (RB15-04). In Area B, cores from five locations had concentrations of nickel exceeding the PEC in at least one depth interval, including three locations near Historic Fort Wayne (downstream of the former Revere Copper & Brass Company) where at least one interval had a concentration exceeding twice the PEC.

Silver concentrations were below the TEC for the majority of core intervals and in surface grab samples from all but three locations. Silver concentrations exceeded the PEC in two surface grab samples in Area A, including an exceedance of three times the PEC at RB15-04. In Area A, core samples from five locations had at least one depth interval with a silver concentration that exceeded the PEC, including two locations near Riverside Park where concentrations exceeding three times the PEC were detected in at least one depth interval. In Area B, core samples from five locations had at least one depth interval with a silver concentration that exceeded the PEC, including one location (RB15-20) with a depth interval that exceeded three times the PEC.

Zinc concentrations were greater than the TEC and less than the PEC for the majority of surface grab samples. A zinc PEC exceedance was detected in one surface grab sample in Area B (RB15-20), where the concentration exceeded twice the PEC. In the core samples from Area A, zinc concentrations exceeded the PEC in at least one depth interval at eight locations, including one location (RB15-03) where a concentration exceeding three times the PEC was detected. In Area B, zinc concentrations exceeding three times the PEC were detected in at least one depth interval at five locations, and one additional location had a zinc concentration that exceeded twice the PEC. Zinc concentrations exceeded three times the PEC for all of the core depth intervals that were analyzed from location RB15-23, and concentrations exceeded the PEC for all of the core intervals that were analyzed from locations RB15-20, -21 and -22, near Historic Fort Wayne (downstream of the former Revere Copper & Brass Company).

The ratio of simultaneously extracted metals to acid volatile sulfide was calculated for all surface grab samples. The sample and the field duplicate (FD) from location RB15-02 had ratios greater than 1. This indicates that this metal is bioavailable and there is potential for toxicity to benthic organisms. Concentrations of lead and silver exceeded their respective PECs in the surface sample from RB15-02, and concentrations of cadmium, chromium, copper, mercury, nickel and zinc exceeded their respective TECs but were below their PECs. Surface samples from the other sampling locations all had ratios below 1.

The highest concentration of diesel range organics (DRO) (C_{10}-C_{20}) was detected in the surface interval of location RB15-20 (1,200 mg/kg). The highest concentration of oil range organics (ORO) (C_{20}-C_{36}) was also detected in the surface interval of RB15-20 (6,700 mg/kg). DRO (C_{10}-C_{20}) and ORO (C_{20}-C_{36}) concentrations were summed (by location) to create a total petroleum hydrocarbon (TPH) concentration (TPH [DRO+ORO]) for each location. A PEC has not been developed for TPH (DRO + ORO), but the DRO and ORO results were compared to Sample Specific Risk Screening Levels (SSRSLs). In Area A, DRO concentrations exceeded the respective SSRSL at three locations, including two locations where the concentration exceeded three times the SSRSL (RB15-02 and -11). ORO concentrations in Area A exceeded the respective SSRSL at 12 locations, of which five exceeded three times the SSRSL and an additional five exceeded twice the SSRSL. In Area B, DRO concentrations exceeded the respective SSRSL at four locations, including one location where the concentration exceeded three times the SSRSL (RB15-20). ORO concentrations in Area B exceeded the respective SSRSL at nine locations, of which two exceeded three times the SSRSL and an additional four exceeded twice the SSRSL.

E.2 EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARK TOXIC UNITS AND PROBABLE EFFECTS CONCENTRATION QUOTIENTS

Equilibrium Partitioning Sediment Benchmark Toxicity Units (ESBTUs) were calculated to estimate whether there is potential ecological risk associated with exposure to pore water that is in equilibrium with a measured concentration of the contaminant in the sediment.

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 2003a). The samples with PAH ESBTUs greater than 1 may be toxic to aquatic life. Of the 103 sediment samples, 27 had a PAH ESBTU less than 1, and 25 samples had a PAH ESBTU equal to or greater than 10. In the surface grabs in Area A, PAH ESBTUs were below 1 at five locations, between 1 and 7.5 at eight locations, between 7.5 and 10 at one location, and greater than 10 at two locations. In the core samples from Area A, PAH ESBTUs greater than 1 were identified in all of the depth intervals that were analyzed at 10 locations, and in at least one depth interval at most locations. PAH ESBTUs greater than 10 were identified in at least one depth interval at 11 locations. In the surface grab samples from Area B, PAH ESBTUs were greater than 10 at one location, between 1 and 7.5 at five locations, and below 1 at five locations. In the core samples from Area B, PAH ESBTUs greater than 1 were identified in at least one depth interval at nine locations, and for all of the depth intervals that were analyzed at six locations. PAH ESBTUs greater than 10 were identified in at least one depth interval at two locations in Area B.

For metals ESBTUs, values below 130 micromoles (µmol) of residual SEM per gram organic carbon (g_{oc}) pose a low risk of adverse biological effects, 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. ESBTU results for metals exceeded 130 µmol/g_{oc} in the surface grab samples from RB15-04 and RB15-19. The ESBTU for metals also exceeded 130 µmol/g_{oc} in the FD collected from the surface grab sample at RB15-02. All of the metals ESBTU results were below 3,000 µmol/g_{oc}

Probable effects concentration quotients (PEC-Qs) are used to evaluate the combined effects of chemical mixtures on the toxicity of sediments to benthic organisms against mean PEC quotients or benchmarks (mean quotients of 0.1, 0.5, 1 and 5) (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. 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; meaning that between 70 percent and 50 percent of the organisms should not show an effect when the PEC-Q is 1. The proportion of organisms which show a toxic effect is in the range of 6 – 35 percent when a geometric mean of the PEC-Q of 0.5 is used; meaning that between 94 percent and 65 percent of organisms do not show a toxic effect when the PEC-Q is 0.5 (Ingersoll et. al. 2001). 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 (EPA 2000).

Mean PEC-Qs at the Riverbend Area ranged from 0.02 at location RB15-25 to 2,665.16 at location RB15-12. The mean PEC-Q for each sediment sample was compared to benchmarks of 0.5 and 1. In the surface grab samples from Area A, mean PEC-Qs were calculated to be: below 0.5 at five locations, between 0.5 and 1.0 at five locations, between 1 and 5 at five locations, and greater than 5 at one location (RB15-11). In the core samples from Area A, 12 of the 17 locations had a mean PEC-Q greater than 1 in at least one depth interval. The mean PEC-Q values in the surface grab samples from Area B were calculated to be: less than 0.5 at five locations, between 0.5 and 1 at one location, between 1 and 5 at four locations, and greater than 5 at one location (RB15-27). In the core samples from Area B, mean PEC-Qs greater than 1 were calculated for at least one depth interval at 8 of the 11 locations.

E.3 SPATIAL ANALYSIS

To determine the location of hot spots within the Riverbend 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 using the kriging method. Although ESBTUs were also calculated for metals, this data was not included in the model inputs for the spatial analysis because only three results exceeded the relevant thresholds and these results occurred within the hot spots that were otherwise identified. Determination of hot spots allows priority areas to be targeted for further investigation or remediation. Four hot spots in the study area where one or more analytes were present in concentrations exceeding the PEC have been identified. The four identified hot spot areas were prioritized for further investigation and potential remediation efforts by taking into consideration the results of the spatial analysis of PAH ESBTUs and PEC-Qs. Hot spots were categorized as Level 1, 2, or 3, with Level 1 hot spots having the highest impact and Level 3 hot spots having the lowest impact and lowest priority for further investigation. To be considered Level 1, hot spots must have a contaminant result that is equal to or greater than three times the respective PEC, a PEC-Q value equal to or greater than 5, or an ESBTU equal to or greater than 7.5. To be considered Level 2, hot spots must have a contaminant result that is equal to or greater than three times the respective PEC, a PEC-Q value equal to or greater than 1, or an ESBTU equal to or greater than 7.5. To be considered Level 3, hot spots must have a contaminant result that is equal to or greater than three times the respective PEC, a PEC-Q value equal to or greater than 0.5, or an ESBTU equal to or greater than 1.

Hot Spots 1, 2, 3 and 4 all have at least one contaminant of concern (COC) result that is equal to or greater than three times the respective PEC. All four of the identified hot spots also have at least one PEC-Q equal to or greater than 5 and at least one ESBTU result equal to or greater than 7.5, and therefore all four of the hots spots meet the Level 1 criteria.

Hot Spot 1 includes sample locations RB15-01, -02, -03, -4, -05, -06, -07, and -09. The COCs in Hot Spot 1 are total PCBs, total 17 PAHs, and eight metals (cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc). The predominant constituent contributing to elevated concentrations above the PEC is total 17 PAHs; which exceeded three times the PEC at RB15-02, -03, -04, -05, and -09. Sample locations RB15-02, -03, -04, -05, and -09 had PAH ESBTUs greater than 10. Sample locations RB15-01, -02, and -04 had PEC-Qs greater than 5 (5.97, 12.58, and 6.24, respectively). Also, sample location RB14-04 had a metals ESBTU greater than 130 μmol/g_{oc}.

Hot Spot 2 includes sample locations RB15-11, -12, -13, -14, -15, and 16. The COCs in Hot Spot 2 are total PCBs, total 17 PAHs, and eight metals (chromium, copper, iron, lead, mercury, nickel, silver, and zinc). The predominant constituent contributing to elevated concentrations above the PEC is total 17 PAHs; which exceeded three times the PEC at all six locations in Hot Spot 2. All six locations in Hot Spot 2 had PAH ESBTUs that were greater than 10 and PEC-Qs that were greater than 5.

Hot Spot 3 includes sample locations RB15-18, -19, -20, -21, -22, -23, and -24. The COCs in Hot Spot 3 are total 17 PAHs, total PCBs, and nine metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc). The predominant constituent contributing to elevated concentrations above the PEC is copper; which exceeded three times the PEC at six of the seven locations. Total 17 PAHs exceeded three times the PEC at five of the seven locations in Hot Spot 3; total PCBs exceeded the PEC at three locations (RB15-19, -22, and -24). Sample location RB15-24 had PAH ESBTUs greater than 10. Sample locations RB15-20, 22, -23, and -24 had maximum PEC-Qs greater than 5 (5.04, 5.14, 6.48, and 7.02, respectively). Also, sample location RB15-19 had a metals ESBTU greater than 130 μmol/g_{oc}.

Hot Spot 4 includes sample locations RB15-27 and -28. The COCs in Hot Spot 4 are total 17 PAHs and eight metals (cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc). The predominant constituent contributing to elevated concentrations above the PEC is total 17 PAHs; which exceeded three times the PEC at RB15-27 and twice the PEC at RB15-28. Sample location RB15-27 had a PAH ESBTU greater than 10 and a PEC-Q greater than 5 (29.00).

E.4 CONCLUSIONS

Based on the data collected during the Riverbend Area sediment characterization, the Level 1 (highest impact) hot spot areas with elevated concentrations of constituents are: Hot Spot 1 (includes the area adjacent to Joe Louis Arena and West Riverfront Park in Area A); Hot Spot 2 (includes the area adjacent to the Ambassador Bridge and Riverside Park in Area A); Hot Spot 3 (includes the area adjacent to the Delray Public Access Boat Ramp and Historic Fort Wayne in Area B); and Hot Spot 4 (includes the area adjacent to the Detroit-Windsor Truck Ferry and the mouth of the Rouge River Old Channel near Zug Island in Area B). These high impact hot spots have an estimated total of 749,000 cubic yards of sediment with constituent concentrations exceeding a PEC.

The four hot spots identified in the Riverbend Area were determined to be Level 1 hot spots and should be considered for further investigation. 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 hot spot areas. Further delineation of the extent of sediment with elevated concentrations of constituents is recommended.

The modeling results for all constituents exceeding two or three times the PEC, the PAH ESBTUs, and the PEC-Qs suggest that the hot spot areas should be considered for further investigation and potential remediation within the Riverbend Area. 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.

1. INTRODUCTION

This report presents the contaminated sediments assessment site characterization for the Riverbend Area (the site), located within the Detroit River Area of Concern (AOC), Detroit, Michigan (Figure 1-1). This work was conducted by EA Engineering, Science, and Technology, (MI) PLC and its affiliate EA Science and Technology (EA) for the U.S. Environmental Protection Agency's (EPA's) Great Lakes National Program Office (GLNPO) in accordance with the Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) for the Riverbend Area Site Characterization, Detroit River AOC, Detroit, Michigan finalized January 2016 (EA 2016a).

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 and areal extent of contamination, provide information about depositional areas, and identify high priority areas for remediation or for further investigation in the Riverbend 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 conclusions of the investigation. The results of this site characterization were evaluated to assess the sediment quality of the Riverbend 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 Riverbend Area at which remediation efforts might be warranted.

1.2 SITE LOCATION AND HISTORY

The Detroit River is part of the international connecting waterway—consisting of the St. Clair River, Lake St. Clair, and the Detroit River—that links Lake Erie to the upper Great Lakes. A 32-mile strait, the Detroit River drains approximately 700 square miles of land in Michigan and Ontario, as well as the 946 square mile City of Detroit "sewershed" (Figure 1-1) (EPA 2015 and Detroit Water and Sewerage Department 2014). However, since about 95 percent of the flow of the Detroit River comes from outside of the watershed, originating in the upper Great Lakes and flowing through Lake St. Clair, the Detroit River AOC comprises only the river itself. The mean discharge of the Detroit River into Lake Erie is 185,000 cubic feet (ft) per second. Its velocity is 1 to 3 ft per second, and the average time for water to pass through the river is about 21 hours. It has five tributaries, although, as noted previously, more than 95 percent of its total flow comes from Lake Huron via the St. Clair River and Lake St. Clair (EPA 2015). The Riverbend Area is an approximately 3.5 mile stretch of the mid Detroit River, beginning at the Joe Louis Arena in downtown Detroit, Michigan, and extending to the confluence of the Lower Rouge River Old Channel near Zug Island (Figure 1-2). To support the needs of a nearby AOC habitat project, the project area also included three advanced sample locations from the Harbortown Area, an approximately 2 mile stretch of the upper Detroit River beginning at the MacArthur Bridge to Belle Isle and extending to the Renaissance Center in Downtown Detroit (the Harbortown Area will be further characterized in June 2016). Results from the three locations in Harbortown will be provided under separate cover and are not included in the sample counts or discussion in this report.

The Detroit River has a past and present use as an industrial and drinking water source. Very little history exists documenting the nature and extent of contamination. The river is heavily industrialized and has been for nearly 100 years. Under the Great Lakes Water Quality Agreement, a Detroit River Stage 1 Remedial Action Plan (RAP) was completed in 1991. The Stage 1 RAP described the river's use and conditions, and identified 11 beneficial use impairments (BUIs) for the Detroit River AOC (Michigan Department of Natural Resources [MDNR] 1991). Known causes of the impairments include urban and industrial development in the watershed, bacteria, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals, and oils and greases. Combined sewer overflows and municipal and industrial discharges are major sources of contaminants within the AOC. Storm-water runoff and discharge from tributaries in Michigan are also major sources of contaminants. The following BUIs were identified in the Stage 1 RAP:

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 RAP 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. 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, electric 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 (MDNR 1991). In the project area there a number of former industries, including the Mistersky power plant, Revere Copper and Brass, Anaconda Brass, Allied Chemical, and a coal gasification plant. There eight known industrial outfalls associated with those industries. Currently there are no industrial outfalls, but 20 uncontrolled municipal combined sewer overflow (CSO) outfalls are present throughout the project area (Figure 1-3).

Use of the river today is similar to 1991 except that there are fewer industries and wastewater treatment plants. Currently in the United States, 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 1.3 billion gallons per day, including waste from about 400 significant industrial users (EPA 2015).

The Stage 1 RAP 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 (EPA 2015). The Michigan shoreline from the Rouge River downstream through the mouth of the Trenton Channel appears to be the most impacted. Contaminant distributions in sediment are reflective of a combination of historical point sources and hydrological effects.

Because there is little lateral mixing in the Detroit River, contaminants 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 (MDNR 1991).

To address the delisting criteria and allow for the eventual removal of the degradation of benthos BUI, 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 Riverbend Area is one of the six target areas (EPA 2015).

2. RIVERBEND 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 and areal extent of contamination, provide information about depositional areas, and identify high priority areas for remediation or for further investigation in the Riverbend Area.

The Riverbend 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 2016a).

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 2016a). Sampling was conducted to delineate the nature and extent of sediment contamination in the Riverbend Area of the Detroit River AOC.

2.1.1 Sample Locations

The sample locations for the Riverbend Area site characterization were chosen based on historical sampling data, location of historical and current outfalls (Figures 1-2 and 1-3), water depth, proximity to the navigation channel, and input from Michigan Department of Environmental Quality (MDEQ) 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 2016a).

Twenty-eight locations within the Riverbend Area were originally chosen for sample collection using a sonic coring system and ponar grab sampler operated by MATECO Drilling Company (MATECO). The sampling equipment was deployed from a barge operated by Marine Services. MATECO utilized an onboard roving Trimble R6 Global Positioning System (GPS)/Global Navigation Satellite System with a TSC3 Data Collector to navigate to each location. Target coordinates for each 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 all 28 sample locations in the Riverbend Area, and ponar grabs were collected at 27 locations. Deviation from the 28 target sample locations is described in Section 2.8. Cores were typically divided into three or four sampling intervals at each location. The sampling interval depths were generally as follows: 0-1 ft, 1-3 ft, and 2 ft thereafter until refusal. These default sampling intervals were adjusted per EPA direction in the field based on observable lithological changes in the cores (this is further discussed in Section

2.8). Sediment from each interval was homogenized prior to collection in individual containers for submittal to the laboratory. Sediment cores varied in length from 2.0 ft to 11.0 ft (Table 2-2). A total of 76 sediment samples from collected cores in the Riverbend Area (not including quality control samples) were submitted for analysis (Table 2-3).

A surface sample of the top 6 inches (0-0.5 ft) of sediment was also collected with a ponar grab/dredge sampler at 27 of the proposed coring locations to provide sufficient sample volume to support analysis of the uppermost interval. A total of 27 surface grab samples (not including quality control samples) were submitted for analysis.

2.2 NAVIGATION AND SURVEY

The Marine Services spud barge navigated to each proposed sampling location using GPS with sub-meter accuracy. The roving GPS unit operated by MATECO utilized the World Geodetic System 1984 to navigate and record each individual sampling location. The unit was checked daily for accuracy prior to use in accordance with 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 2016a). 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 prior to sampling (Figure 2-1A and Figure 2-1B).

2.3 SEDIMENT SAMPLING

Mobilization for the Riverbend Area sediment sampling commenced on 26 October 2015. Sample collection was initiated on 26 October and continued through 5 November 2015. Staging for the field effort took place at the U.S. Army Corps of Engineers' facility at Historic Fort Wayne in Detroit, Michigan. Level D personal protective equipment (i.e., safety glasses, work boots, and Nitrile gloves) were worn during core collection as necessary (EA 2016a). EA standard operating procedures (SOPs) 016 and 059 for maintaining field logbooks (Attachment A of the FSP) were followed throughout sample collection and processing.

2.3.1 Sonic Core Sampling

A total of 28 subsurface sediment cores were collected from the Riverbend Area using a sonic coring system onboard the Marine Services spud barge. The roving GPS operated by MATECO was used to navigate to each location. The sonic coring system consisted of a Geoprobe 7822DT sampling rig with a mini-sonic head, a metal barrel, and connected high-density polyethylene (HDPE) core tubes. MATECO began core collection by lowering a 4.25 inch diameter hollow-stem auger down to the sediment surface. Two 5 ft long and one 1 ft long 3 inch inner diameter HDPE core tubes were connected and placed into the bottom of a 3-inch diameter metal barrel approximately 11 ft in length. The 1 ft long core tube segment was located at the top of the connected core tubes. A core catcher was attached to the bottom of the metal barrel. A one-way ball valve was located at the top of the barrel, above the connected core tubes, to allow water to exit the tube as sediment entered. The barrel was lowered down through the auger to the sediment surface. A sonic machine head was placed at the top of the barrel and connected to a motor on the deck of the barge. The sonic machine head, which contains mechanisms for both rotary motion and oscillation, moved the barrel down 10 ft through the sediment or until refusal was met, at which point the core was retrieved. After retrieval, the core tubes were carefully separated to prevent loss of sediment, and then each core tube was capped at both ends, sealed, and measured. Each core tube was labeled with the location number, direction of top and bottom of core, and date and time of retrieval. Core tubes were stored upright onboard the barge.

At the end of each day, sediment cores were transferred to a refrigeration truck (cooled to 4 degrees Celsius [°C]) at the on-shore staging area. The cores were stored upright 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 2016a). 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 27 surface sediment samples (not including field duplicates) were successfully collected from locations in the Riverbend Area using a ponar sampler onboard the Marine Services spud barge. The ponar sampler was mechanically deployed and retrieved as described in SOP 021 (EA 2016a). The procedure included use of a davit to deploy the sampler off of the bow of the barge, retrieving the sampler to the barge deck, decanting water at the top of the sampler, and transferring the sediment into a disposable aluminum tray. Multiple deployments were sometimes necessary to collect sufficient volume.

Sediment for analysis of the ratio of simultaneously extracted metals (SEM) to acid volatile sulfide (AVS) was placed into a jar directly after the ponar sample was collected, and prior to homogenization of the material to minimize aeration of the sample. Samples for SEM/AVS analysis were filled with no headspace. Following collection of sediment for SEM/AVS, the remaining sediment for all other analyses was thoroughly homogenized and then transferred directly into laboratory-approved, labeled sample containers onboard the vessel. The surface samples were stored in a cooler with ice onboard the Marine Services barge until they were transferred to the sample processing area onshore and stored in a refrigeration truck (cooled to 4 °C) until transit to the laboratories facilities.

2.3.3 Sediment Core Processing

Core sediment sample processing was performed onshore at a temporary staging location at the U.S. Army Corps of Engineers' facility at Historic Fort Wayne in Detroit, Michigan. 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 (Attachment A of the FSP).

After the log was completed, the sediment from each subsample interval was removed from the core or grab sampler with a decontaminated spatula or spoon and placed in a clean disposable aluminum try. Cores were subsampled at several depth intervals. Prior to collection, all material from a designated depth interval in a single core was homogenized by mixing until consistency was uniform. Sediment samples were packaged and shipped in accordance with EA SOPs (EA 2016a). Equipment that was re-used (e.g., cutting tools, broad knife, spatula, 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 2-3. Each sediment core sample and surface grab sample (103 total from the Riverbend Area) 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/moisture.

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

- SEM/AVS
- Diesel range organics (DRO)
- Oil range organics (ORO)
- Ammonia
- Grain size.

These analyses were only performed on ponar grab sediment samples because the data they yield are useful for assessing toxicity to organisms that typically contact only the surface sediments. Matrix spike (MS)/matrix spike duplicate (MSD) samples were not collected for percent solids or grain size.

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); PAHs; Michigan 10 metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc) plus iron and nickel; TOC; percent solids; SEM/AVS; DRO; ORO; and grain size were picked up from the site sample processing facility by TestAmerica's courier and shipped to TestAmerica's laboratory in Burlington, Vermont. Samples were placed in the appropriate sample containers (obtained from TestAmerica), preserved, and labeled in accordance with the QAPP/FSP (EA 2016a). With exception given to sediment collected for SEM/AVS analysis, sediments within an interval were mixed to uniform consistency to homogenize prior to placing in jars. Sediment sampled for SEM/AVS analysis was placed directly into jars after the ponar grab sample was collected, prior to homogenization. SEM/AVS samples were filled without head space. In preparation for shipment to the laboratories, all samples were packaged in accordance with the procedures outlined in the FSP (EA 2016a).

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 2016a) outlines the specific sample identification procedures that were implemented. Sample identifications included the location (RB), the year of sampling (15), the location number, and either "-SURF" for surface samples or the interval from the core in feet. An example of a sample identifier is "RB15-22-3050"; which describes a sample collected at Riverbend in 2015 at location 22 at the depth interval of 3-5 ft below the sediment surface. Sample depths were typically at intervals of 0-0.5 ft (SURF), 0-1 ft, and 2 ft thereafter, with some adjustments based on guidance from EPA in response to lithological features observed in the field. Field duplicates were designated by adding "FD" to the end of the sample identifier. MS/MSDs were designated by adding "MS" or "MSD" to the end of the sample identifier. For example: RB15-23-1030FD or RB15-03-SURFMS.

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 2016b).

2.5.2 Quality Control

Throughout the project, various measures were implemented to help facilitate 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 2016a). Duplicate samples were submitted as described in the FSP (EA 2016a), and field and laboratory quality control requirements were completed in accordance with Section B.5 of the QAPP. Deviations from the QAPP/FSP 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 effort. Decontamination procedures were carried out in accordance with the SOPs presented in Attachment A of the FSP (EA 2016a).

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 Attachment A of the FSP (EA 2016a). In general, residual sediments and decontamination water were collected, drummed, and disposed of offsite in accordance with the EA SOPs. Water used for decontamination of the sampling equipment on the Marine Services spud barge was allowed to drain back into the river at each respective sampling location. 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

Twenty-eight sample locations within the Riverbend Area were originally chosen based on historical sampling data, location of historic and current outfalls, water depth, and input from MDEQ and the Detroit River Riverkeeper (Table 2-1).

Of the 28 actual sampling locations in the Riverbend Area, 21 were more than 10 ft from the target sampling location (Table 2-1). As noted in Table 2-1, sample locations were moved during the field investigation for multiple reasons, including difficulty maneuvering the barge in high wind conditions, to avoid obstructions near shore (i.e., riprap and pilings), and to achieve more complete recovery by moving to areas of soft sediment deposition. Two locations—RB15-24 and RB15-25—were moved to avoid submerged pipelines in their vicinity. EA and MATECO worked with representatives of Kinder Morgan and Plains All American Pipeline in relocating sample locations RB15-24 and RB15-25 to maintain a safe distance from the pipelines. For the other 26 locations the actual sampling coordinates were within 90 ft of the target location coordinates, and at 20 of these locations the actual coordinates were within 25 ft of the target coordinates.

Four of the Riverside Park sample locations (RB15-11, -13, -14, and -15) were revised by MDEQ on 23 October 2015; three days prior to the start of the field investigation. In navigating to the revised Riverside Park sample locations, EA noted discrepancies in sample locations between the aerial images provided by MDEQ and the positions indicated by the GPS. The MDEQ representative onsite, Mr. John Barkach of Great Lakes Environmental Center, Inc., advised EA to sample where the aerial image indicated based on visual landmarks and proximity to the seawall. The actual sample locations of RB15-11, -13, -14, and -15 were approximately 17 ft, 10 ft, 17 ft, and 9 ft from their revised target locations, respectively.

2.8.2 Sample Recovery

Sediment penetration and recovery of the cores for each location were recorded in a field datasheet as observed through the clear core liner. The recovery value was then re-measured at the staging area immediately prior to processing to account for settling and consolidation that may have occurred in those core tubes that were not full. The sediment penetration and recovery of the cores used for chemical analysis are presented in Table 2-2.

Core recovery was greater than 100 percent at nine locations: RB15-02, -03, -06, -09, -10, -11, -13, -19 and -24 (Table 2-2 and Appendix B). Core recovery did not meet or exceed 70 percent after three attempts at five locations: RB15-01 (maximum recovery of 51 percent), RB15-07 (maximum recovery of 60 percent), RB15-12 (maximum recovery of 22 percent), RB15-21 (maximum recovery of 48 percent), and RB15-23 (maximum recovery of 50 percent) (Table 2-2).

Surface samples were collected at 27 of the 28 target sample locations in the Riverbend Area (Table 2-2). No surface sediment was retrieved at RB15-12 after five ponar grab sample attempts at that location. At several locations, a dense layer of mussel shells prevented efficient ponar sampling at the sediment surface, yielding very little sediment for analysis. To provide sufficient sediment for analysis at the locations with high quantities of mussel shells, double analytical volume was collected when possible, as noted in Table 2-1.

2.8.3 Sample Processing and Analytical Program

The ponar surface sample (0 to 0.5 ft below sediment surface) was collected to assess sediment-related toxicity, bioavailability and bioaccumulation in surficial sediment benthos. Accordingly (as presented in Table 2-3), the ponar samples were analyzed for: 34 PAHs; total Michigan metals plus iron and nickel; PCB Aroclors; SEM/AVS; total organic carbon (TOC); percent moisture/solids; grain size; ammonia; and diesel range organics (DROs)/oil range organics (OROs) as specified in the QAPP (EA 2016a). Ponar surface sample collection was conducted as detailed in Section 4.2.1 of the FSP (EA 2016a).

Separate and in addition to the ponar sample, the sediment core from each location was divided into sample intervals. The QAPP defined sample intervals at 0 to 1 ft, 1 to 3 ft, and every 2 feet thereafter until the end of the core (EA 2016a). However, per EPA's direction during the field investigation, sediment core intervals were adjusted to coincide with observable lithological changes and/or contamination in the core. Sediment intervals are further documented in the field data collection forms (Appendix A) and the photographic log (Appendix C). Additionally, cores were only sampled to the start of gray clay, which EPA assumed to be minimally impacted. Core sample processing and compositing were otherwise conducted as detailed in Section 4.4 of the FSP (EA 2016a). The proposed analytical program for the Riverbend Area Site

Characterization is presented in the QAPP (EA 2016a) and the actual analytical program, including the start and end of each sample interval in inches, is presented in Table 2-3.

The QAPP and FSP stated that a maximum of 140 samples from the Riverbend Area would be submitted for 34 PAHs, total Michigan metals plus iron and nickel, PCB Aroclors, TOC, and percent solids/moisture by assuming that 5 analytical samples (including the surface sample) would be submitted for each location (this does not include a maximum of 15 samples proposed to be collected from the three Harbortown area locations). A total of 103 samples from the Riverbend Area were submitted for these analytes. The QAPP and FSP stated that a maximum of 28 samples (surface only) from the Riverbend Area would be submitted for grain size, SEM/AVS, DRO/ORO, and ammonia analysis (this does not include three samples collected from the Harbortown area). A total of 27 samples from the Riverbend Area were submitted for these analyses. Field duplicates were submitted for 10 percent of the samples, and matrix spike (MS)/matrix spike duplicates (MSDs) were submitted for 5 percent of the samples, with two exceptions: MS/MSD analysis samples were not submitted for grain size, and percent solids/moisture, as specified in the QAPP/FSP (EA 2016a).

3. RESULTS

3.1 DATA EVALUATION

The overall DQO for the project was to provide data of known and documented quality to characterize current site conditions at the Riverbend Area. Data collected from the Riverbend 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 2016a). 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 2016b).

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) where available (MacDonald et al. 2000, Persaud et al. 1993, EPA 2003b, EPA 2005, WDNR 2003). Contaminant concentrations exceeding the applicable sediment quality guidelines were identified. Figures have been prepared to visually present contaminant concentrations and identify potential hot spots or focus areas within the study area.

Detected values equal to or greater than 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. Field duplicate results are presented in the analytical tables but are not included in the bulk sediment results figures.

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 are unlikely to be observed, while PECs typically represent concentrations above which adverse effects are likely to be 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, and only a TEC value was provided for silver. Therefore, iron concentrations in sediment from the Riverbend Area were compared to the TEC and PEC values for iron documented in the Ontario effect-based freshwater sediment quality guidelines (Persaud et al. 1993), and silver concentrations were compared to TEC and PEC values for silver documented in draft criteria for managing contaminated sediment in British Columbia (MacDonald and MacFarlane 1999). These iron and silver benchmarks were recommended for use by MDEQ and EPA, and they also appear in guidance from 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 guidelines. Total PCBs results often have a significant number of non-detects. Additionally, individual PCB Aroclors represent mixtures of PCB congeners, creating the potential for double counting. For these reasons total PCBs concentrations were calculated by summing the concentrations of each PCB Aroclor with non-detects set equal to zero (ND=0) to reduce the potential for overestimation.

3.1.3 Ratio of Simultaneously Extracted Metals to Acid Volatile Sulfide

The bioavailability of divalent metals to aquatic organisms is influenced by the presence of AVS. In low oxygenated (anaerobic) environments, divalent metals precipitate as metal sulfides, making them unavailable for uptake by aquatic organisms. Using this method, six metals (cadmium, copper, lead, nickel, mercury, and zinc) were extracted, measured, converted to units of micromoles per gram (µmol/g) and added together (including any values that were J-qualified) to determine the amount of SEM. If a metal was not detected, it was considered a zero in the calculation. SEM was then compared to the amount of AVS detected (units of µmol/g) 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 as metal sulfides and not bioavailable to aquatic organisms. If the SEM/AVS ratio 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 Effects Concentration Quotients

Equilibrium Partitioning Sediment Benchmark Toxicity Units (ESBTUs) were utilized to estimate whether there is potential ecological risk associated with exposure to pore water that is in equilibrium with a measured concentration of a contaminant in the sediment. 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 2003a). The PAH ESBTU benchmark of 7.5 is based on the preliminary remediation goal (PRG) for PAHs developed for the Lower Rouge River Old Channel (LRROC) Great Lakes Legacy Act site, which is also located within the Detroit River AOC (AMEC et al. 2013). The LRROC PRG is based on the Sediment Contaminant Bioavailability Alliance (SCBA) dataset (Geiger 2010), which is a widely accepted sediment assessment tool comprised of over 250 samples from 18 sediment sites where PAHs were the source of contamination. The dataset was used to evaluate risk to sensitive species

(*Hyalella azteca*, freshwater amphipod) in the benthic community based on pore water exposure. The LRROC PRG was used for comparison based on guidance provided by MDEQ and EPA.

Eighty percent survivability is a typical level of acceptability for benthic organisms exposed to pore water from contaminated sediments. The LRROC PRG was established at 85 percent survivability based on SCBA toxicity results from the 28-day *Hyalella* test. Based on a correlation using the SCBA dataset, 85 percent survivability correlated with a level of 5 toxic units; however, most sediment chemistry samples are based on analysis of bulk sediments. For the LRROC site, in order to arrive at a bulk sediment toxic unit equal to 5 toxic units in pore water, a relationship was established between pore water and bulk sediment based on site specific PAH samples. The result was that a toxic unit of 7.5 in bulk sediments was found to be equal to 5 toxic units in pore water. Details of the ESBTU calculations and results are presented in Chapter 4.

Probable effects concentration quotients (PEC-Qs) were used to evaluate the combined effects of chemical mixtures on the toxicity of sediments to benthic organisms against mean PEC quotients or benchmarks (mean quotients of 0.1, 0.5, 1 and 5) (Ingersoll et al. 2001). The PEC-Qs combine data from multiple constituents in sediments into one unit-less index, and thus are useful in comparing the quality of sediments from different locations and at different times (EPA 2000). A benchmark PEC-Q of 0.5 was used because the proportion of organisms that show toxic effect drops to 6 – 35 percent when a geometric mean of the PEC-Q of 0.5 is used; meaning that between 94 percent and 65 percent of organisms do not show a toxic effect when the PEC-Q is 0.5 (Ingersoll et. al. 2001). Details of the PEC-Q calculations and results are presented in Chapter 5.

3.2 RESULTS FROM THE RIVERBEND AREA SEDIMENT INVESTIGATION

For reporting and visual presentation of the results of the sediment investigation, the Riverbend Area was divided into two separate areas. Area A, the upstream portion of the site, extends from the Joe Louis Arena west to the Detroit Terminal of the Nicholson Terminal & Dock Company, and includes sample locations near West Riverfront Park, the Ambassador Bridge and Riverside Park (Figure 2-1A). Area B, the downstream portion of the site, extends from the Detroit Terminal of the Nicholson Terminal & Dock Company to the mouth of the Rouge River old channel, and includes sample locations near the former Mistersky power plant, Revere Copper & Brass, Historic Fort Wayne and the LaFarge loading dock (Figure 2-1B).

3.2.1 Sample Recovery

Cores were collected from 28 locations and ponar surface grab samples were collected from 27 locations.

Core collection attempts were targeted to reach a depth of 10 ft or refusal, whichever occurred first. Refusal was not encountered at two locations (RB15-02 and RB15-03). Sediment recovery ranged from 2.2 ft (RB15-12) to 11.0 ft (RB15-02, -03, and -24) (Table 2-2). Detailed lithographic descriptions of the 28 collected cores are presented in Appendix B.

3.2.2 Lithology

The sediment cores collected within the Riverbend Area demonstrate a mixture of core profiles containing sediment types consistent with a fluvial system. Most cores were characterized by shorter layers of silt, sand or gravel underlain by larger layers of clay. Native and non-native material such as shells, roots and organic material, and organic and hydrocarbon odors were observed within various sediment types and depths. Complete core logs and photographs are included in Appendices B and C, respectively. A general description of cores collected during the investigation is included in the text that follows.

Area A
A total of 17 cores were collected in Area A. Cores collected in Area A showed varying lithology, but the majority of cores had layers of sand and/or silt underlain by larger layers of clay. At least trace levels of gravel were observed in 16 of the cores in Area A, with RB15-06 being the only exception. Organic material and/or organic odors were present in cores from RB15-01, -02, -03, -12, -13, -14, -15, and -16. Mussel shells, shell fragments or shell hash were noted in the top intervals of cores from RB15-02, -04, 05, -06, -07, -09, -10, -11, -12, -13, -14, -15, and -16. A hydrocarbon odor was noted in subsurface intervals in cores from RB15-01, -02, -03, -04, -11, -12, -13, -14, -15, -16, and -17. Orange staining or sheen was noted in subsurface intervals in cores at three locations near Riverside Park: RB15-12, -15, and -16. Black non-aqueous phase liquid (NAPL) was observed in the core from RB15-12.

Area B
The cores collected in Area B had varying lithology, although several were comprised mostly of layers of silt or sand underlain by layers of clay, including those from locations RB15-18, -19, -20, -24, -25, and -28. Cores from RB15-23 and RB15-27 were comprised primarily of layers of silty clay. Cores from RB15-21, -22, and -26 were comprised primarily of either sandy clay or clayey sand. Gravel was present in at least trace amounts in cores from most of the locations in Area B, with locations RB15-25 and -26 being the only exceptions. Organic material was present in at least trace amounts in cores from RB15-20, -21, -22, -23, -24, and -27. Mussel shells, shell fragments or shell hash was found in the top intervals of cores from locations RB15-18, -19, -21, -22, and -23, while shell hash was noted in an interval approximately 5 ft below the sediment surface in the core from RB15-24. A hydrocarbon odor was noted for cores collected from RB15-19, -20, -21, -22, -23, -24, and -27. An orange stain on the core liner and NAPL sheen were observed for the core from location RB15-22 near Historic Fort Wayne.

3.2.3 Bulk Sediment Results

Nine field duplicates and 103 sediment samples were submitted for PCB Aroclor, PAH, TOC, percent solids/moisture and Michigan 10 metals (plus iron and nickel) analyses (these numbers do not include the 16 samples and 2 field duplicates collected and analyzed from the three Harbortown area sampling locations); additionally, 27 of these sediment samples and 3 field duplicates were also submitted for DRO, ORO, ammonia, SEM/AVS and grain size analysis (Table 2-3). Table 3-1 summarizes the Riverbend sediment results and the percentages of threshold exceedances.

Chicago Bridge & Iron Company's Quality Assurance Technical Support Program was subcontracted by EPA to conduct a 100 percent Tier I and 20 percent Tier II data validation verification check for this project. The Tier I and Tier II reviews were performed according to the *National Functional Guidelines (NFG) for Superfund Organics Method Data Review* (EPA 2014a) and *NFG for Inorganic Superfund Data Review* (EPA 2014b). Electronic data validation was performed within GLNPO's eXchange and Evaluation System prior to review by Chicago Bridge & Iron Company's Quality Assurance Technical Support Program (EA 2016b). 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 for grain size, particle size, and density are presented in Table 3-2. These results provide additional data for characterizing sediments that can be useful in subsequent investigations or to support potential remediation efforts. Of 27 submitted surface samples, 21 (78 percent) were primarily comprised (greater than 50 percent) of sand and gravel, and the remaining six samples (22 percent) were primarily comprised of silt and clay. Eight of the surface grab samples were comprised of at least 65 percent sand (RB15-02, -04, -08, -13, -14, -21, -25, and -27); with the highest percentage (95.0 percent) at RB15-25. One of the surface grab samples was comprised of at least 65 percent gravel: 77.1 percent at RB15-26. Surface grab samples with the highest percentage of silt (52.2 percent) and clay (41.3) were collected at locations RB15-24 and RB15-17, respectively. Particle size distribution graphs for each sample are presented in Appendix D.

3.2.3.2 Ammonia

Ammonia results for the Riverbend Area are provided in Table 3-3. Ammonia concentrations ranged from a minimum of 4.7 milligrams per kilogram (mg/kg) in the surface grab sample at RB15-27 to a maximum of 297 mg/kg in the surface grab sample from RB15-24. Ammonia concentrations were above 100 mg/kg at 8 locations (RB15-01, -03, -05, -09, -10, -16, -20, and -24) out of the 27 total locations where surface grab samples were collected. Ammonia data was collected as part of this site characterization due to the concerns of MDEQ regarding historical sources of ammonia in the area.

3.2.3.3 PCB Aroclors

PCB Aroclors data and total PCBs (ND=0) are presented in Table 3-4. Figure 3-1A and Figure 3-1B show the distribution of total PCBs SQG exceedances in Areas A and B, respectively. Results from the surface grab samples (0-0.5 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. The most frequently detected Aroclors were: Aroclor 1260 (86 detections in 112 samples), Aroclor 1242 (80 detections in 112 samples), and Aroclor 1254 (69 detections in 112 samples).

Area A

In Area A, all but two of the surface grab samples had a concentration greater than the TEC (59.8 micrograms per kilogram [µg/kg]), with RB15-05 and -17 being the exceptions. Four surface grab samples had a concentration that exceeded the PEC (676 µg/kg) (RB15 -02, -09, -13, and -14), including one surface sample that had a result that exceeded twice the PEC (RB15-09). In the core samples, total PCBs exceeded the PEC in at least one depth interval at six locations (RB15-01, -02, -04, -07, -12, and -13). Core samples at three of these locations exceeded three times the PEC in at least one subsurface depth interval (RB15-01, -02, and -13). The concentration of total PCB Aroclors exceeded the PEC for all of the depth intervals analyzed from the core at RB15-01. The maximum total PCBs concentration (9,940 µg/kg) was detected in the 3-5 ft interval at location RB15-01.

Area B

Total PCBs concentrations in surface samples in Area B exceeded the TEC at eight locations (RB15-19, -20, -21, -22, -23, -24, -27, and -28), with the surface sample at one location exceeding the PEC (RB15-19). Core samples submitted from three locations in Area B had total PCB concentrations that exceeded the PEC in at least one depth interval (RB15-19, -22, and -24).

3.2.3.4 Polycyclic Aromatic Hydrocarbons

PAH data and total 17 PAHs (ND=½ RL) are presented in Table 3-5. Total PAHs were calculated using both 17 individual PAHs and 34 individual PAHs; however, the total 17 PAHs were used as a comparison threshold to be consistent with the derivation of the TEC/PEC values. Figure 3-2A and Figure 3-2B show the distribution of total 17 PAH SQG exceedances in areas A and B, respectively. Results from the surface grab samples (0-0.5 ft interval) are shown on the aerial photo, and results from the core depth intervals are shown on the associated graphs.

Area A

In Area A, all but one of the locations (the exception being RB15-17) had surface grab samples with a total 17 PAH result greater than the TEC (1,610 µg/kg). Surface grab samples exceeded the PEC (22,800 µg/kg) at 10 locations in Area A (RB15-02, -04, -06, -07, -09, -11, -13, -14, -15, and -16). Of these ten locations, five had surface grab samples that exceeded twice the PEC (RB15-02, -04, -11, -13, and -14), of which three exceeded three times the PEC (RB15-04, -11, and -13). In the core samples, total 17 PAHs exceeded the TEC in at least one subsurface depth interval at all but one of the locations sampled, with RB15-06 being the sole exception. Total 17 PAH concentrations exceeded three times the PEC in at least one core depth interval at 11 locations (RB15-02, -03, -04, -05, -09, -11, -12, -13, -14, -15, and -16). Total 17 PAH concentrations exceeded the PEC in all of the core depth intervals analyzed from location RB15-01. The maximum total 17 PAH concentration (182,230,000 µg/kg) was detected in the 1-3 ft interval at sample location RB15-12.

Area B

Total 17 PAH concentrations in surface samples in Area B exceeded the TEC at 10 of the 11 locations, with RB15-25 being the lone exception. Total 17 PAH concentrations in surface grab samples exceeded the PEC at four locations (RB15-19, -20, -27, and -28). The highest concentrations of total 17 PAHs in surface grab samples in Area B were found at the two locations near the mouth of the Rouge River Old Channel, with RB15-28 exceeding twice the PEC and RB15-27 exceeding three times the PEC. In the core samples, PEC exceedances occurred at in at least one depth interval at 9 of the 11 locations in Area B, with RB15-25 and -26 being the exceptions. Concentrations of total 17 PAHs exceeded three times the PEC in at least one depth interval at six locations (RB15-19, -20, -22, -23, -24, and -27). Concentrations also exceeded twice the PEC in at least one subsurface depth interval at RB15-18, -21, and -28. Concentrations of total 17 PAHs at two locations (RB15-25 and -26) were below the TEC for all of the core depth intervals that were analyzed.

3.2.3.5 Total Organic Carbon

TOC results are provided in Table 3-6. In addition to providing additional data for characterizing sediments, TOC results are utilized in the calculation of metals ESBTUs, as discussed in Section 4.2. In the surface grab samples, TOC ranged from 6,530 mg/kg at RB15-26, located in Area B, to 51,800 mg/kg at location RB15-20, also located in Area B. For the core samples, the lowest TOC result (6,290 mg/kg [0.629 percent]) was detected in the 0-1 ft interval at location RB15-25 in Area B, and the highest TOC result (409,000 mg/kg [40.9 percent]) occurred in the 1-3 ft interval at RB15-12 in Area A.

3.2.3.6 Metals

Metals results were compared to respective TEC and PEC values and are presented in Table 3-6 (MacDonald et al. 2000 and WDNR 2003). Of the 12 analyzed metals, two (barium and selenium) 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 (Chapter 6).

The detected concentrations for each metal compared with TEC/PEC values at each location are displayed in the following figures: Figures 3-3A and 3-3B (arsenic), Figures 3-4A and 3-4B (cadmium), Figures 3-5A and 3-5B (chromium), Figures 3-6A and 3-6B (copper), Figures 3-7A and 3-7B (iron), Figures 3-8A and 3-8B (lead), Figures 3-9A and 3-9B (mercury), Figures 3-10A and 3-10B (nickel), Figures 3-11A and 3-11B (silver), and Figures 3-12A and 3-12B (zinc). Results from the surface grab samples (0-0.5 ft interval) are shown on the aerial photo and results from the sonic core depth intervals are shown on the associated graphs.

Arsenic

Figures 3-3A and 3-3B show the distribution of arsenic SQG exceedances in Area A and Area B, respectively.

In Area A, the majority of surface grab samples had concentrations below the TEC (9.79 mg/kg). Concentrations exceeding the TEC, but below the PEC (33 mg/kg), were detected in surface grab samples at two locations near the Ambassador Bridge (RB15-08 and -11). In the core samples, the majority of locations in Area A had at least one sample result that exceeded the TEC but was below the PEC (RB15-01, -02, -03, -04, -06, -09, -12, -13, -14, -15, and -16). No surface or subsurface samples in Area A exceeded the PEC.

Arsenic concentrations in surface samples from the majority of locations in Area B were below the TEC. Only one location in Area B had a surface sample with an arsenic concentration in exceedance of the TEC (RB15-20). Five locations in Area B had subsurface sample concentrations in at least one depth interval that exceeded the TEC (RB15-20, -22, -23, -24, and -27). An arsenic concentration exceeding three times the PEC was identified in the 0-1 ft interval at location RB15-24, which was the maximum arsenic concentration detected (191 mg/kg) and the only sample with an arsenic concentration exceeding the PEC.

Cadmium

Figures 3-4A and 3-4B show the distribution of cadmium SQG exceedances in Area A and Area B, respectively.

In Area A, the majority of surface grab samples had cadmium concentrations below the TEC (0.99 mg/kg). Concentrations exceeding the TEC were detected in surface grab samples at five locations (RB15-02, -03, -04, -06, and -13). In the core samples, cadmium concentrations exceeding the TEC were detected in at least one depth interval at nine locations (RB15-01, -02, -03, -04, -12, -13, -14, -15, and -16). Of these locations, concentrations exceeding the PEC (4.98 mg/kg) were detected in at least one core depth interval at three locations (RB15-01, -02, and -03); with the concentration exceeding three times the PEC in the top two core depth intervals at location RB15-03. The maximum cadmium concentration (56.3 mg/kg) was detected in the 1-3 ft interval at RB15-03.

In Area B, the surface samples had concentrations below the TEC at 10 of the 11 locations, with RB15-20 being the lone exception. No surface grab samples had concentrations exceeding the PEC. In the core samples, cadmium concentrations exceeding the PEC were detected in at least one depth interval at six locations (RB15-20, -21, -22, -23, -24, and -27). Concentrations exceeding three times the PEC were detected in at least one depth interval at four of these locations (RB15-20, -22, -23, and -27), and concentrations exceeding twice the PEC were also detected in depth intervals at one additional location (RB15-24). Cadmium concentrations exceeded twice the PEC for all of the core depth intervals that were analyzed from location RB15-23.

Chromium

Figures 3-5A and 3-5B show the distribution of chromium SQG exceedances in Area A and Area B, respectively.

In Area A, the majority of locations had chromium concentrations in surface grab samples that were less than the TEC (43.4 mg/kg). Chromium concentrations exceeded the TEC in surface grab samples at four locations (RB15-02, 04, -14, and -16), with the concentration at one of these locations (RB15-04) having a concentration that exceeded the PEC (111 mg/kg). In the core samples, chromium concentrations exceeded the TEC in at least one subsurface depth interval at eight locations (RB15-01, -02, -03, -04, -07, -11, -12, and -13). Of these locations, chromium concentrations exceeded the PEC in at least one core depth interval at four locations (RB15-01, -03, -04, and -12), with the concentrations exceeding twice the PEC in the 1-3 ft interval at RB15-03 and the 0-1 ft interval from RB15-04.

Two locations in Area B had surface grab samples with chromium concentrations that exceeded the TEC (RB15-20 and -28), with one of these locations exceeding the PEC (RB15-28). Six locations in Area B had at least one core depth interval with a chromium concentration that exceeded the PEC (RB15-20, -21, -22, -23, -24, and -27), and one additional location had one core depth interval with a chromium concentration that exceeded the TEC (RB15-19). Of the locations with PEC exceedances from core samples, chromium concentrations exceeded twice the PEC in samples from the 1-3 ft and 3-5 ft depth intervals at RB15-23, and three times the PEC in samples from the 0-1 ft and 1-2 ft depth intervals at RB15-20. The maximum chromium concentration (683 mg/kg) was detected in the 1-2 ft depth interval from RB15-20 near the U.S. Army Corps of Engineers facility at Historic Fort Wayne.

Copper

Figures 3-6A and 3-6B show the distribution of copper SQG exceedances in Area A and Area B, respectively.

In Area A, 12 of the 16 locations (RB15-01, -02, -03, -04, -06, -08, -09, -11, -13, -14, -15, and -16) had surface grab samples with copper concentrations that were greater than the TEC (31.6 mg/kg). The copper concentration exceeded three times the PEC (149 mg/kg) in the surface grab sample at location RB15-04. No other surface grab samples in Area A exceeded the copper PEC. In the core samples, copper concentrations exceeded the PEC in at least one depth interval at eight locations (RB15-01, -02, -03, -04, -12, -14, -15, and -16). Of these locations with PEC exceedances for copper, concentrations exceeded twice the PEC for at least one depth interval at three locations (RB15-02, -03, and -04), of which one location (RB15-04) had a concentration exceeding three times the PEC in the 0-1 ft interval.

All but two of the surface grab samples collected in Area B had copper concentrations that exceeded the TEC, with RB15-25 and -26 being the two exceptions. Surface grab samples in Area B exceeded the PEC at three locations (RB15-18, -19, and -20), of which two locations had concentrations exceeding three times the PEC (RB15-18 and -20). In the core samples, copper concentrations exceeded three times the PEC in at least one depth interval at six locations (RB15-20, -21, -22, -23, -24, and -27), and the copper concentration exceeded twice the PEC in one depth interval at one additional location (RB15-19). Copper concentrations exceeded at least twice the PEC in all of the depth intervals that were analyzed from the cores at four locations (RB15-20, -21, -22, and -23); including exceeding three times the PEC for all core depth intervals at RB15-23. The maximum copper concentration (6,100 mg/kg) was detected near the U.S. Army Corps of Engineers facility at Historic Fort Wayne in the 1-2 ft interval at location RB15-20.

Iron

Figures 3-7A and 3-7B show the distribution of iron SQG exceedances in Area A and Area B, respectively.

In Area A, the iron concentration in surface grab samples was greater than the TEC (20,000 mg/kg) at four locations (RB15-01, -08, -16, and -17). Iron concentrations did not exceed the PEC (40,000 mg/kg) in any of the surface grab samples from Area A. In the core samples, iron concentrations exceeded the TEC in at least one depth interval from cores at 10 locations (RB15-01, -03, -06, -07, -11, -12, -13, -14, -15, and -16). The iron concentration exceeded the PEC in the 0-1 ft interval at location RB15-14, which was the maximum iron concentration (50,600 mg/kg) that was detected.

In Area B, surface grab samples at three locations (RB15-20, -24, and -28) had iron concentrations above the TEC. In the core samples, iron concentrations exceeded the TEC in at least one depth interval at six locations (RB15-20, -22, -23, -24, -27, and -28), with iron concentrations exceeding the TEC for all of the core depth intervals that were analyzed at two locations (RB15-20 and -23). Iron concentrations did not exceed the PEC in any of the samples that were analyzed in Area B.

Lead

Figures 3-8A and 3-8B show the distribution of lead SQG exceedances in Area A and Area B, respectively.

In Area A, 14 of the 16 surface grab samples had lead concentrations greater than the TEC (35.8 mg/kg), with RB15-10 and -17 being the two exceptions. Lead concentrations exceeded the PEC (128 mg/kg) in surface grab samples at five locations (RB15-02, -04, -05, -11, and -14), which includes a lead concentration exceeding three times the PEC in the surface sample at RB15-04. In the core samples, lead concentrations exceeded three times the PEC in at least one depth interval at eight locations (RB15-01, -02, -03, -04, -12, -13, -14, and -16). In addition to these locations, a lead concentration exceeding twice the PEC was also detected at RB15-15, and a lead concentration exceeding the PEC was detected in the 0-1 ft interval at RB15-07.

Lead concentrations in surface grab samples in Area B exceeded the TEC at all but three locations, with RB15-25, -26, and -27 being the exceptions. Lead concentrations exceeded the PEC in surface grab samples from three locations (RB15-19, -20, and -28), of which one exceeded three times the PEC (RB15-28). In the core samples, lead concentrations exceeded three times the PEC in at least one depth interval at five locations (RB15-20, -22, -23, -24, and -27). In addition to these locations, lead concentrations exceeding twice the PEC were detected in all of the core intervals at location RB15-21, and a lead concentration exceeding the PEC was detected in the 0-1 ft interval at RB15-19. Lead concentrations exceeded three times the PEC in all of the depth intervals that were analyzed from location RB15-23. The maximum lead concentration (1,970 mg/kg) was detected in the surface grab sample from location RB15-28 near Zug Island.

Mercury

Figures 3-9A and 3-9B show the distribution of mercury SQG exceedances in Area A and Area B, respectively.

In Area A, surface grab samples at eight locations (RB15-01, -02, -04, -06, -09, -13, -14, and -15) had mercury concentrations greater than the TEC (0.18 mg/kg). Of these locations, mercury concentrations exceeding the PEC (1.06 mg/kg) were detected in surface grab samples at three locations (RB15-01, -04, and -06), one of which exceeded twice the PEC (RB15-06). In the core samples, mercury concentrations exceeding three times the PEC were detected in at least one depth interval at three locations (RB15-03, -04, and -12), and concentrations exceeding twice the PEC were also detected in at least one depth interval at four additional locations (RB15-02, -14, -15, and -16).

In Area B, mercury concentrations in surface grab samples exceeded the TEC at five locations (RB15-19, -20, -22, -27, and -28), of which one location (RB15-19) exceeded three times the PEC. No other location in Area B had a mercury PEC exceedance in the surface grab sample. In the cores, mercury concentrations exceeding three times the PEC were detected in at least one depth interval at five locations (RB15-20, -22, -23, -24, and -27). Mercury concentrations detected in the core from location RB15-23 exceeded at least twice the PEC for all of the depth intervals that were analyzed. The maximum mercury concentration (16.5 mg/kg) was detected in the surface grab sample at location RB15-19.

Nickel

Figures 3-10A and 3-10B show the distribution of nickel SQG exceedances in Area A and Area B, respectively.

In Area A, the nickel concentrations in surface grab samples were greater than the TEC (22.7 mg/kg) at seven locations (RB15-01, -02, -03, -04, -09, -11, and -17). Nickel concentrations were below the PEC (48.6 mg/kg) for all the surface grab samples in Area A. The majority of locations had core samples with nickel concentrations that exceeded the TEC in at least one depth interval. Five locations had at least one core sample depth interval with a concentration that exceeded the PEC (RB15-01, -02, -03, -04, and -13). The nickel concentration exceeded three times the PEC in the 0-1 ft interval of the core from RB15-04 and exceeded twice the PEC in the 1-3 ft interval of the core from RB15-03. The maximum nickel concentration (159 mg/kg) was detected in the 0-1 ft interval at location RB15-04.

In Area B, nickel concentrations in surface grab samples were above the TEC at five locations (RB15-19, -20, -22, -24, and -28). Nickel concentrations did not exceed the PEC in any of the surface grab samples in Area B. The majority of core samples collected in Area B had nickel concentrations at or above the TEC. Core samples from three locations had nickel concentrations that exceeded twice the PEC in at least one depth interval (RB15-20, -22, and -23). Nickel concentrations exceeding the PEC were also detected in at least one interval at two additional locations (RB15-24 and -27). Nickel concentrations exceeded the PEC in all of the depth intervals that were analyzed from locations RB15-22 and -23.

Silver

Figures 3-11A and 3-11B show the distribution of silver SQG exceedances in Area A and Area B, respectively.

In Area A, one surface grab sample had a silver concentration that exceeded three times the PEC (2.2 mg/kg) (RB15-04) and one additional location also had a silver concentration that exceeded the PEC (RB15-02). Silver concentrations in all other surface grab samples in Area A were below the TEC (1.6 mg/kg). The majority of samples from the cores in Area A had silver concentrations that were below the TEC. Silver concentrations exceeding the PEC were detected in at least one depth interval from cores at five locations (RB15-01, -02, -03, -04, and -15). Of these PEC exceedances, silver concentrations exceeding three times the PEC were detected in one interval each at locations RB15-03 and -04. Concentrations exceeding twice the PEC were also detected in at least one core interval at locations RB15-01 and -02. The maximum silver concentration was detected in the 0-1 ft interval at RB15-04.

In Area B, the silver concentration exceeded the TEC in the surface grab sample from one location (RB15-28). Silver concentrations in surface grab samples in Area B were all below the PEC. In the cores, silver concentrations exceeding the PEC were detected in at least one depth interval at five locations (RB15-20, -22, -23, -24, and -27). Of these locations, a silver concentration exceeding three times the PEC was detected at one location (RB15-20), and silver concentrations exceeding twice the PEC were also detected in at least one depth interval at three additional locations (RB15-22, -23, and -24).

Zinc

Figures 3-12A and 3-12B show the distribution of zinc SQG exceedances in Area A and Area B, respectively.

In Area A, surface grab samples from 10 locations (RB15-01, -02, -03, -04, -09, -11, -13, -14, -15, and -16) had zinc concentrations that exceeded the TEC (121 mg/kg). Zinc concentrations did not exceed the PEC (459 mg/kg) at any of the surface grab samples in Area A. In the core samples, zinc concentrations exceeding the PEC were detected in at least one depth interval at eight locations (RB15-01, -02, -03, -04, -12, -13, -14, and -16). A zinc concentration exceeding three times the PEC was detected in the 3-5 ft depth interval at RB15-03.

In Area B, zinc concentrations exceeded the TEC in surface grab samples from seven locations (RB15-19, -20, -21, -22, -23, -24, and -28). One location in Area B had a surface grab sample with a zinc concentration that exceeded twice the PEC (RB15-20); surface grab samples from the remaining locations in Area B were below the PEC. In the core samples, zinc concentrations exceeding three times the PEC were detected in at least one depth interval at five locations (RB15-20, -21, -22, -23, and -24). Additionally, a zinc concentration exceeding twice the PEC was also detected in one depth interval at location RB15-27. Zinc concentrations exceeded the PEC for all of the depth intervals that were analyzed from the core samples at four locations (RB15-20, -21, -22, and -23), including one location where zinc concentrations exceeded three times the PEC for all of the core intervals that were analyzed (RB15-23). The maximum zinc concentration (14,500 mg/kg) was detected in the 1-2 ft interval from the core at RB15-20.

3.2.3.7 Ratio of Simultaneously Extracted Metals to Acid Volatile Sulfide

A total of 27 surface grab samples and 3 field duplicates were submitted for the ratio of SEM to AVS analysis. The SEM/AVS ratio was calculated for samples from 17 of the 30 samples that were submitted for analysis, but could not be calculated for the remaining 13 samples (RB15-04, -06, -07, -08, -08FD, -09FD, -10, -11, -16, -17, -18, -19, and -25) because AVS was not detected. The sample and the FD from location RB15-02 each had an SEM/AVS ratio greater than 1. This indicates that this metal may be bioavailable and there is potential for toxicity to benthic organisms. Concentrations of lead and silver exceeded their respective PECs in the surface sample from RB15-02, and concentrations of cadmium, chromium, copper, mercury, nickel and zinc exceeded their respective TECs but were below their PECs. All SEM/AVS results are presented in Table 3-7. These data were used for derivation of the ESBTUs presented in Chapter 4.

3.2.3.8 Petroleum Hydrocarbons

Results for DRO and ORO are presented in Table 3-8. The highest concentration of DRO (C_{10}-C_{20}) was detected in the surface grab sample from location RB15-20 (1,200 mg/kg). The highest concentration of ORO (C_{20}-C_{36}) was also detected in the surface grab sample from RB15-20 (6,700 mg/kg).

DRO (C_{10}-C_{20}) and ORO (C_{20}-C_{36}) concentrations were summed (by location) to create a total petroleum hydrocarbon (TPH) concentration (TPH [DRO+ORO]) for each location. Figure 3-13 presents the distribution of TPH (DRO+ORO) results in the Riverbend Area. For the evaluation purposes of this report, TPH (DRO+ORO) sample results were compared to values of 100 mg/kg, 1,000 mg/kg, 5,000 mg/kg, and 10,000 mg/kg. Six locations in Area A had TPH (DRO+ORO) values greater than 1,000 mg/kg and less than 5,000 mg/kg (RB15-01, 02, -03, -04, -11, and -15). In Area B, one location had a TPH value greater than 5,000 mg/kg (RB15-20) and one location had a TPH value greater than 1,000 mg/kg and less than 5,000 mg/kg (RB15-24).

DRO and ORO Results Compared to Sample-Specific Risk Screening Levels

At present, there are no recognized cleanup goals for petroleum in sediment that are protective of aquatic receptors. A report prepared for the Massachusetts Department of Environmental Protection – Office of Research and Standards, titled *Sediment Toxicity of Petroleum Hydrocarbon Fractions* (Battelle 2007), proposes an approach for the development of sediment benchmarks based on the equilibrium partitioning theory. This theory, "states that the toxicity of hydrocarbons in sediments to benthic organisms is caused by the hydrocarbons that partition from the organic fraction of sediment particles into pore water and from pore water into the tissues of sediment-dwelling organisms" (Battelle 2007). Equilibrium partitioning sediment benchmarks were derived for fractions (classes or groupings of compounds with similar chemical and toxicological properties) using the final chronic aquatic toxicity value (derived in Battelle 2007 based on a logarithmic relationship between existing toxicological data and known values of the octanol-water partition coefficient), the sediment organic carbon/water partition coefficient, and the fraction of organic carbon in sediment.

There are uncertainties in using the equilibrium partitioning theory to develop sediment benchmarks for petroleum, such as the wide range of aromatic hydrocarbon toxicity data for both marine and freshwater species, as well as various test durations. Additionally, the aqueous solubility of hydrocarbons used in the DRO and ORO fractions are below the estimated acute toxicity values; the benchmarks are conservative. Where the benchmarks are exceeded, it is "difficult to distinguish between toxicological effects and potential physical impacts," and further site evaluation is necessary (Battelle 2007).

Sediment benchmarks were derived using the following equation:

$$\text{Sediment Benchmark (mg/kg)} = K_{oc} \text{ x FCV x } f_{oc} \text{ (0.001)}$$

Where:

K_{oc} = sediment organic carbon/water partition coefficient
FCV = final chronic value
f_{oc} = fraction of organic carbon in sediment. An f_{oc} of 0.1 percent (0.001) was used to give the most conservative estimated benchmark.

The sediment benchmarks presented in the following table were used to evaluate DRO and ORO results in the Riverbend Area:

Hydrocarbon Fraction	Geometric Mean Log K_{ow}	K_{oc}	Final Chronic Value (µg/L)	Sediment Benchmark (mg/kg oc)
$C_{13} – C_{18}$ (DRO)	8.57	1.10 x 10^8	0.05[a]	5543
$C_{19} – C_{36}$ (ORO)	11.64	8.32 x 10^{10}	0.0001[a]	9883

Source: Table 6, Sediment Toxicity of Petroleum Hydrocarbon Fractions (Battelle 2007)

Notes:
K_{ow}: octanol-water partition coefficient
K_{oc}: sediment organic carbon/water partition coefficient
f_{oc}: fraction of organic carbon in sediment
[a] The fraction is not likely toxic because the mean LC_{50} (lethal concentration required to cause mortality to 50 percent of test organisms) exceeds mean aqueous solubility.

Results from the site were provided as DRO C_{10}-C_{20} and ORO C_{20}-C_{36}. Consequently, for the purposes of the comparison of site results with sample-specific risk screening values, DRO C_{13}-C_{18} and ORO C_{19}-C_{36} were used, respectively.

The following equation was used to determine the sample-specific risk screening levels (SSRSLs):

$$\boxed{\text{SSRSL} = \text{Sediment Benchmark (mg/kg) x Fraction of Organic Carbon in Sediment } (f_{oc})}$$

This example calculation uses the DRO (C_{10}-C_{20}) results of surface sample RB15-01:

RB15-01-SURF SSRSL = 5543 mg/kg (sediment benchmark) x 0.0392 (f_{oc} for RB15-01-SURF)
= 217.3 mg/kg

Table 3-8 and Figures 3-14A and 3-14B (DRO) and 3-15A and 3-15B (ORO) present the comparison of results to the calculated DRO and ORO SSRSLs.

Area A

The majority of locations in Area A did not have DRO concentrations exceeding the respective SSRSL. Three locations in Area A (RB15-02, -08, and -11) had DRO concentrations equal to or exceeding the SSRSL. Of these three locations, two (RB15-02 and -11) had DRO concentrations exceeding three times their respective SSRSL. The majority of locations in Area A had ORO concentrations exceeding the respective SSRSL. Five locations had ORO concentrations exceeding three times their SSRSL (RB15-01, -02, -04, -08, and -11); an additional five locations had ORO concentrations exceeding twice their SSRSL (RB15-03, -07, -09, -14, and -15); and two locations had ORO concentrations that exceeded the SSRSL but were less than twice the SSRSL (RB15-06 and -13) (Figures 3-14A and 3-15A).

Area B

The majority of locations in Area B did not have DRO concentrations exceeding the SSRSL. Four locations in Area B had concentrations of DRO in the surface grab that exceeded the respective SSRSL (RB15-18, -19, -20, and -21). Of these four locations, one had an ORO concentration that exceeded three times the SSRSL (RB15-20). The majority of locations in Area B had ORO concentrations exceeding the respective SSRSL, including two locations with ORO concentrations exceeding three times the respective SSRSL (RB15-20 and -21); an additional four locations with ORO concentrations exceeding twice the respective SSRSL (RB15-19, -23, -24, and -28); and three locations with ORO concentrations that exceeded their respective SSRSL but were less than twice the SSRSL (RB15-18, -26, and -27) (Figures 3-14B and 3-15B).

4. EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARKS

PAH 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 pore water 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 POLYCYCLIC AROMATIC HYDROCARBONS

ESBTUs for total 34 PAHs 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 2003a). 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 PAHs' 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 2003a). To better evaluate the results, the following PAH ESBTUs ranges were used: ESBTUs less than 1, between 1 and 7.5, between 7.5 and 10, and equal to or greater than 10. The samples with PAH ESBTUs greater than 1 may be toxic to aquatic life. Of the 103 sediment samples that were analyzed, 27 had a PAH ESBTU less than 1, and 25 samples had a PAH ESBTU equal to or greater than 10 (Table 4-1). Results from the PAH ESBTU calculations are presented in Figures 4-1A and 4-1B.

In Area A, 16 of the 17 locations that were sampled had a PAH ESBTU greater than 1 in at least one depth interval from the core or in the surface grab sample, with the one exception being RB15-10. In the surface grab samples from Area A, PAH ESBTUs were below 1 at five locations (RB15-01, -03, -10, -15, and -17); between 1 and 7.5 at eight locations (RB15-02, -05, -06, -07, -08, -09, -14, and -16); between 7.5 and 10 at one location (RB15-13); and greater than 10 at two locations (RB15-04 and -11). In the core samples, PAH ESBTUs greater than 1 occurred in at least one depth interval at 14 of the 17 locations, with the three exceptions being RB15-06, -07, and -10. A PAH ESBTU greater than 10 occurred in at least one depth interval from cores at 11 locations (RB15-02, -03, -04, -05, -09, -11, -12, -13, -14, -15, and -16). PAH

ESBTUs were greater than 1 in all of the depth intervals that were analyzed from cores at 10 locations (RB15-01, -02, -03, -08, -09, -12, -13, -14, -15, and -16).
In Area B, 9 of the 11 locations that were sampled had a PAH ESBTU greater than 1 in at least one depth interval from the core or in the surface grab sample, with the two exceptions being RB15-25 and -26. In the surface grab samples from Area B, PAH ESBTUs were below 1 in five locations (RB15-22, -23, -24, -25, and -26); between 1 and 7.5 at five locations (RB15-18, -19, -20, -21, and -28); and greater than 10 at one location (RB15-27). In the core samples, PAH ESBTUs greater than 1 occurred in at least one depth interval at 9 of the 11 locations, with the two exceptions being RB15-25 and -26. A PAH ESBTU greater than 10 occurred in at least one depth interval at two locations (RB15-24 and -27), while two additional locations had PAH ESBTUs that were greater than 7.5 in one depth interval each (RB15-22 and -23). PAH ESBTUs were greater than 1 in all of the depth intervals that were analyzed from cores at six locations (RB15-18, -20, -21, -22, -23, and -27).

4.2 METALS

Metal toxicity is evaluated through an indirect estimate of bioavailability based on the concentrations of AVS and SEM, as well as TOC in the sediments. Metal ESBTUs were calculated following the methods outlined in *Procedures for the Derivation of 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 micromoles (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.

ESBTU results for metals exceeded 130 µmol/g_{oc} in the surface grab samples from RB15-04 in Area A and RB15-19 in Area B. The ESBTU for metals also exceeded 130 µmol/g_{oc} in the FD collected from the surface grab sample at RB15-02 in Area B (although FDs are not included on figures elsewhere in this report, RB15-02-SURFFD is indicated on Figure 4-2A for reference). All of the metals ESBTU results were below 3,000 µmol/g_{oc} (Table 4-2, and Figures 4-2A and 4-2B).

5. PROBABLE EFFECTS CONCENTRATION QUOTIENTS

As described in the *Prediction of Sediment Toxicity Using Census-based Freshwater Sediment Quality Guidelines* (EPA 2000) guidance, 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 70 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 the Riverbend Area. Mean PEC-Qs were calculated using the procedure that was established by EPA (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 of seven metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc) based on the available PEC.

$$PEC - Q\ metals = \frac{metal\ concentration\ (in\ dry\ weight)}{corresponding\ PEC\ value}$$

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 (EPA 2000).

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

where n = number of metals in the calculation with available sediment chemistry data and PECs.

PEC-Qs were also calculated for total 17 PAHs 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). Nine of the 17 PAHs have PEC values and were used in the PEC-Q calculation: anthracene; benzo(a)anthracene; benzo(a)pyrene; chrysene; dibenzo(a,h)anthracene; fluoranthene; fluorene; naphthalene; phenanthrene; and pyrene.

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

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

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.

$$mean\ PEC - Q = \frac{mean\ PEC - Q\ metals + PEC - Q\ total\ PAHs + PEC - Q\ total\ PCBs}{n}$$

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

The mean PEC-Q was determined for each sediment sample 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 (EPA 2000).

The mean PEC-Q values for each sample collected are summarized in Table 5-1. The mean PEC-Qs ranged from 0.02 in the surface sample at location RB15-25 to 2,665.16 in the 1-3 ft interval at location RB15-12 (Table 5-1, Figure 5-1A and Figure 5-1B). The mean PEC-Q for each sediment sample was compared to benchmarks of 0.5, 1, and 5.

In the surface grab samples from Area A, mean PEC-Qs were calculated to be: below 0.5 at five locations (RB15-01, 03, -05, -10, and -17); between 0.5 and 1.0 at five locations (RB15-06, -07, -08, -15 and -16); between 1 and 5 at five locations (RB15-02, -04, -09, -13, and -14); and greater than 5 at one location (RB15-11). In the core samples from Area A, 12 of the 17 locations had a mean PEC-Q greater than 1 in at least one depth interval (RB15-01, -02, -03, -04, -05, -09, -11, 12, -13, -14, -15, and -16).

The mean PEC-Q values in the surface grab samples from Area B were calculated to be: less than 0.5 at five locations (RB15-21, -23, -24, -25, and -26); between 0.5 and 1 at one location (RB15-22); between 1 and 5 at four locations (RB15-18, -19, -20, and -28); and greater than 5 at one location (RB15-27). In the core samples from Area B, mean PEC-Qs greater than 1 were calculated for at least one depth interval at 8 of the 11 locations (RB15-19, -20, -21, -22, -23, -24, -27, and -28).

6. SPATIAL ANALYSIS TO DETERMINE HOT SPOTS WITHIN THE RIVERBEND AREA

To determine the location of hot spots within the Riverbend Area of 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); and 3) the calculated PEC-Qs (Chapter 5). Hot spot determination allows for prioritizing areas to be targeted for further investigation or remediation.

Interpolation was performed by using a spatially explicit statistical method called kriging, as described in Section 6.1. Section 6.2 describes the kriging analysis results for concentrations of all constituents, Section 6.3 describes the kriging analysis results for PAH ESBTUs, and Section 6.4 describes the kriging analysis results for PEC-Qs. Section 6.5 describes the priority assessment of hot spots based on all constituents.

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 Mining Visualization System Version 9.89.

Input included each analyte’s concentration at every location, and the results were combined to identify all areas with one or more detections above the respective PEC levels, two times above the PEC levels, 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 7.5, between 7.5 and 10, and equal to or greater than 10, and to identify areas with PEC-Qs between 0.5 and 1 and equal to or greater than 1. Although ESBTUs were also calculated for metals, this data was not included in the model inputs for the spatial analysis because only three results (one of which was an FD) exceeded the thresholds discussed in Section 4.2, and these results occurred within the hot spots identified in Section 6.2.

6.2 MODEL RESULTS FOR ALL CONSTITUENTS IN THE RIVERBEND AREA

Concentrations of all individual constituents were input to the model, and the kriging analysis identified areas with PEC exceedances of total PCBs, total 17 PAHs, and/or each of the 10 metals that have PECs. Four hot spots were identified within the study area where one or more analytes were present in concentrations exceeding the PEC.

Figure 6-1A presents the results for all constituents exceeding their respective PECs in Area A, and Figure 6-1B presents the results for all constituents exceeding their respective PECs in Area B. These figures present the estimated volume of sediment with elevated concentrations of constituents exceeding their respective PECs for each hot spot along with the predominant constituent contributing to the 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. Figures 6-2 through 6-5 provide additional detail on each hot spot, including sample locations and the maximum concentration of each constituent greater than the respective PEC. Hot Spots 1 and 2 are separated by two sample locations that did not have PEC exceedances (RB15-08 and -10); Hot Spots 2 and 3 are separated by one location that did not have a PEC exceedance (RB15-17); and Hot Spots 3 and 4 are separated around two locations that did not have PEC exceedances (RB15-25 and -26).

- **Hot Spot 1**: Hot Spot 1 is in Area A and contains sample locations RB15-01, -02, -03, -04, -05, -06, -07, and -09. It includes the areas adjacent to Joe Louis Arena and West Riverfront Park (Figures 6-1A and 6-2). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 461,000 cubic yards (cy) (Figures 6-1A and 6-2). Constituents for which PEC exceedances occurred within Hot Spot 1 include total 17 PAHs, total PCBs, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. The predominant constituent contributing to elevated concentrations above the PEC is total 17 PAHs; which exceeded three times the PEC at RB15-02, -03, -04, -05, and -09 (Figures 6-1A and 6-2). The maximum concentrations of total PCBs (RB15-01), cadmium (RB15-03), nickel (RB15-04) and silver (RB15-04) identified in the Riverbend Area occurred within Hot Spot 1.

- **Hot Spot 2**: Hot Spot 2 is in Area A and contains sample locations RB15-11, -12, -13, -14, -15, and -16. It includes the areas adjacent to the Ambassador Bridge and Riverside Park (Figures 6-1A and 6-3). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 42,000 cy (Figures 6-1A and 6-3). Constituents for which PEC exceedances occurred within Hot Spot 2 include total 17 PAHs, total PCBs, chromium, copper, iron, lead, mercury, silver, and zinc. The predominant constituent contributing to elevated concentrations above the PEC is total 17 PAHs; which exceeded three times the PEC at RB15-11, -12, -13, -14, -15, and -16 (Figure 6-3). The maximum concentrations of total PAHs (RB15-12) and iron (RB15-14) identified in the Riverbend Area occurred within Hot Spot 2.

- **Hot Spot 3**: Hot Spot 3 is in Area B and contains sample locations RB15-18, -19, -20, -21, -22, -23, and -24. It includes the areas adjacent to the Detroit Terminal of the Nicholson Terminal & Dock Company and Historic Fort Wayne (Figures 6-1B and 6-4). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 163,000 cy (Figures 6-1B and 6-4). Constituents for which PEC exceedances occurred within Hot Spot 3 include total 17 PAHs, total PCBs, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. The predominant constituent contributing to elevated concentrations above the PEC is copper; which was three times the PEC at RB15-18, -21, -22, -23, and -24 (Figure 6-4). The maximum concentrations of arsenic (RB15-24), chromium (RB15-20), copper (RB15-20), mercury (RB15-19), and zinc (RB15-20) identified in the Riverbend Area occurred within Hot Spot 3.

- **Hot Spot 4**: Hot Spot 4 is in Area B and contains sample locations RB15-27 and -28. It is located near the outfall of the Rouge River Old Channel and includes the areas adjacent to the Detroit-Windsor Truck Ferry loading dock and Zug Island (Figures 6-1B and 6-5). The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 83,000 cy (Figures 6-1B and 6-5). Constituents for which PEC exceedances occurred within Hot Spot 4 include total 17 PAHs, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. The predominant constituent contributing to elevated concentrations above the PEC is total 17 PAHs; which exceeded three times the PEC at RB15-27 (Figure 6-5). The maximum concentration of lead (RB15-28) identified in the Riverbend Area occurred within Hot Spot 4.

6.3 MODEL RESULTS FOR PAH EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARK TOXIC UNITS FOR THE RIVERBEND AREA

A kriging analysis was performed to identify areas with PAH ESBTUs equal to or greater than 1 within some of the hot spot areas that were identified when all constituents were kriged (Section 6.2). Figure 6-6A presents the results for PAH ESBTUs exceeding 1 overlain with the identified hot spots in Area A. Figure 6-6B presents the results for PAH ESBTUs exceeding 1 overlain with the identified hot spots in Area B.

6.3.1 Spatial Analysis for PAH ESBTUs in Area A

The spatial analysis for PAH ESBTUs in Area A identified two areas and 16 sample locations where sediment samples had PAH ESBTUs greater than 1. Figure 6-6A presents the areas identified along with the maximum PAH ESBTU at each sample location, as well as the overlap of the spatial analysis for PAH ESBTUs in Area A and identified hot spots.

The areas with elevated PAH ESBTUs in Area A are primarily in the same locations as Hot Spots 1 and 2 that were identified in Section 6.2 (Figures 6-1A and 6-6A). The two exceptions to this are: sample location RB15-08 falls just outside of Hot Spot 1 but has a maximum PAH ESBTU of 2.49, and sample location RB15-17 is downstream of Hot Spot 2 but has a maximum PAH ESBTU of 3.57 (Figure 6-6A). Within the area of Hot Spot 1, maximum PAH ESBTUs were calculated to be: between 1 and 7.5 at sample locations RB15-01, -06, -07, and -08; and greater than 10 at sample locations RB15-02, -03, -04, -05, and -09 (Figure 6-6A). The maximum PAH ESBTUs calculated at sample locations within Hot Spot 2 were all greater than 10 (Figure 6-6A). The highest PAH ESBTU in Area A (202.8) was calculated for the 0-1 ft interval at location RB15-12 in Hot Spot 2.

6.3.2 Spatial Analysis for PAH ESBTUs in Area B

The spatial analysis for PAH ESBTUs in Area B identified two areas, nine sample locations, where sediment samples had PAH ESBTUs greater than 1. Figure 6-6B presents the areas identified along with the maximum PAH ESBTU at each sample location, as well as the overlap of the spatial analysis for PAH ESBTUs in Area B and identified hot spots.

Both of the areas with elevated PAH ESBTUs in Area B are in the same locations as the identified hot spots in Area B (Figures 6-1B and 6-6B). Within the area of Hot Spot 3, maximum PAH ESBTUs were calculated to be: between 1 and 7.5 at sample locations RB15-18, -19, -20, and -21; between 7.5 and 10 at sample locations RB15-22 and -23; and greater than 10 at sample location RB15-24 (Figure 6-6B). Within the area of Hot Spot 4, the maximum PAH ESBTUs were calculated to be between 1 and 7.5 at RB15-28 and greater than 10 at RB15-27 (Figure 6-6B). The highest PAH ESBTU in Area B (123.6) was calculated for the surface grab sample at location RB15-27 within Hot Spot 4.

6.4 MODEL RESULTS FOR PROBABLE EFFECTS CONCENTRATION QUOTIENTS FOR THE RIVERBEND AREA

In addition to all constituent concentrations and PAH ESBTUs, PEC-Qs were also modeled. The kriging analysis identified areas with PEC-Qs equal to or greater than 0.5 within some of the hot spot areas that were identified when all constituents were kriged (Section 6.2). Figure 6-7A presents the results for PEC-Qs exceeding 0.5 overlain with the identified hot spots in Area A; Figure 6-7B presents the results for PEC-Qs exceeding 0.5 overlain with the identified hot spots in Area B.

6.4.1 Spatial Analysis for PEC-Qs in Area A

The spatial analysis for PEC-Qs in Area A identified three areas, 15 sample locations, where sediment samples had PEC-Qs greater than 0.5. Figure 6-7A presents the areas identified in Area A and the maximum PEC-Q value at each sample location, as well as the overlap of the spatial analysis for PEC-Qs in Area A and identified hot spots.

Most of the areas with elevated PEC-Qs in Area A were in the same location as Hot Spots 1 and 2 (Figure 6-7A). The only exceptions were that there is a gap within Hot Spot 1 where the predicted PEC-Q values are below 0.5 and that sample location RB15-08, which falls just outside of Hot Spot 1, had a maximum calculated PEC-Q of between 0.5 and 1 in the surface grab sample. Within the area of Hot Spot 1, the maximum PEC-Qs were calculated to be: between 0.5 and 1 at sample locations RB15-06 and -07; between 1 and 5 at sample locations RB15-03, -05, and -09; and greater than 5 at sample locations RB15-01, -02, and -04 (Figure 6-7A). The maximum PEC-Qs calculated for sample locations within Hot Spot 2 were all greater than 5 (Figure 6-7A). The highest PEC-Q in Area A (2,665) was calculated for the 1-3 ft interval at location RB15-12 within the area of Hot Spot 2.

6.4.2 Spatial Analysis for PEC-Qs in Area B

The spatial analysis for PEC-Qs in Area B identified two areas, nine sample locations, where sediment samples had PEC-Qs greater than 0.5. Figure 6-7B presents the areas identified in Area B and the maximum PEC-Q value at each sample location, as well as the overlap of the spatial analysis for PEC-Qs in Area B and the hot spots identified in Section 6.2.

The areas with elevated PEC-Qs in Area B overlapped with Hot Spots 3 and 4 (Figure 6-7B). Within the area of Hot Spot 3, the maximum PEC-Qs were calculated to be: between 1 and 5 at sample locations RB15-18, -19, and -21; and greater than 5 at sample locations RB15-20, -22, -23, and -24 (Figure 6-7B). Within the area of Hot Spot 4, the maximum PEC-Qs were calculated to be between 1 and 5 at sampling location RB15-28 and greater than 5 at sampling location RB15-27 (Figure 6-7B). The highest PEC-Q in Area B (29.0) was calculated in the 5-6.5 ft depth interval at location RB15-27 within the area of Hot Spot 4.

6.5 DETERMINATION OF PREDOMINANT HOT SPOTS BASED ON ALL CONSTITUENTS IN THE RIVERBEND AREA

The hot spot areas identified in Section 6.2 can be prioritized for further investigation and potential remediation efforts when considered with the results of the spatial analyses of PAH ESBTUs and PEC-Qs. Hot spots are further categorized as Level 1, Level 2, or Level 3 based on the following criteria:

Level 1 – highest impact
- Contaminant results are ≥ 3 x PEC **OR**
- PEC-Q ≥ 5, **OR**
- ESBTU ≥ 7.5.

Level 2
- Contaminant results are ≥ 3 x PEC **OR**
- PEC-Q ≥ 1, **OR**
- ESBTU ≥ 7.5.

Level 3 – lowest impact
- Contaminant results are ≥ 3 x PEC **OR**
- PEC-Q ≥ 0.5, **OR**
- ESBTU ≥ 1.

This categorization is based on the presence of elevated levels of contaminants and is not a comparative evaluation of the impact of different classes of contaminants. Level 1 hot spot areas have the largest estimated volumes of sediment with COCs exceeding the PEC. Level 3 hot spot areas have less elevated contaminant concentrations and, in some cases, smaller estimated sediment volumes exceeding the PEC. This section presents additional details on each of the four hot spot areas, presented within their respective levels.

6.5.1 Level 1 Hot Spots

To be considered Level 1, hot spots must have at least one of the following three conditions: a contaminant result that is equal to or greater than three times the respective PEC, a PEC-Q value equal to or greater than 5, or an ESBTU equal to or greater than 7.5. Hot Spots 1, 2, 3, and 4 all meet the Level 1 criteria.

6.5.1.1 Hot Spot 1

Hot Spot 1 includes sample locations RB15-01, -02, -03, -4, -05, -06, -07, and -09 (Figure 6-2). The COCs for this hot spot area are total PCBs, total 17 PAHs, and eight metals (cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc). The model estimates that 80 percent of the hot spot area has constituent concentrations exceeding three times the PEC.

Total PCBs concentrations exceeded the PEC at five of the eight sample locations in Hot Spot 1. Concentrations of total PCBs exceeded three times the PEC at sample locations RB15-01 and -02 (Figure 6-2). Of the intervals analyzed, total PCBs concentrations above the PEC in Hot Spot 1 were present to a maximum depth interval of 3-5 ft (RB15-01). Total 17 PAHs concentrations exceeded the PEC at all eight sample locations in Hot Spot 1. Total 17 PAHs concentrations exceeded three times the PEC at locations RB15-02, -03, -04, -05, and -09. Of the intervals analyzed, total 17 PAHs concentrations above the PEC in Hot Spot 1 were present to a maximum depth interval of 3-5 ft (RB15-01 and -03).

No metals exceeded the PEC at RB15-09. Concentrations of eight metals at RB15-01 and -03; seven metals at RB15-02 and -04; and one metal at RB15-05, -06 and -07 exceeded the PEC. Of the intervals analyzed, metals concentrations above the PEC in Hot Spot 1 were present to a maximum depth interval of 3-5 ft (RB15-01 and -03). The highest concentrations of nickel and silver in the Riverbend Area were detected at RB15-04, the highest concentration of total PCBs in the Riverbend Area was detected at RB15-01, and the highest concentration of cadmium in the Riverbend Area was detected at RB15-03.

Sample locations RB15-01, -06 and -07 had maximum PAH ESBTUs greater than 1 and less than 7.5. Sample locations RB15-02, -03, -04, -05, and -09 had maximum PAH ESBTUs greater than 10. Sample locations RB15-03, -05, and -09 had maximum PEC-Qs greater than 1 and less than 5 (4.75, 2.41, and 1.74, respectively). Sample locations RB15-01, -02, and -04 had maximum PEC-Qs greater than 5 (5.97, 12.58, and 6.24, respectively). In addition, sample location RB14-04 had a metals ESBTU greater than 130 $\mu mol/g_{oc}$, which indicates the location may have adverse biological effects associated with metals.

6.5.1.2 Hot Spot 2

Hot Spot 2 includes sample locations RB15-11, -12, -13, -14, -15, and -16 (Figure 6-3). The COCs for this hot spot area are total PCBs, total 17 PAHs, and eight metals (chromium, copper, iron, lead, mercury, nickel, silver, and zinc). The model estimates that most of the hot spot area has constituent concentrations exceeding three times the PEC.

Concentrations of total 17 PAHs exceeded three times the PEC at all six locations in Hot Spot 2. Maximum concentrations of total PCBs exceeded the PEC at locations RB15-12 and -14, and the maximum concentration of total PCBs exceeded three times the PEC at RB15-13. Of the intervals analyzed, total 17 PAHs and total PCBs concentrations above the PEC in Hot Spot 2 were present to a maximum depth interval of 4-6 ft (RB15-16) and 2.5-3.5 ft (RB15-13), respectively. The highest concentration of total 17 PAHs in the Riverbend Area was detected at location RB15-12.

Concentrations of five metals at RB15-12 and -14, four metals at RB15-15 and -16, three metals at RB15-13, and one metal at RB15-11 exceeded the PEC. The highest concentration of iron in the Riverbend Area was detected at RB15-14. Of the intervals analyzed, metals concentrations above the PEC in Hot Spot 2 were present to a maximum depth interval of either 2-4 ft or 3-4 ft (detected at locations RB15-15 and -16, respectively).

All six of the sample locations in Hot Spot 2 had maximum PAH ESBTUs that were greater than 10. All six of the sample locations in Hot Spot 2 had maximum PEC-Qs greater than 5: 13.05 at RB15-11, 2,665.16 at RB15-12, 18.97 at RB15-13, 19.70 at RB15-14, 17.34 at RB15-15, and 46.60 at RB15-16.

6.5.1.3 Hot Spot 3

Hot Spot 3 includes sample locations RB15-18, -19, -20, -21, -22, -23, and -24 (Figure 6-4). The COCs for this hot spot area are total 17 PAHs, total PCBs, and nine metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. The model estimates that most of the hot spot area has constituent concentrations exceeding three times the PEC.

Maximum concentrations of total 17 PAHs exceeded three times the PEC at five of the locations in Hot Spot 2, and exceeded twice the PEC at the other two locations. Maximum concentrations of total PCBs exceeded the PEC at locations RB15-19, -22, and -24. Of the intervals analyzed, total 17 PAHs and total PCBs concentrations above the PEC in Hot Spot 2 were present to a maximum depth interval of 5-6 ft (RB15-24) and 0-1 ft (RB15-19, 22 and 24), respectively.

Concentrations of eight metals at RB15-20, -22, and -23; nine metals at RB15-24, five metals at RB15-21; four metals at RB15-19; and two metals at RB15-18 exceeded the PEC. The highest concentration of arsenic in the Riverbend Area was detected at RB15-24. The highest concentrations of chromium, copper, and zinc in the Riverbend Area were detected at RB15-20. The highest concentration of mercury in the Riverbend Area was detected at RB15-19. Of the intervals analyzed, metals concentrations above the PEC in Hot Spot 2 were present to a maximum depth interval of either 4-5 ft or 3-5 ft (detected at locations RB15-24 or RB15-22 and -23, respectively).

Sample locations RB15-18, -19, -20, and -21 had maximum PAH ESBTUs greater than 1 and less than 7.5. Sample locations RB15-22 and -23 had maximum PAH ESBTUs between 7.5 and 10. Sample location RB15-24 had a maximum PAH ESBTU greater than 10. Sample locations RB15-18, -19, and -21 had maximum PEC-Qs greater than 1 and less than 5 (1.57, 2.31, and 1.48, respectively). Sample locations RB15-20, 22, -23, and -24 had maximum PEC-Qs greater than 5 (5.04, 5.14, 6.48, and 7.02, respectively). In addition, sample location RB14-19 had a metals ESBTU greater than 130 $\mu mol/g_{oc}$, which indicates the location may have adverse biological effects associated with metals.

6.5.1.4 Hot Spot 4

Hot Spot 4 includes sample locations RB15-27 and -28 (Figure 6-5). The COCs for this hot spot area are total 17 PAHs and eight metals (cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc). The model estimates that most of this hot spot area has constituent concentrations exceeding three times the PEC.

Concentrations of total 17 PAHs exceeded the twice PEC at both sample locations in Hot Spot 4, and exceeded three times the PEC at RB15-27. Of the intervals analyzed, total 17 PAHs concentrations above the PEC in Hot Spot 4 were present to a maximum depth interval of 5-6.5 ft (RB15-27).

Concentrations of eight metals at RB15-27 and two metals at RB15-28 exceeded the PEC (Figure 6-5). The highest concentration of lead in the Riverbend Area was detected at RB15-28. Of the intervals analyzed, metals concentrations above the PEC in Hot Spot 4 were present to a maximum depth interval of 5-6.5 ft (RB15-27).

The maximum PAH ESBTUs were between 1 and 7.5 at RB15-28 and greater than 10 at RB15-27. The maximum PEC-Qs were between 1 and 5 at RB15-28 (1.70) and greater than 5 at RB15-27 (29.00).

6.5.2 Level 2 and Level 3 Hot Spots

The four hot spots identified based on the results of this investigation were all categorized as Level 1; no Level 2 or Level 3 hots spots were identified.

6.6 COMPARISON OF RIVERBEND AREA HOT SPOTS WITH ASSESSMENTS FOR OTHER SECTIONS OF THE DETROIT RIVER AREA OF CONCERN

The Level 1, Level 2 and Level 3 criteria in Section 6.5 were also utilized to categorize hot spots in the Mid/Lower Trenton Channel Assessment of Contaminated Sediments (EA 2015). Different hot spot rating systems were utilized in the Celeron Island Area Assessment of Contaminated Sediments (EA 2014a) and the River Rouge/Ecorse Shoreline Assessment of Contaminated Sediments (EA 2014b). In the Celeron Island Area characterization, hot spots were categorized as low or high impact. Low impact hot spots were defined as areas having concentrations of at least one constituent exceeding its respective PEC, while the high impact designation was applied to hot spots containing concentrations of at least one constituent exceeding three times its respective PEC (EA 2014a). In the River Rouge/Ecorse Shoreline characterization, hot spots were categorized as major if the model predicted that a majority of the area within the hot spot had at least one constituent with a concentration exceeding three times its respective PEC. Hot spots that did not satisfy the criteria to be labeled as major were identified as other hot spots (EA 2014b).

As discussed in the previous sections, four hots spots have been identified in the Riverbend Area, all of which are designated as Level 1. All four of the Riverbend Area hot spots would be identified as high impact hot spots under the criteria utilized in the Celeron Island Area characterization. The four Riverbend Area hot spots would all be identified as major hot spots according to the criteria applied in the River Rouge/Ecorse Shoreline characterization.

In the Mid/Lower Trenton Channel, nine hot spots were identified, of which seven were designated as Level 1, one was designated as Level 2, and one was designated as Level 3 (EA 2015). Seven of the Mid/Lower Trenton Channel hot spots would be identified as high impact under the criteria utilized in the Celeron Island Area characterization, with the remaining two being designated as low impact. If the criteria from the River Rouge/Ecorse Shoreline were applied, four of the Mid/Lower Trenton Channel hot spots would be identified as major hot spots and the remaining five would be identified as other hot spots.

In the Celeron Island Area characterization, seven hot spots were identified, of which four were designated as high impact and three were designated as low impact (EA 2014a). If the criteria described in Section 6.5 were applied to the seven hot spots that were identified in the Celeron Island Area characterization, four of the hot spots would be identified as Level 1 hot spots and three would be identified as Level 3 hot spots. If the criteria from the River Rouge/Ecorse Shoreline characterization were applied, one of the hot spots in the Celeron Island Area would be identified as a major hot spot and the other six would be considered other hot spots.

Three hot spots were identified in the River Rouge/Ecorse Shoreline characterization, of which two hot spots were labeled as major and one hot spot was labeled as other (EA 2014b). If the criteria defined in Section 6.5 were applied to the hot spots identified in the River Rouge/Ecorse Shoreline characterization, all three of the hot spots would be designated as Level 1. If the criteria from the Celeron Island Area characterization were applied to the three hot spots identified in the River Rouge/Ecorse Shoreline characterization, all three would be labeled as high impact hot spots.

7. MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY SAMPLES COLLECTED FROM LOCATIONS NEAR RIVERSIDE PARK

MDEQ provided input on the six sample locations near Riverside Park (RB15-11, -12, -13, -14, -15, and -16) (Figure 7-1). Mr. John Barkach of Great Lakes Environmental Center, Inc. served as the MDEQ representative and was onsite as these samples were collected and processed. During the sample processing, the MDEQ representative selected some of the core sample intervals from these locations near Riverside Park to perform additional chemical analysis, the results of which will be used to support a separate MDEQ project. None of the intervals from the core at RB15-11 were selected by the MDEQ representative for the additional analysis. The MDEQ representative collected some of the extra material from the other five locations to submit for analysis of volatiles, semi-volatiles, total cyanide, Kjeldahl nitrogen, and percent total solids. The results of these analyses are presented in Tables 7-1A, 7-1B, 7-1C, 7-1D, and 7-1E. These results are separate and independent from the analysis discussed in the other sections of this report and are not included in any of the preceding calculations or spatial models.

7.1 RESULTS OF THE MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY ANALYSIS OF RIVERSIDE PARK SAMPLES

The MDEQ analysis included 63 semi-volatiles constituents performed on one sample from each of five locations for a total of five samples, and 72 volatile constituents performed on 15 total samples from five locations. Concentrations of semi-volatile constituents were compared to available TEC and PEC values (MacDonald et al. 2000, WDNR 2003). Details of these results are presented in Tables 7-1A and 7-1B.

A fingerprint analysis following EPA Method 8270 was performed on five of the samples collected by MDEQ (Table 7-1C).

Total cyanide results ranged from 2.7 mg/kg in the 2-4 ft interval of the core from RB15-15, to 1,200 mg/kg collected near the 1.5 ft depth level of RB15-14 (Table 7-1D).

Percent total solids ranged from 58 percent in the 1-2 ft interval of the core from RB15-12, to 81.1 percent near the 4.3 ft depth level of RB15-13 and the 4.2 ft depth level of RB15-15 (Table 7-1D).

Kjeldahl nitrogen ranged from 760 mg/kg in the 2-4 ft interval of the core from RB15-15, to 4,300 mg/kg in the 1-2 ft interval of the core from RB15-12 (Table 7-1E).

8. CONCLUSIONS

Based on the data collected during the Riverbend Area sediment characterization, the Level 1 (highest impact) hot spot areas with elevated concentrations of constituents are: Hot Spot 1 (includes the area adjacent to Joe Louis Arena and West Riverfront Park in Area A); Hot Spot 2 (includes the area adjacent to the Ambassador Bridge and Riverside Park in Area A); Hot Spot 3 (includes the area adjacent to the Delray Public Access Boat Ramp and Historic Fort Wayne in Area B); and Hot Spot 4 (includes the area adjacent to the Detroit-Windsor Truck Ferry and the mouth of the Rouge River Old Channel near Zug Island in Area B) (Figures 6-2 through 6-5). These Level 1 high impact hot spots have an estimated total of approximately 749,000 cy of sediment with constituent concentrations exceeding at least one PEC.

The four hot spots identified in the Riverbend Area were determined to be Level 1 hot spots and should be considered for further investigation. 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 hot spot areas. Further delineation of the extent of sediment with elevated concentrations of constituents is recommended.

The modeling results for all constituents exceeding two or three times the PEC, the PAH ESBTUs, and the PEC-Qs suggest that the hot spot areas should be considered for further investigation and potential remediation within the Riverbend Area. 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.

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Figures

Legend

🟨 Riverbend Area

🟥 Detroit River Area of Concern (AOC)

0 1 2 3 4

Miles

Map Date: 4/12/2016

Basemap: ESRI 2014

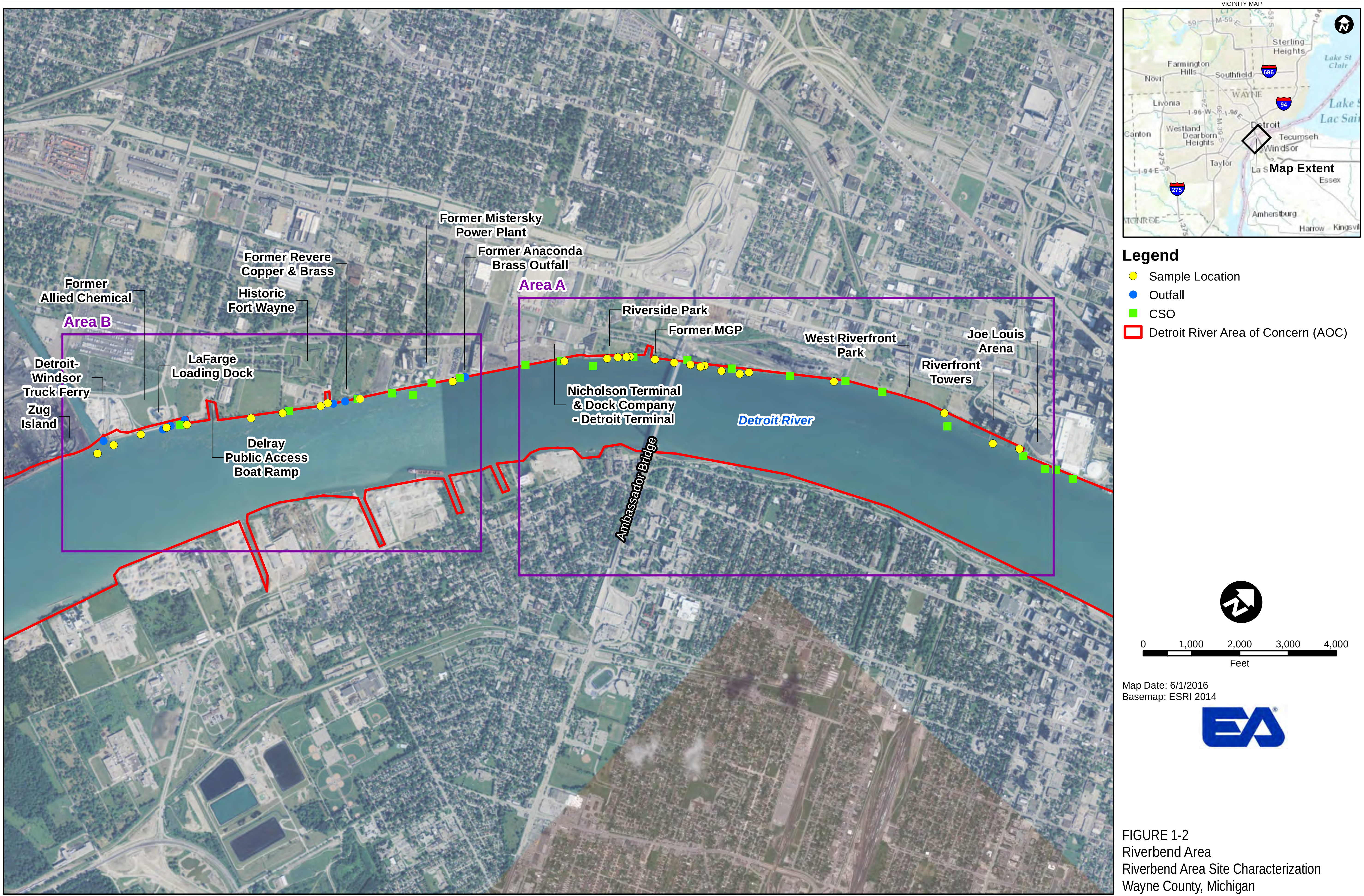
FIGURE 1-1

Project Site Location

Riverbend Area Site Characterization

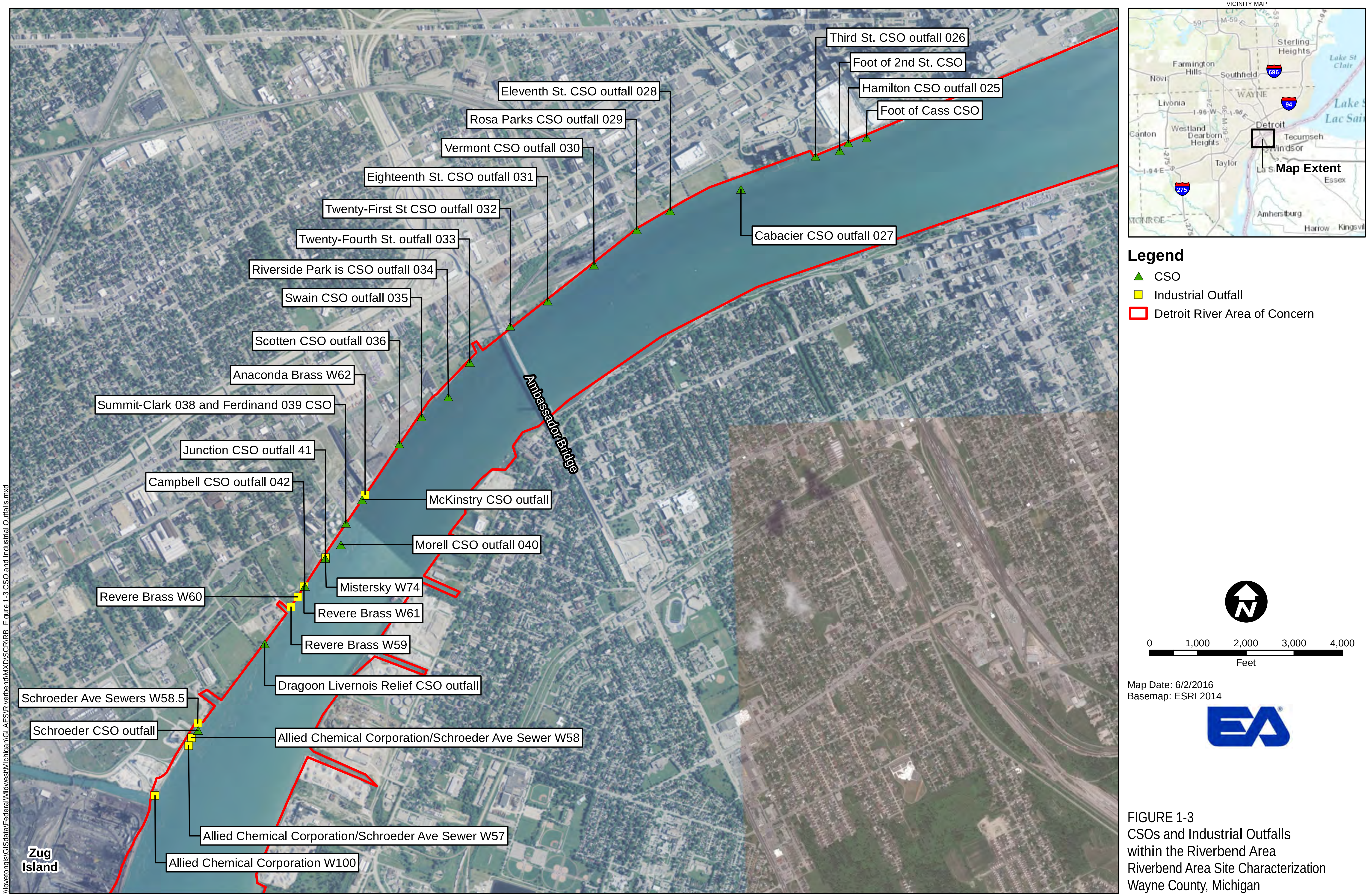
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 1-1 Project Site Location.mxd



Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 1-2
Riverbend Area
Riverbend Area Site Characterization
Wayne County, Michigan

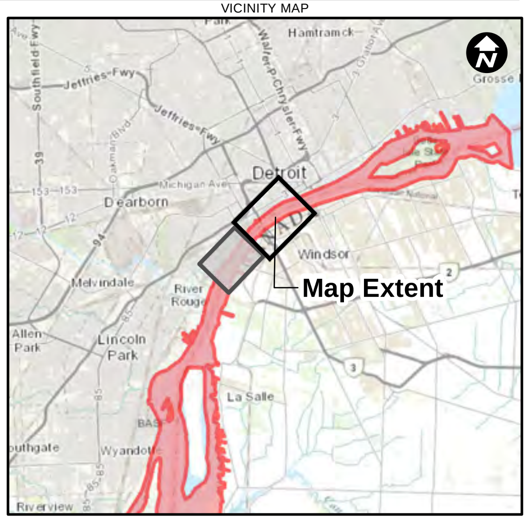


Map Date: 6/2/2016
Basemap: ESRI 2014

FIGURE 1-3
CSOs and Industrial Outfalls
within the Riverbend Area
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovelongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 1-3 CSO and Industrial Outfalls.mxd

VICINITY MAP



Legend

- ● Sample Location
- 🟥 Detroit River Area of Concern (AOC)

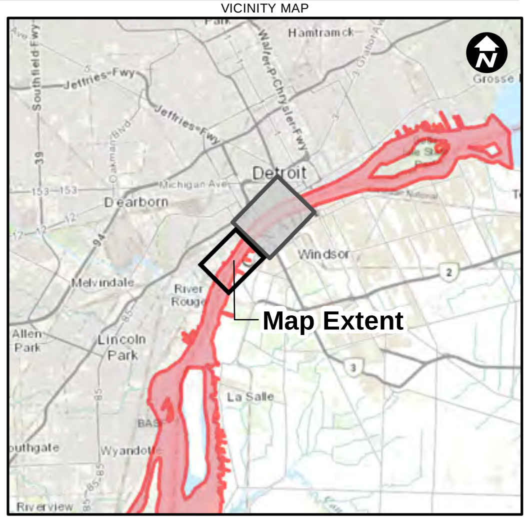
0	500	1,000	1,500	2,000

Feet

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 2-1A
Sample Locations - Area A
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 2-1A Sample Locations Area A.mxd



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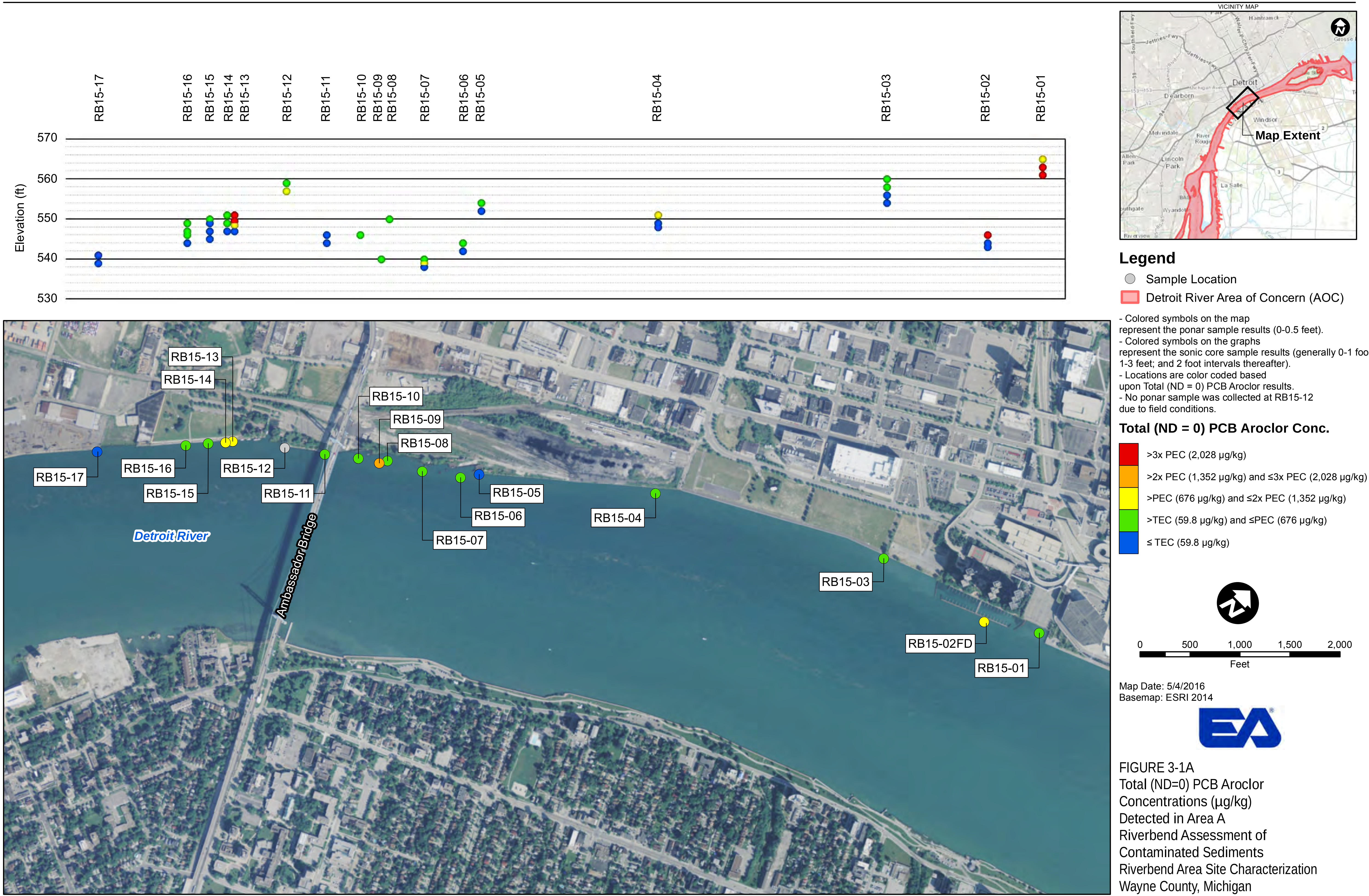
● Sample Location

🟥 Detroit River Area of Concern (AOC)

0 400 800 1,200 1,600
Feet

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 2-1B
Sample Locations - Area B
Riverbend Area Site Characterization
Wayne County, Michigan



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon Total (ND = 0) PCB Aroclor results.
- No ponar sample was collected at RB15-12 due to field conditions.

Total (ND = 0) PCB Aroclor Conc.

🟥 >3x PEC (2,028 μg/kg)

🟧 >2x PEC (1,352 μg/kg) and ≤3x PEC (2,028 μg/kg)

🟨 >PEC (676 μg/kg) and ≤2x PEC (1,352 μg/kg)

🟩 >TEC (59.8 μg/kg) and ≤PEC (676 μg/kg)

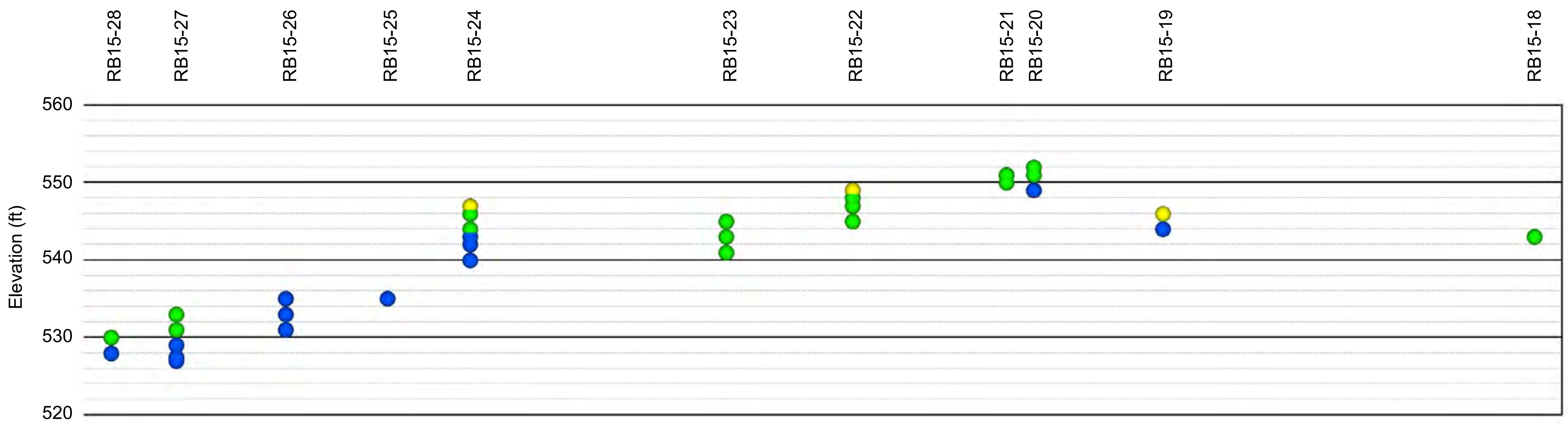
🟦 ≤ TEC (59.8 μg/kg)

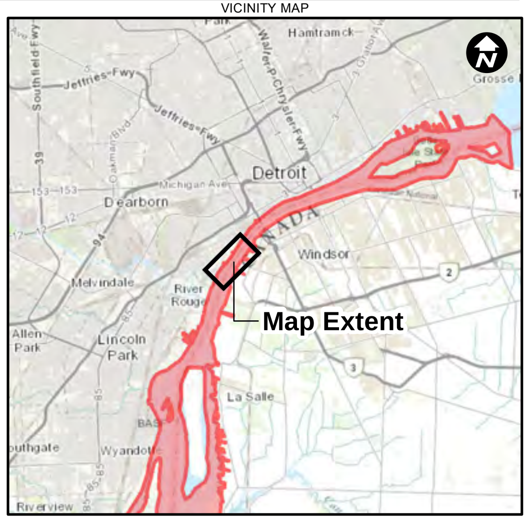
0 500 1,000 1,500 2,000
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-1A
Total (ND=0) PCB Aroclor Concentrations (μg/kg) Detected in Area A
Riverbend Assessment of Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-1A PCB Area A.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon Total (ND = 0) PCB Aroclor results.

Total (ND = 0) PCB Aroclor Conc.

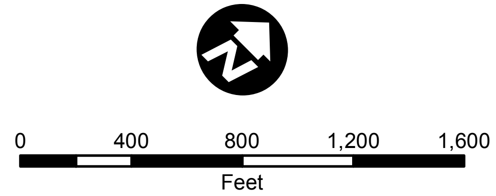
🟥 >3x PEC (2,028 µg/kg)

🟧 >2x PEC (1,352 µg/kg) and ≤3x PEC (2,028 µg/kg)

🟨 >PEC (676 µg/kg) and ≤2x PEC (1,352 µg/kg)

🟩 >TEC (59.8 µg/kg) and ≤PEC (676 µg/kg)

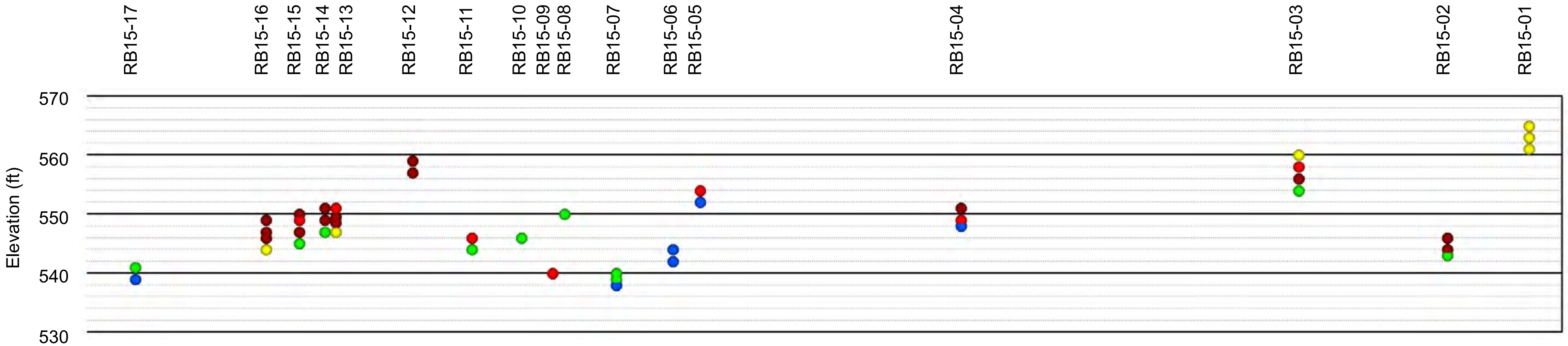
🟦 ≤TEC (59.8 µg/kg)

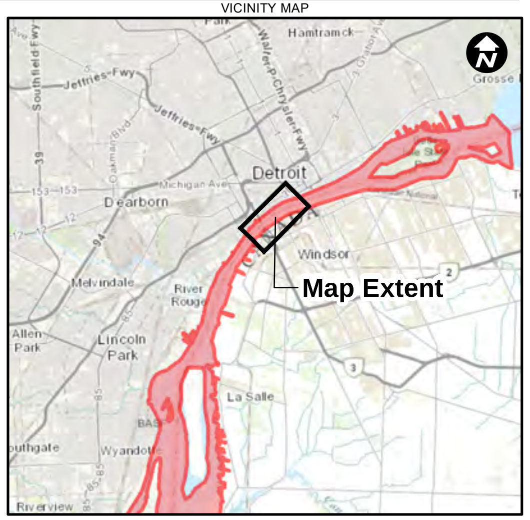


Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-1B
Total (ND=0) PCB Aroclor
Concentrations (µg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-1B PCB Area B.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon Total (ND = ½ RL) 17 PAH results.
- No ponar sample was collected at RB15-12 due to field conditions.

Total (ND = ½ RL) 17 PAHs Concentrations

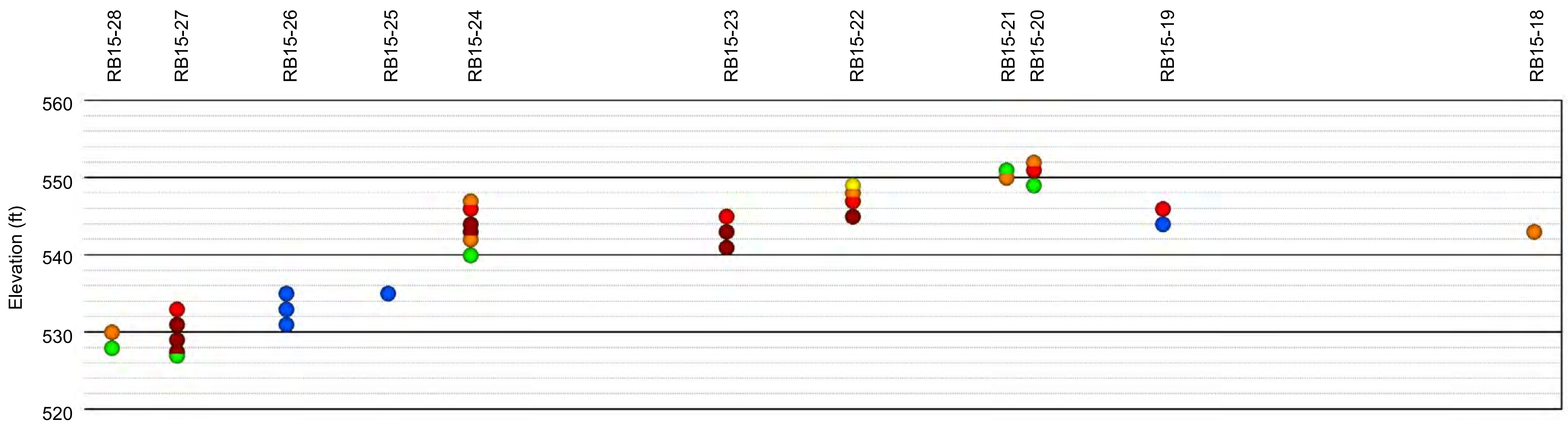
🟥	>10x PEC (228,000 µg/kg)
🟥	>3x PEC (68,400 µg/kg) and ≤10x PEC (228,000 µg/kg)
🟧	>2x PEC (45,600 µg/kg) and ≤3x PEC (68,400 µg/kg)
🟨	>PEC (22,800 µg/kg) and ≤2x PEC (45,600 µg/kg)
🟩	>TEC (1,610 µg/kg) and ≤PEC (22,800 µg/kg)
🟦	≤TEC (1,610 µg/kg)

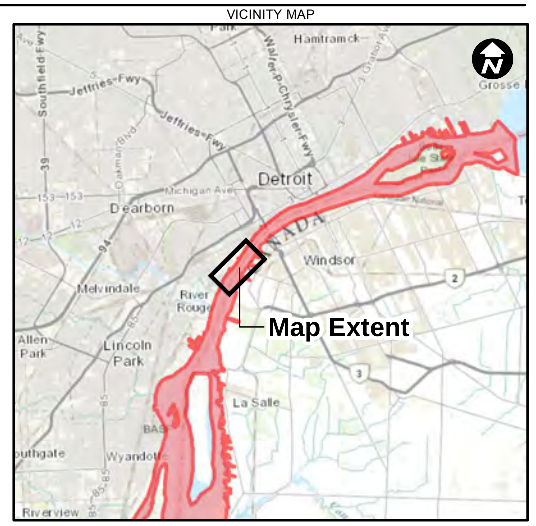
0 500 1,000 1,500 2,000
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-2A
Total (ND= ½ RL) 17 PAHs
Concentrations (µg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-2A PAH17 Area A.mxd





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● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon Total (ND = ½ RL) 17 PAH results.

Total (ND = ½ RL) 17 PAHs Concentrations

🟥	>10x PEC (228,000 µg/kg)
🟥	>3x PEC (68,400 µg/kg) and ≤10x PEC (228,000 µg/kg)
🟧	>2x PEC (45,600 µg/kg) and ≤3x PEC (68,400 µg/kg)
🟨	>PEC (22,800 µg/kg) and ≤2x PEC (45,600 µg/kg)
🟩	>TEC (1,610 µg/kg) and ≤PEC (22,800 µg/kg)
🟦	≤TEC (1,610 µg/kg)

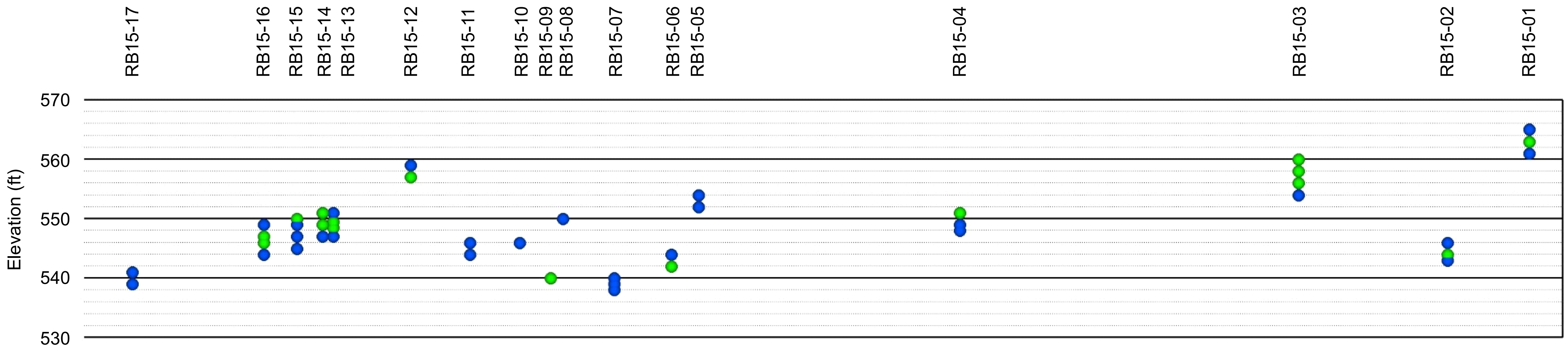
0 400 800 1,200 1,600

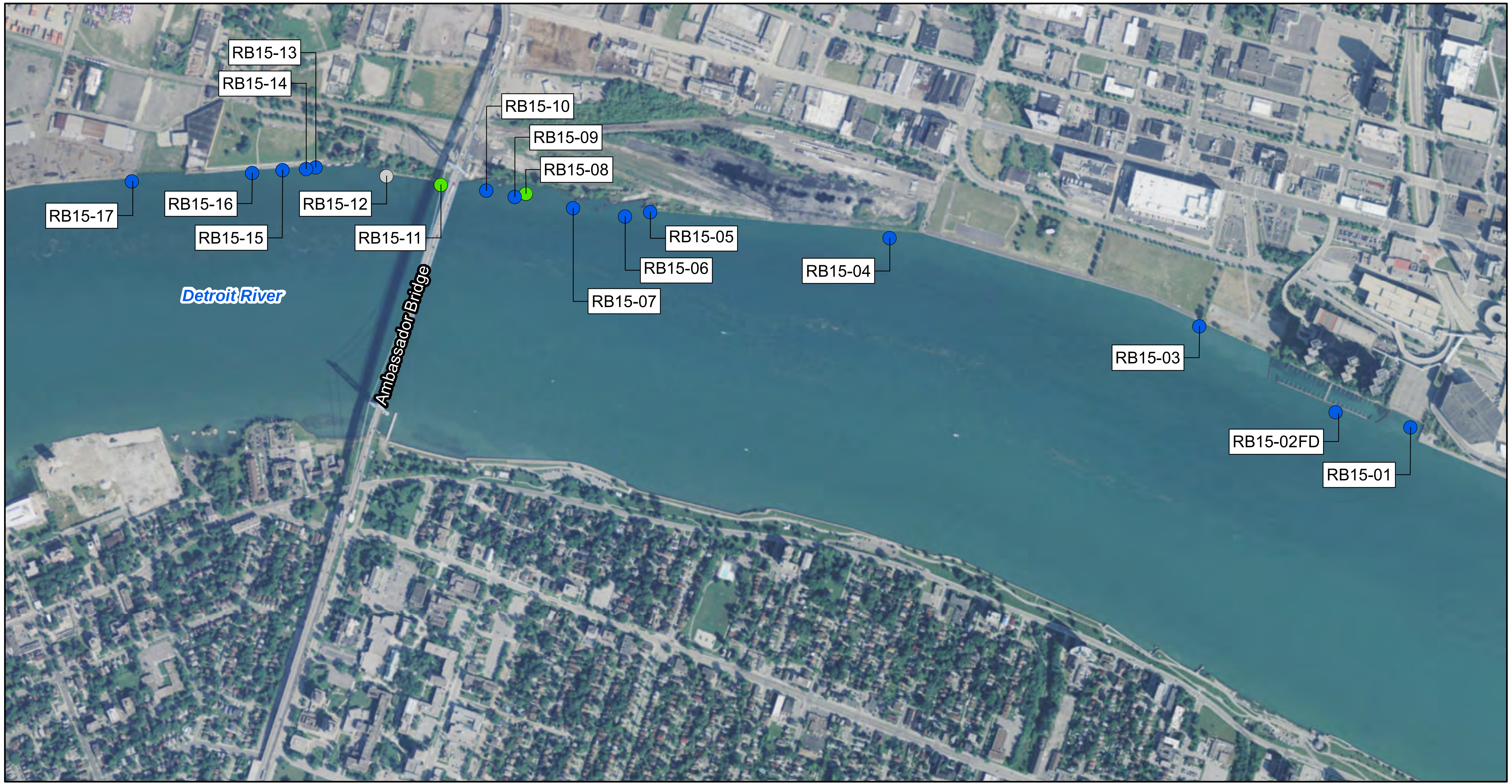
Feet

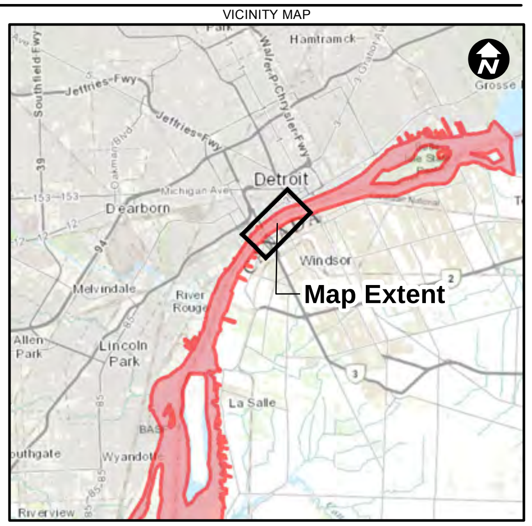
Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-2B
Total (ND= ½ RL) 17 PAHs
Concentrations (µg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-2B PAH17 Area B.mxd







Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon arsenic results.
- No ponar sample was collected at RB15-12 due to field conditions.

Arsenic Concentrations

🟥 >3x PEC (99 mg/kg)

🟧 >2x PEC (66 mg/kg) and ≤3x PEC (99 mg/kg)

🟨 >PEC (33 mg/kg) and ≤2x PEC (66 mg/kg)

🟩 >TEC (9.79 mg/kg) and ≤PEC (33 mg/kg)

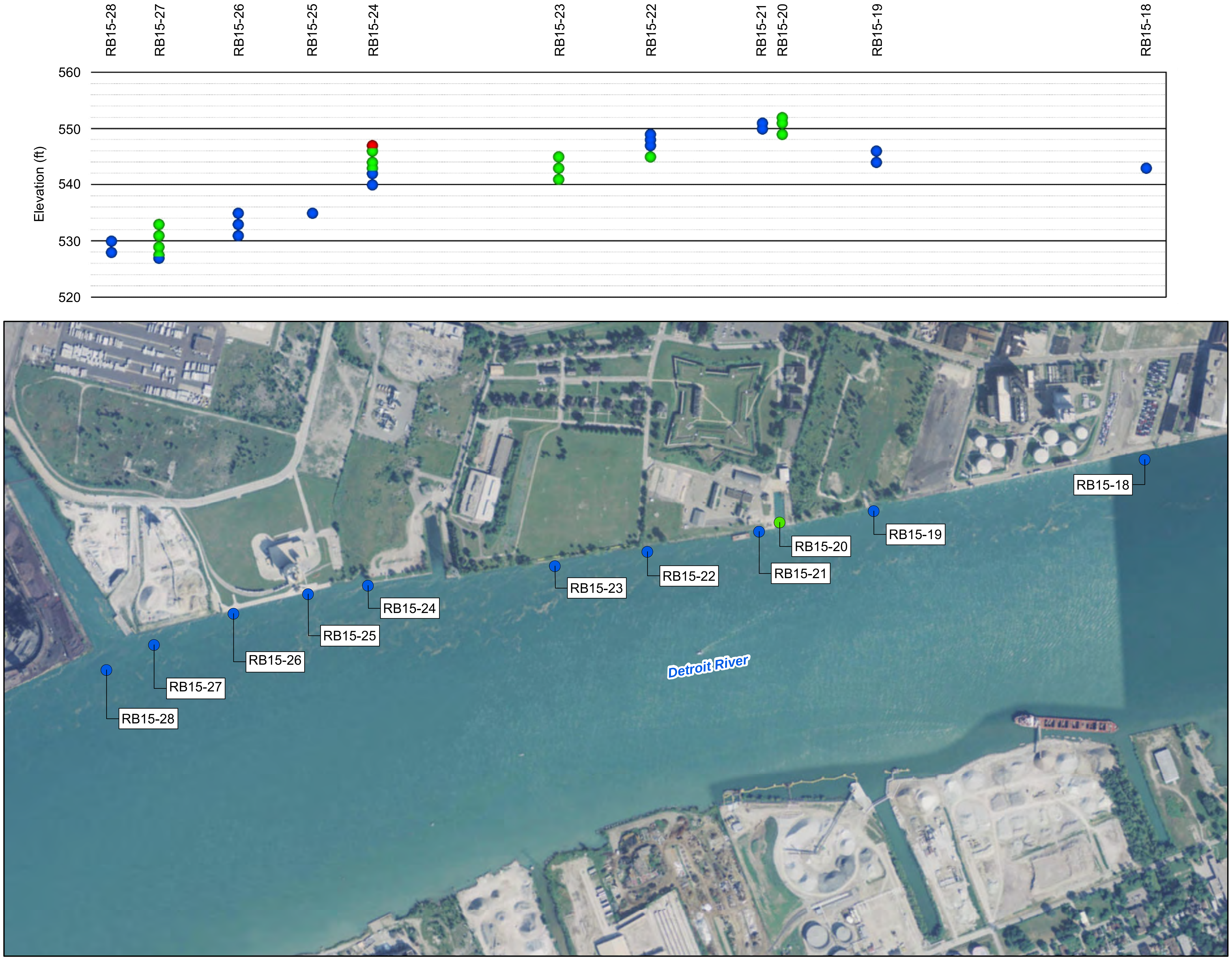
🟦 ≤TEC (9.79 mg/kg)

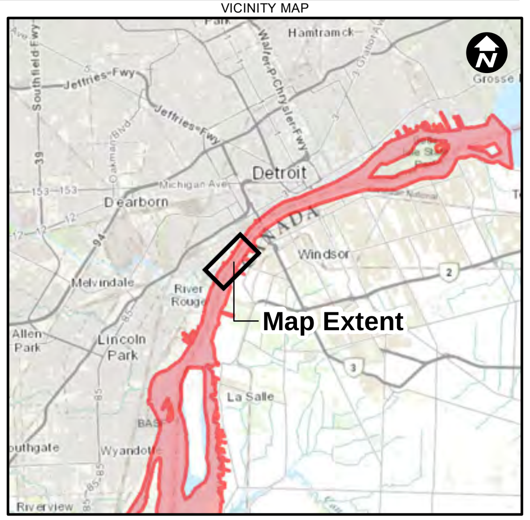
0 500 1,000 1,500 2,000
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-3A
Arsenic Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-3A Arsenic Area A.mxd





Legend

● Sample Location

▨ Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon arsenic results.

Arsenic Concentrations

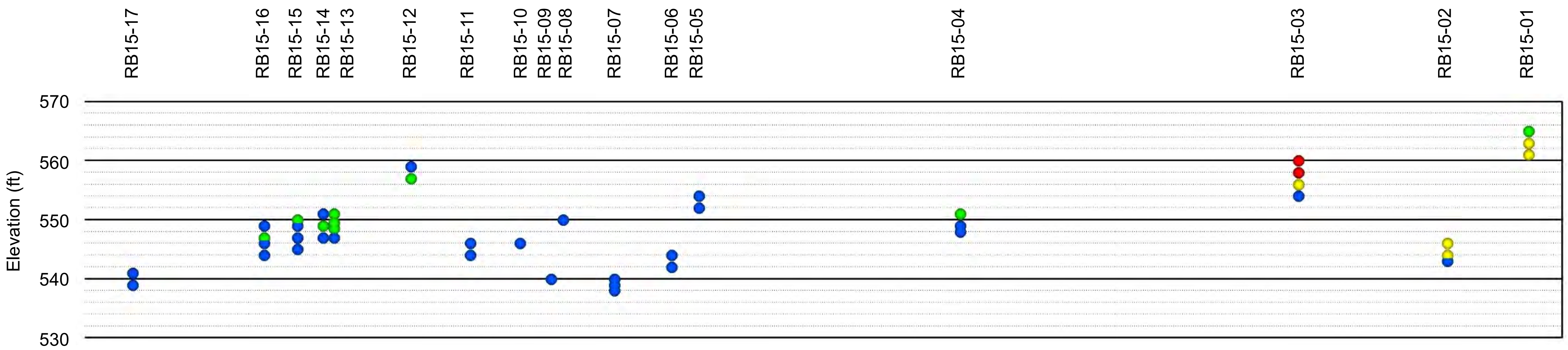
🟥	>3x PEC (99 mg/kg)
🟧	>2x PEC (66 mg/kg) and ≤3x PEC (99 mg/kg)
🟨	>PEC (33 mg/kg) and ≤2x PEC (66 mg/kg)
🟩	>TEC (9.79 mg/kg) and ≤PEC (33 mg/kg)
🟦	≤TEC (9.79 mg/kg)

0 400 800 1,200 1,600
Feet

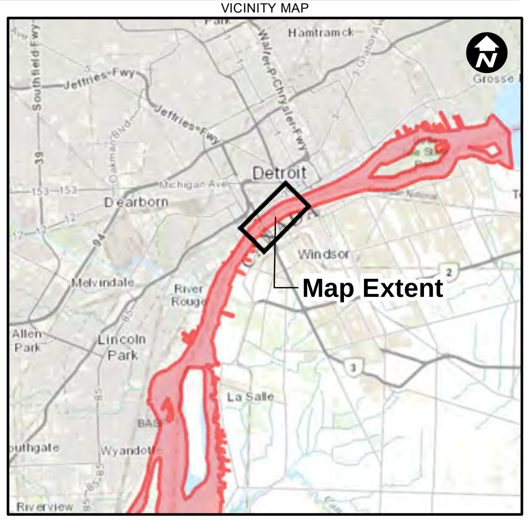
Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-3B
Arsenic Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-3B Arsenic Area B.mxd



\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-4A Cadmium Area A.mxd



Legend

- ● Sample Location
- 🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon cadmium results.
- No ponar sample was collected at RB15-12 due to field conditions.

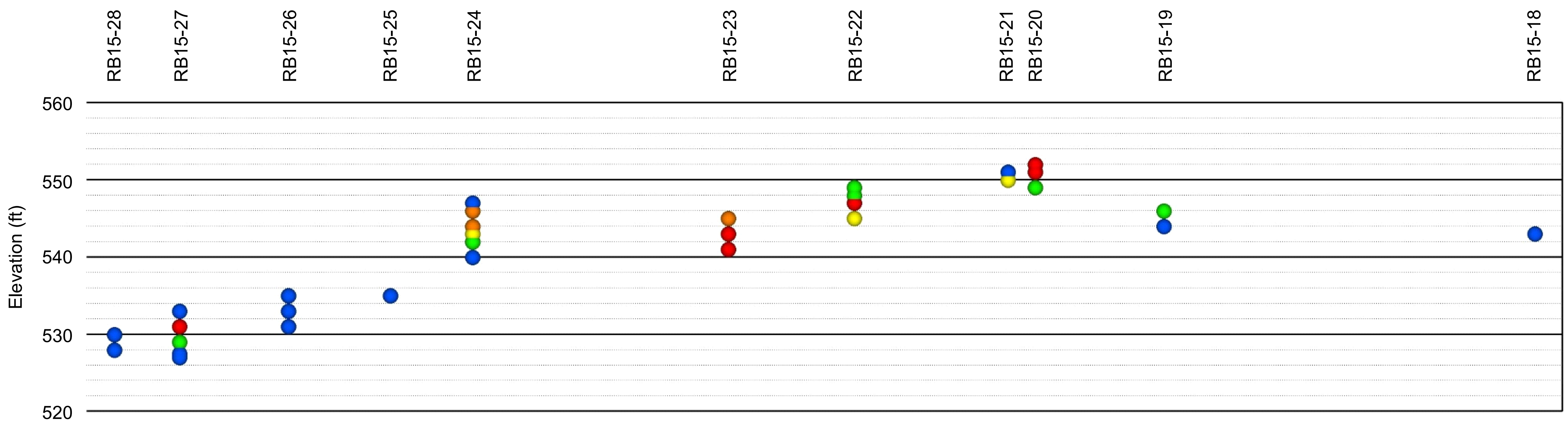
Cadmium Concentrations

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

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

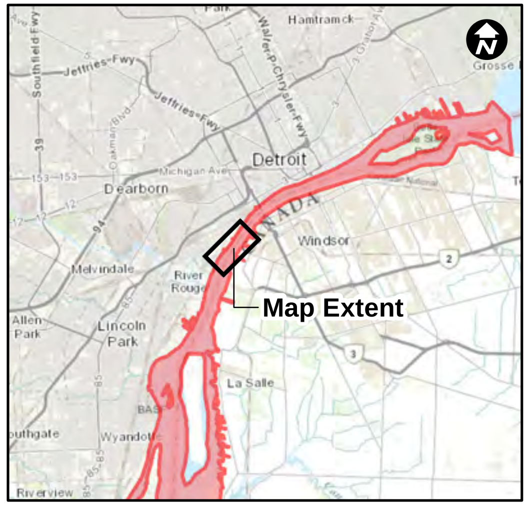
Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-4A
Cadmium Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan



\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-4B Cadmium Area B.mxd

VICINITY MAP



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon cadmium results.

Cadmium Concentrations

🟥 >3x PEC (14.94 mg/kg)

🟧 >2x PEC (9.96 mg/kg) and ≤3x PEC (14.94 mg/kg)

🟨 >PEC (4.98 mg/kg) and ≤2x PEC (9.96 mg/kg)

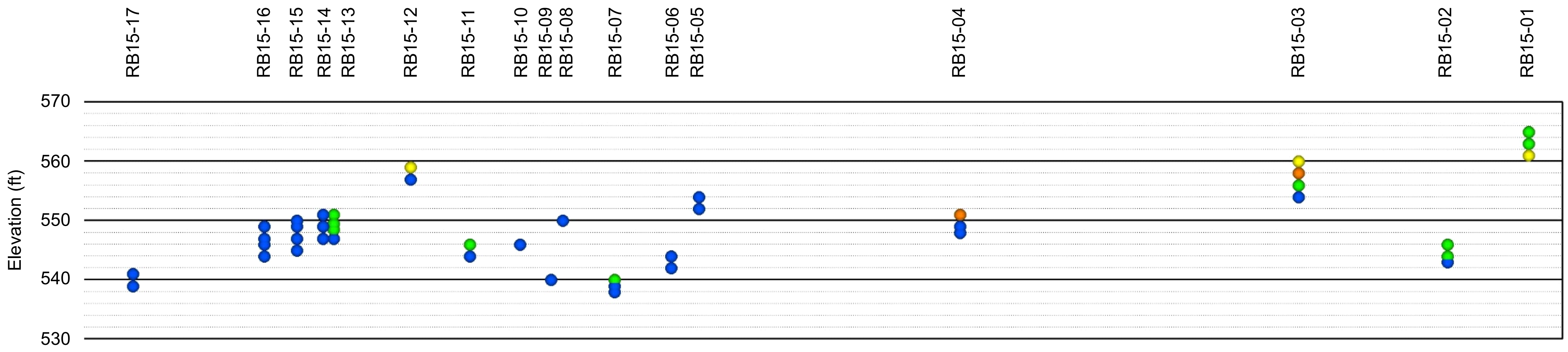
🟩 >TEC (0.99 mg/kg) and ≤PEC (4.98 mg/kg)

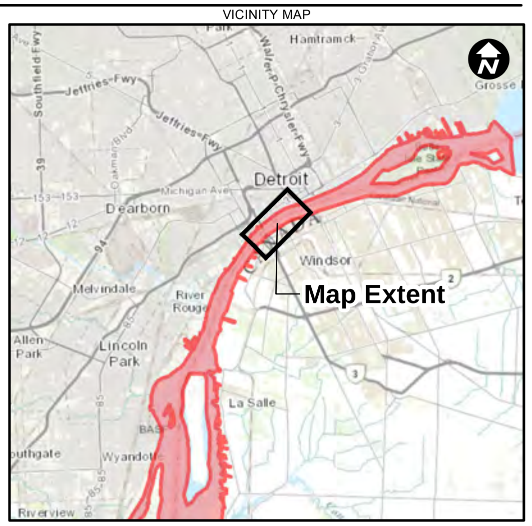
🟦 ≤TEC (0.99 mg/kg)

0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-4B
Cadmium Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon chromium results.
- No ponar sample was collected at RB15-12 due to field conditions.

Chromium Concentrations

🟥 >3x PEC (333 mg/kg)

🟧 >2x PEC (222 mg/kg) and ≤3x PEC (333 mg/kg)

🟨 >PEC (111 mg/kg) and ≤2x PEC (222 mg/kg)

🟩 >TEC (43.4 mg/kg) and ≤PEC (111 mg/kg)

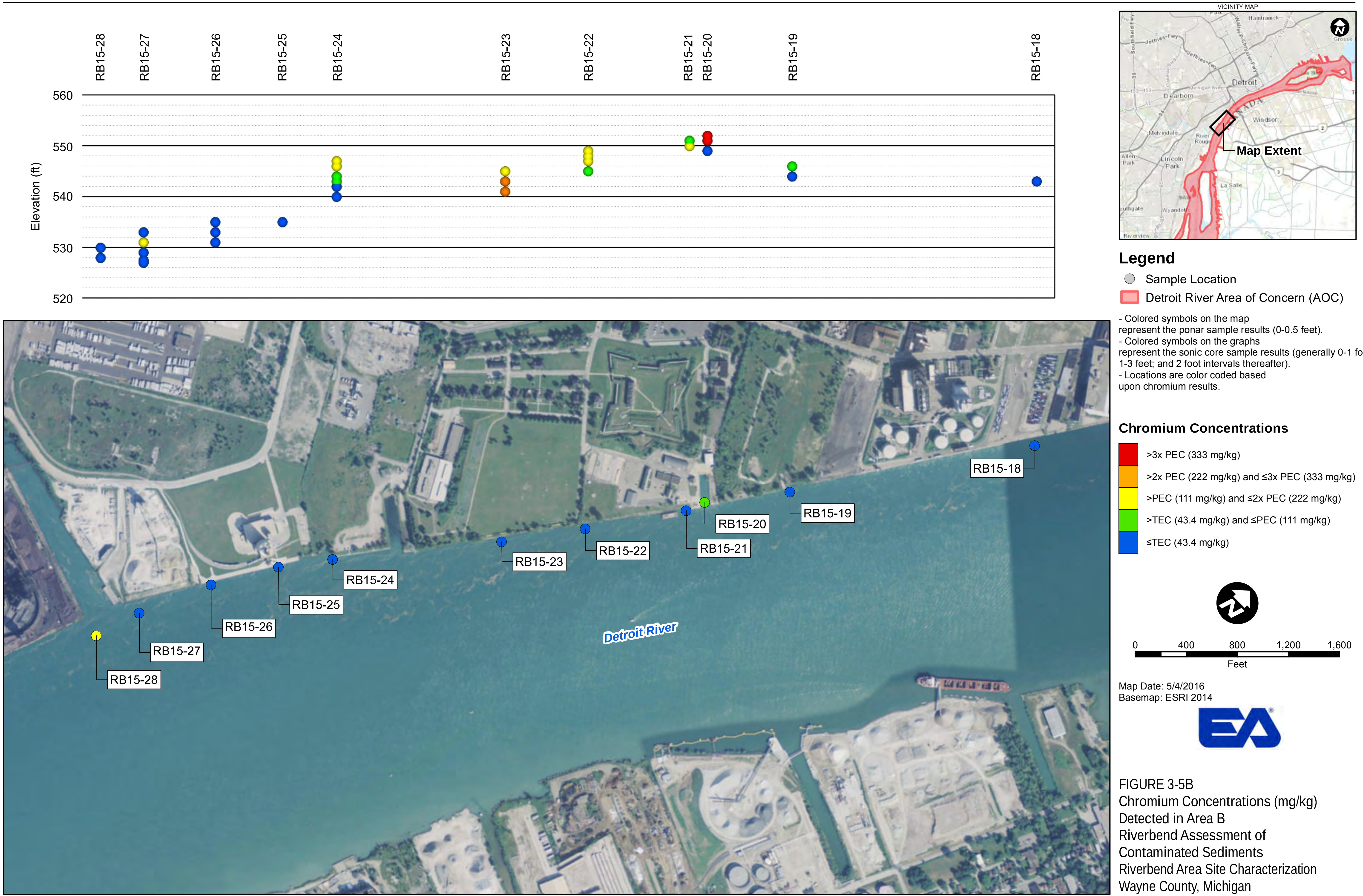
🟦 ≤TEC (43.4 mg/kg)

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

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-5A
Chromium Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-5A Chromium Area A.mxd



Legend

○ Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon chromium results.

Chromium Concentrations

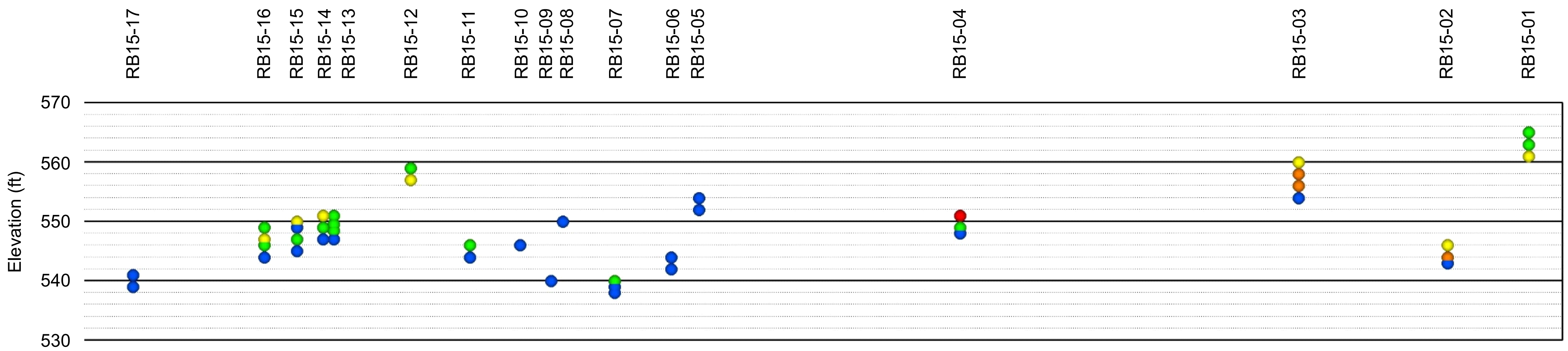
🟥	>3x PEC (333 mg/kg)
🟧	>2x PEC (222 mg/kg) and ≤3x PEC (333 mg/kg)
🟨	>PEC (111 mg/kg) and ≤2x PEC (222 mg/kg)
🟩	>TEC (43.4 mg/kg) and ≤PEC (111 mg/kg)
🟦	≤TEC (43.4 mg/kg)

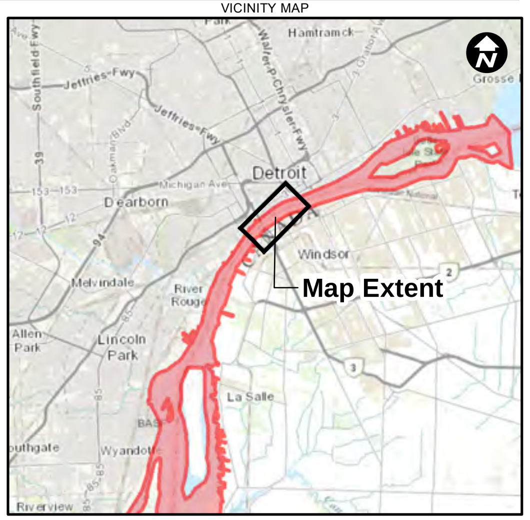
0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-5B
Chromium Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-5B Chromium Area B.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon copper results.
- No ponar sample was collected at RB15-12 due to field conditions.

Copper Concentrations

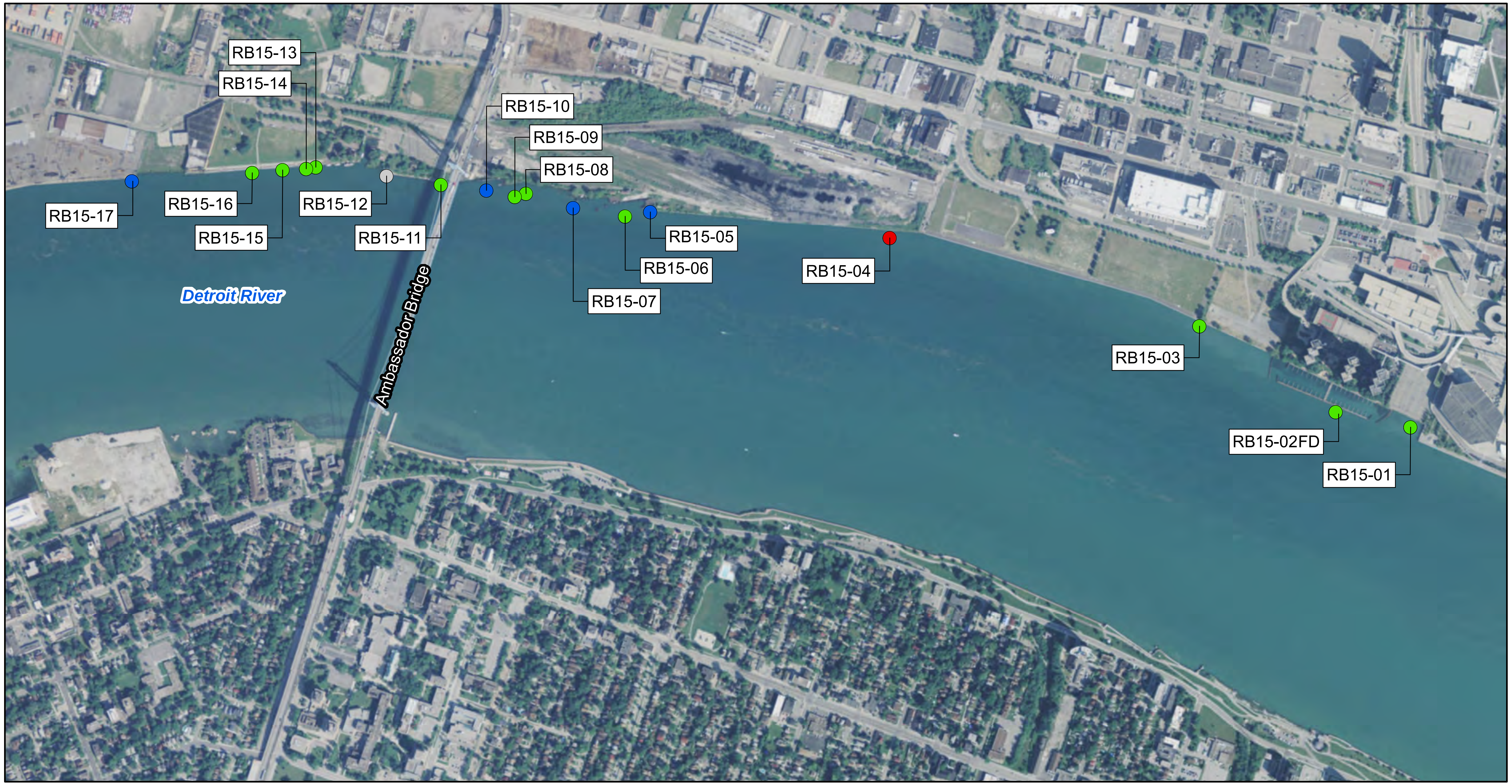
🟥 >3x PEC (447 mg/kg)

🟧 >2x PEC (298 mg/kg) and ≤3x PEC (447 mg/kg)

🟨 >PEC (149 mg/kg) and ≤2x PEC (298 mg/kg)

🟩 >TEC (31.6 mg/kg) and ≤PEC (149 mg/kg)

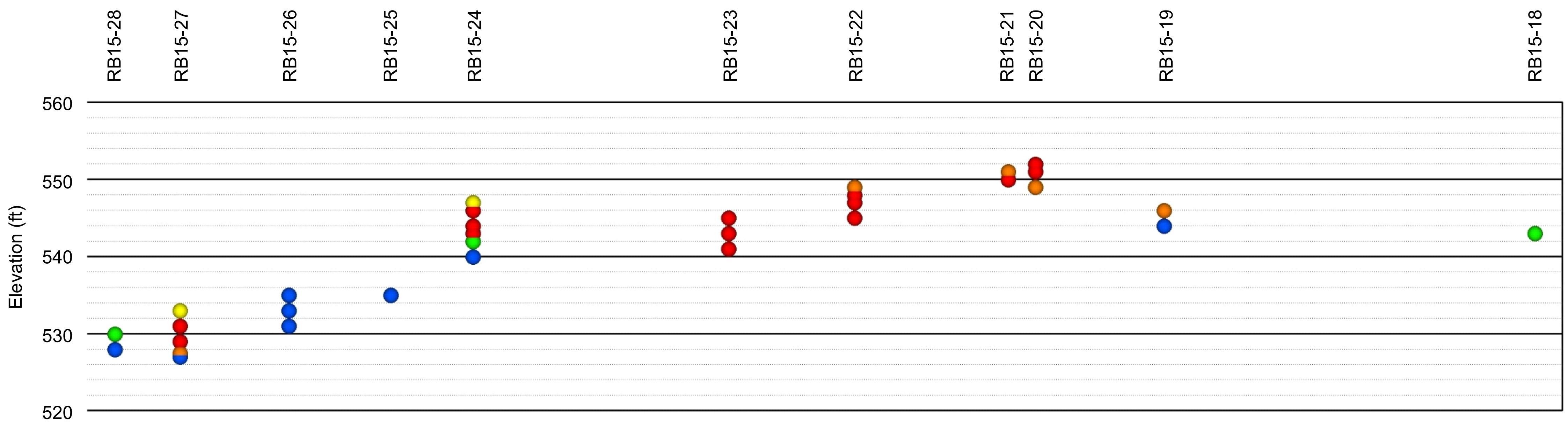
🟦 ≤TEC (31.6 mg/kg)

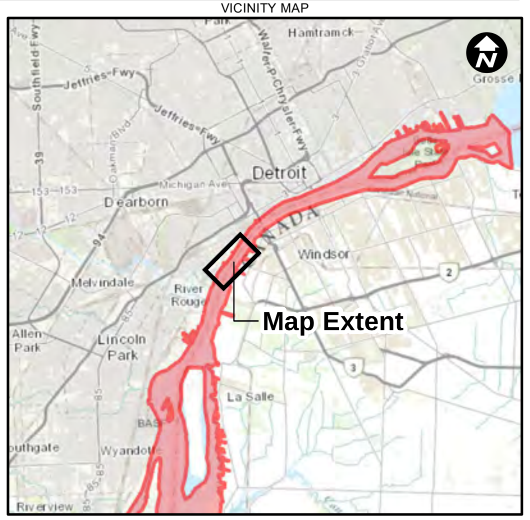


Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-6A
Copper Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-6A Copper Area A.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon copper results.

Copper Concentrations

🟥 >3x PEC (447 mg/kg)

🟧 >2x PEC (298 mg/kg) and ≤3x PEC (447 mg/kg)

🟨 >PEC (149 mg/kg) and ≤2x PEC (298 mg/kg)

🟩 >TEC (31.6 mg/kg) and ≤PEC (149 mg/kg)

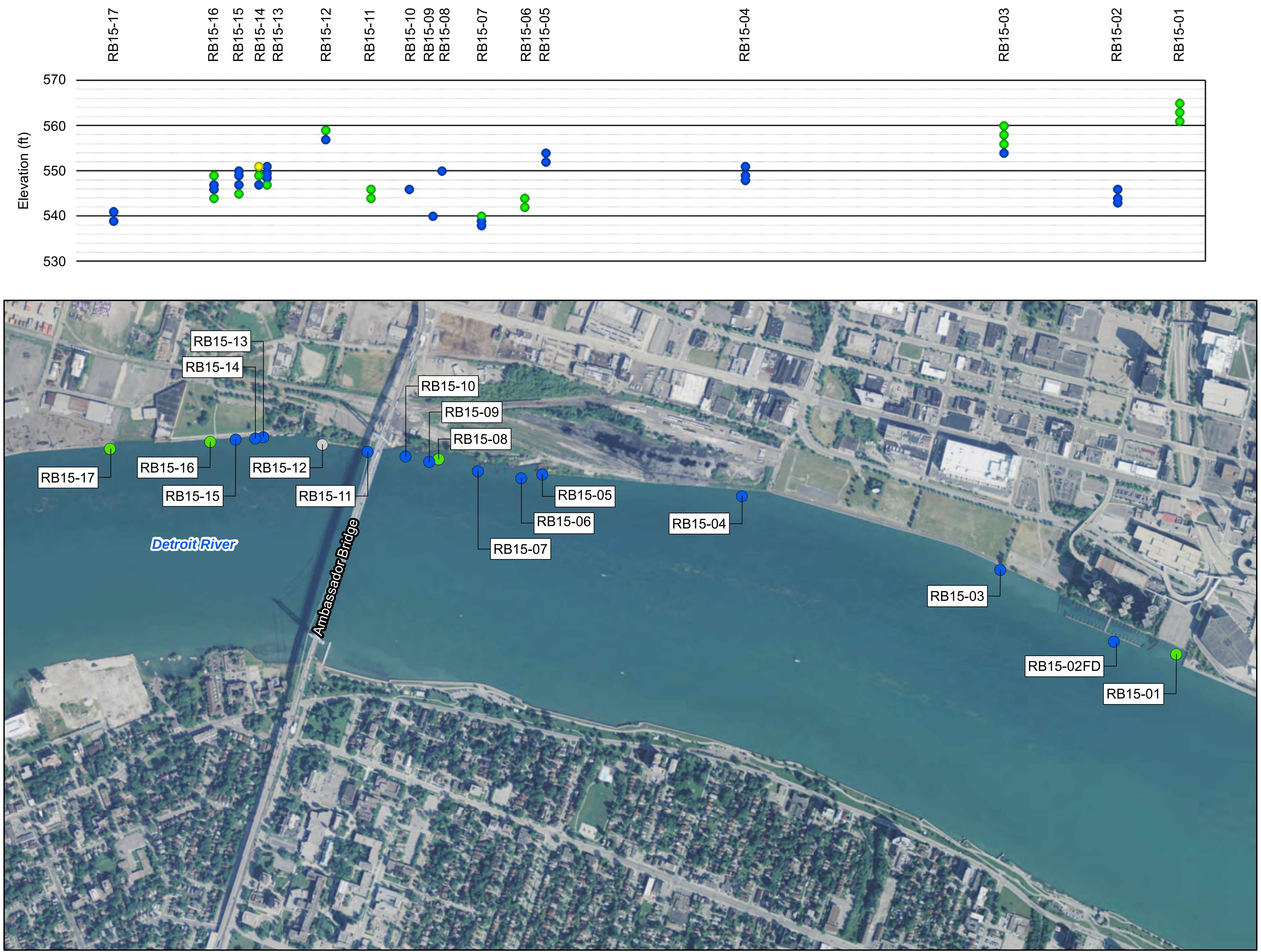
🟦 ≤TEC (31.6 mg/kg)

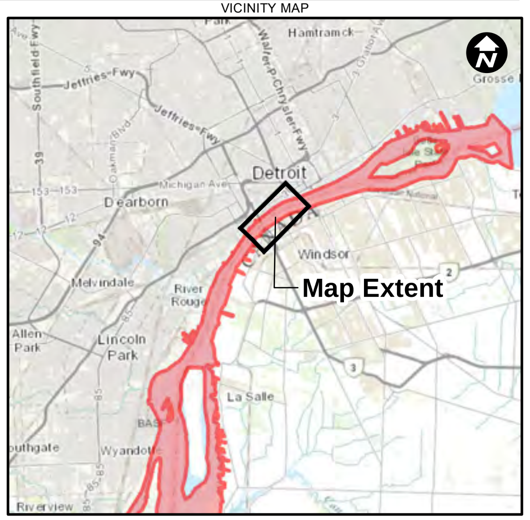
0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-6B
Copper Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-6B Copper Area B.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon iron results.
- No ponar sample was collected at RB15-12 due to field conditions.

Iron Concentrations

🟥 >3x PEC (120,000 mg/kg)

🟧 >2x PEC (80,000 mg/kg) and ≤3x PEC (120,000 mg/kg)

🟨 >PEC (40,000 mg/kg) and ≤2x PEC (80,000 mg/kg)

🟩 >TEC (20,000 mg/kg) and ≤PEC (40,000 mg/kg)

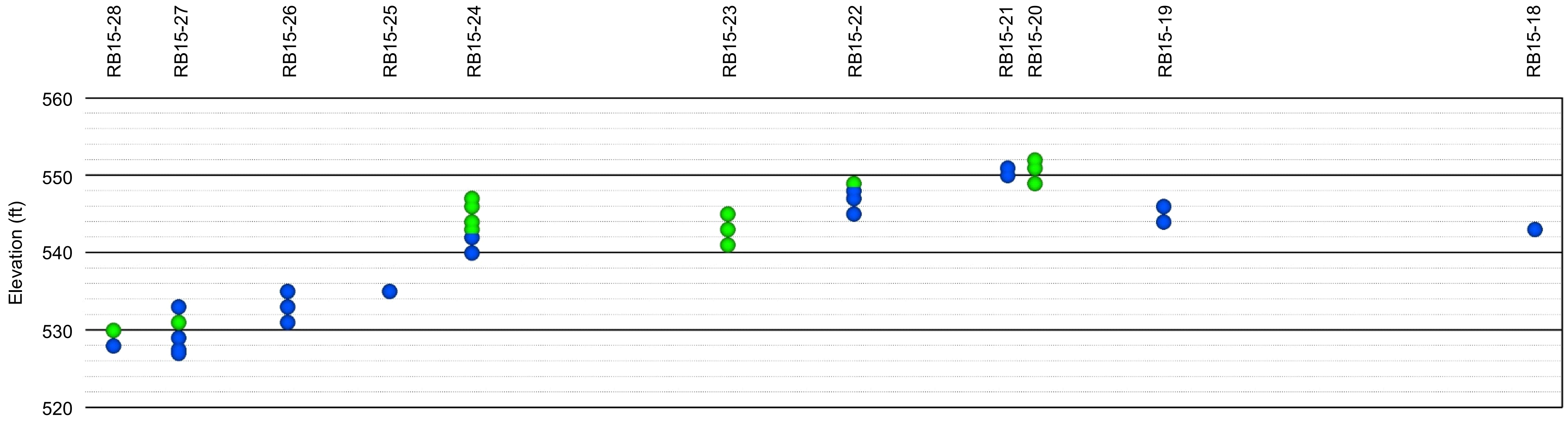
🟦 ≤TEC (20,000 mg/kg)

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

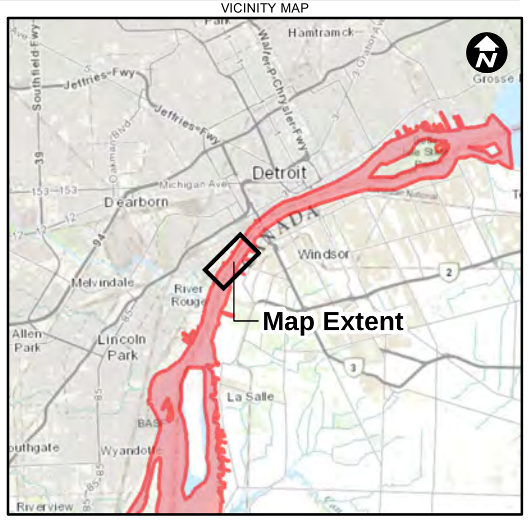
Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-7A
Iron Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-7A Iron Area A.mxd



\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-7B Iron Area B.mxd



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon iron results.

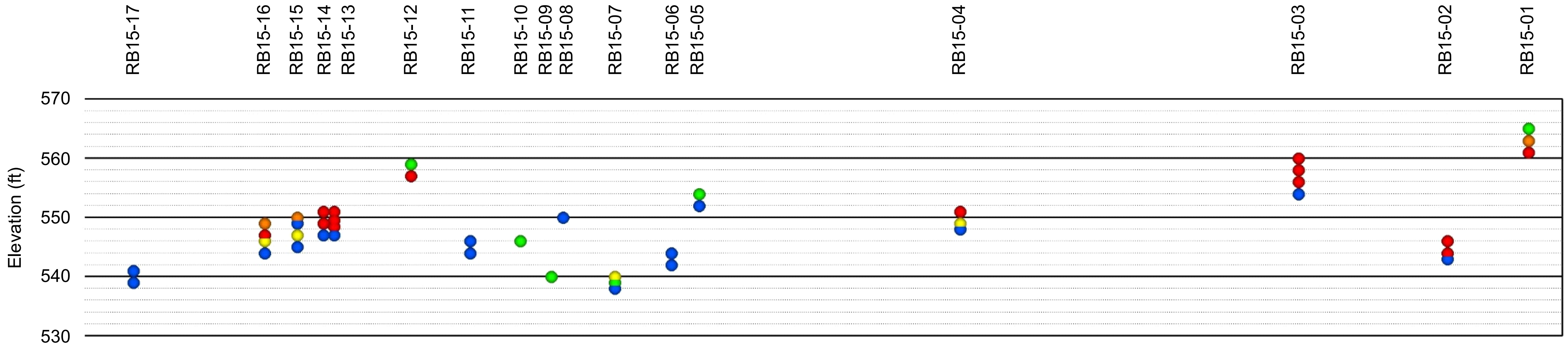
Iron Concentrations

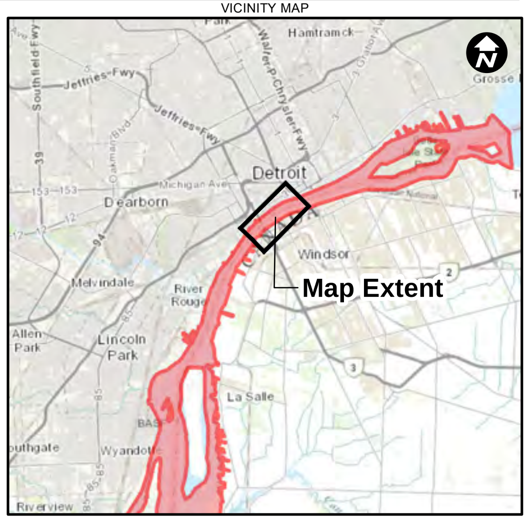
🟥	>3x PEC (120,000 mg/kg)
🟧	>2x PEC (80,000 mg/kg) and ≤3x PEC (120,000 mg/kg)
🟨	>PEC (40,000 mg/kg) and ≤2x PEC (80,000 mg/kg)
🟩	>TEC (20,000 mg/kg) and ≤PEC (40,000 mg/kg)
🟦	≤TEC (20,000 mg/kg)

0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-7B
Iron Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon lead results.
- No ponar sample was collected at RB15-12 due to field conditions.

Lead Concentrations

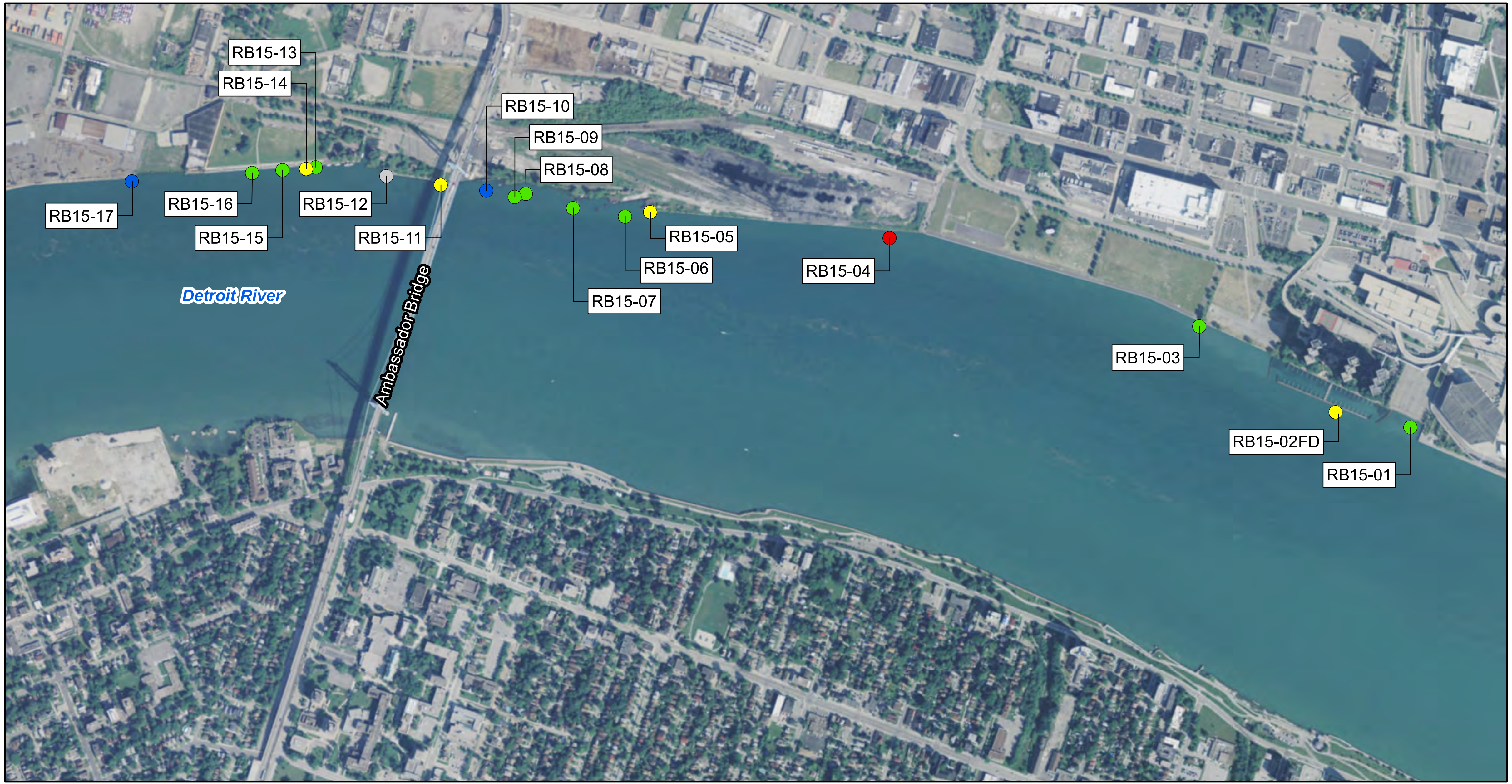
🟥 >3x PEC (384 mg/kg)

🟧 >2x PEC (256 mg/kg) and ≤3x PEC (384 mg/kg)

🟨 >PEC (128 mg/kg) and ≤2x PEC (256 mg/kg)

🟩 >TEC (35.8 mg/kg) and ≤PEC (128 mg/kg)

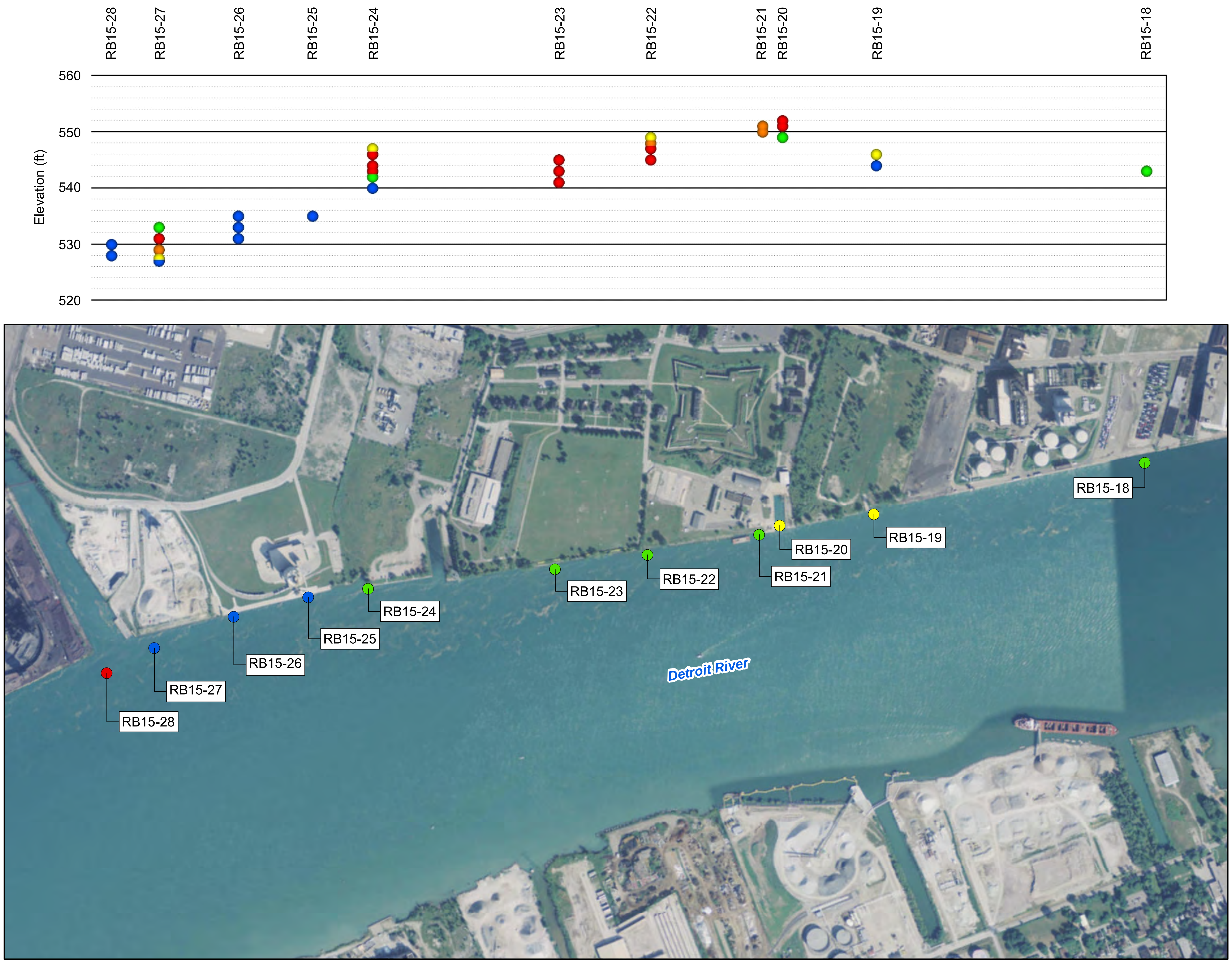
🟦 ≤TEC (35.8 mg/kg)

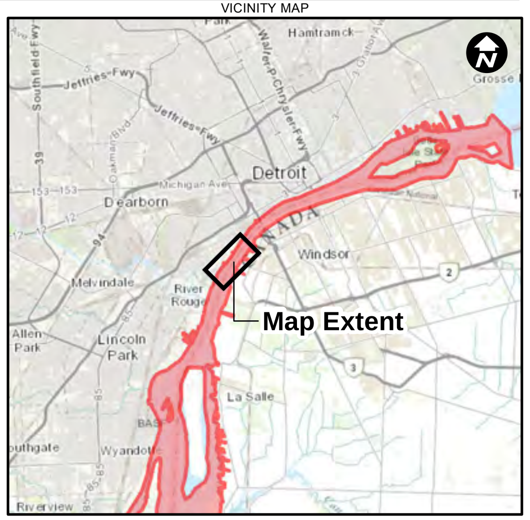


Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-8A
Lead Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-8A Lead Area A.mxd





Legend

- ● Sample Location
- 🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon lead results.

Lead Concentrations

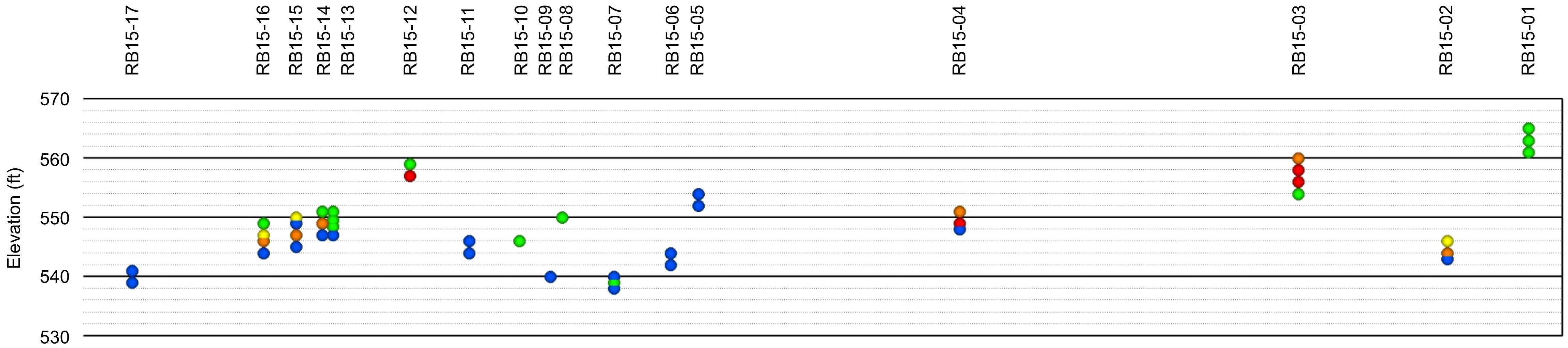
- 🟥 >3x PEC (384 mg/kg)
- 🟧 >2x PEC (256 mg/kg) and ≤3x PEC (384 mg/kg)
- 🟨 >PEC (128 mg/kg) and ≤2x PEC (256 mg/kg)
- 🟩 >TEC (35.8 mg/kg) and ≤PEC (128 mg/kg)
- 🟦 ≤TEC (35.8 mg/kg)

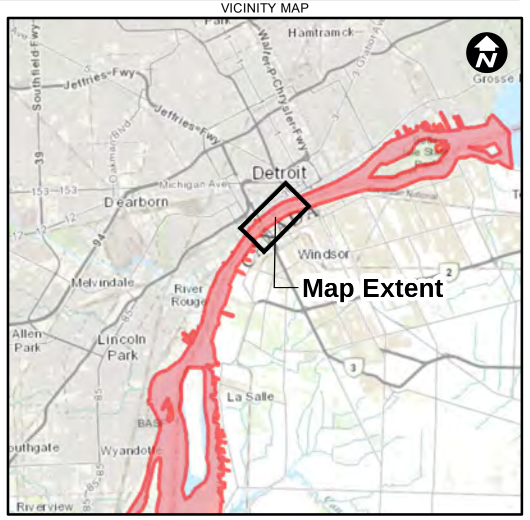
0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-8B
Lead Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-8B Lead Area B.mxd





Legend

● Sample Location
🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon mercury results.
- No ponar sample was collected at RB15-12 due to field conditions.

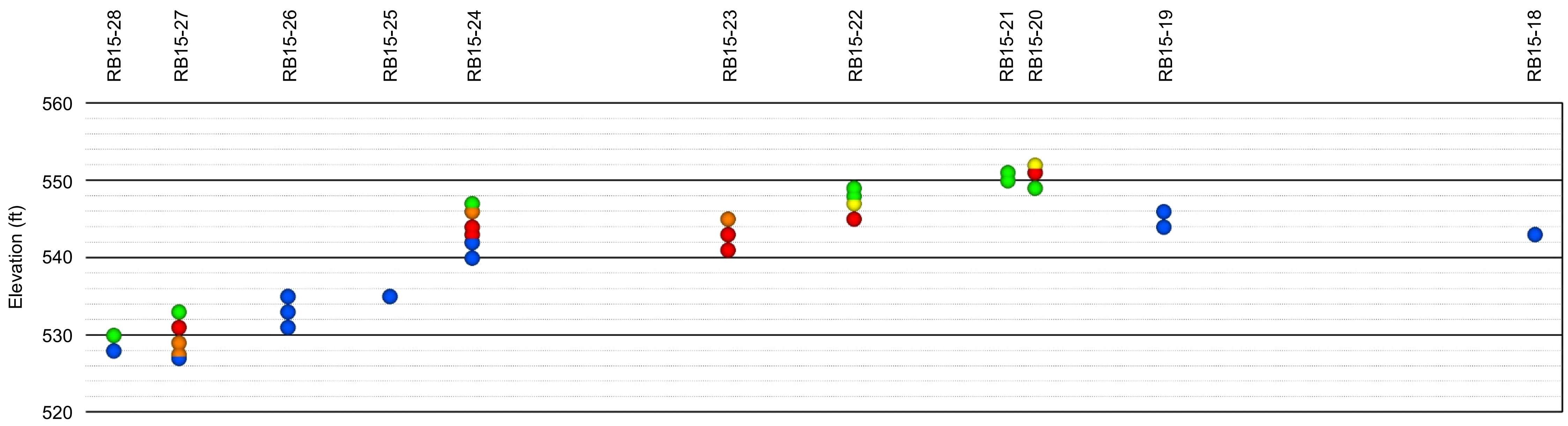
Mercury Concentrations

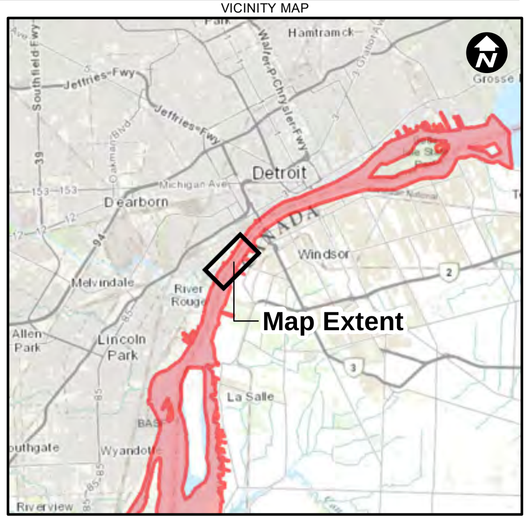
🟥 >3x PEC (3.18 mg/kg)
🟧 >2x PEC (2.12 mg/kg) and ≤3x PEC (3.18 mg/kg)
🟨 >PEC (1.06 mg/kg) and ≤2x PEC (2.12 mg/kg)
🟩 >TEC (0.18 mg/kg) and ≤PEC (1.06 mg/kg)
🟦 ≤TEC (0.18 mg/kg)

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

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-9A
Mercury Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon mercury results.

Mercury Concentrations

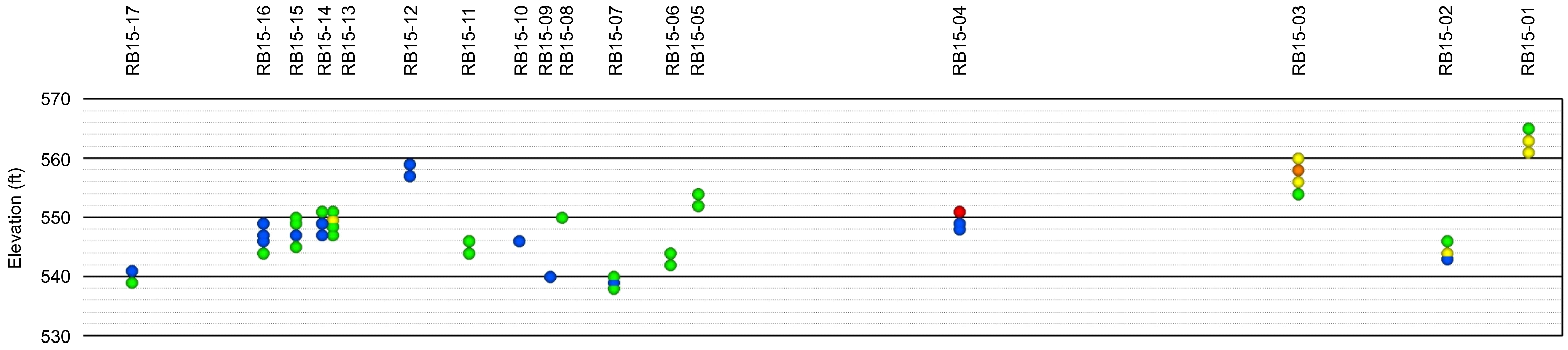
🟥	>3x PEC (3.18 mg/kg)
🟧	>2x PEC (2.12 mg/kg) and ≤3x PEC (3.18 mg/kg)
🟨	>PEC (1.06 mg/kg) and ≤2x PEC (2.12 mg/kg)
🟩	>TEC (0.18 mg/kg) and ≤PEC (1.06 mg/kg)
🟦	≤TEC (0.18 mg/kg)

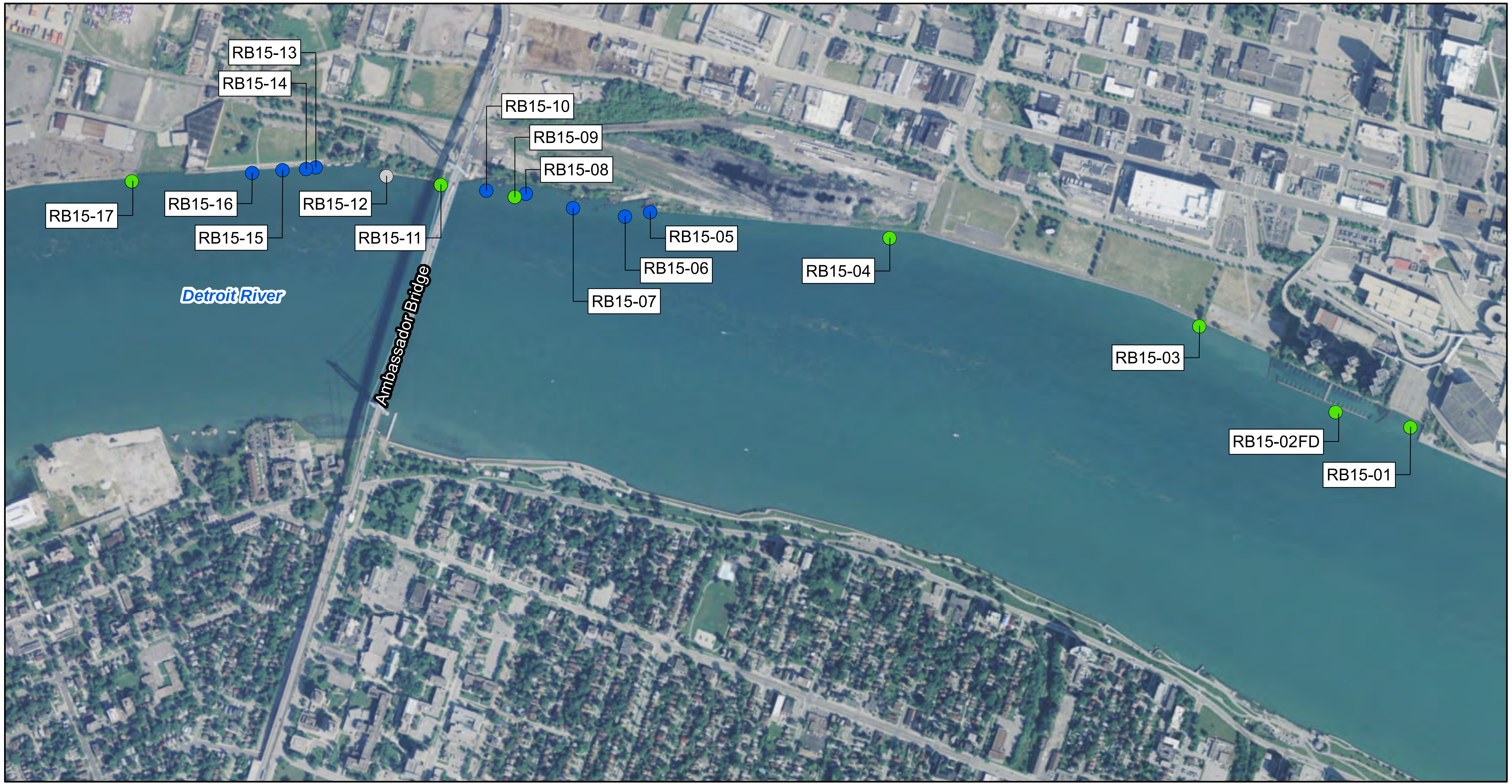
0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

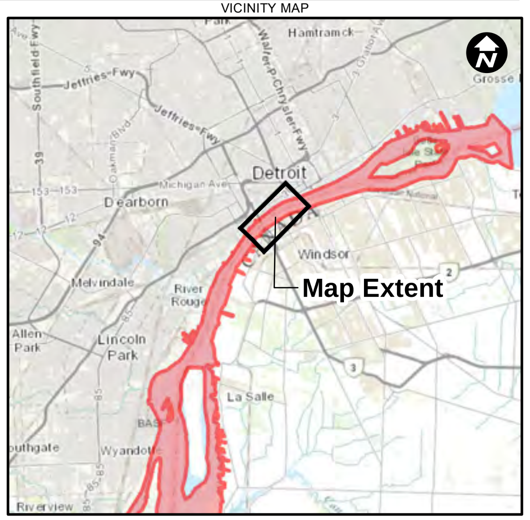
FIGURE 3-9B
Mercury Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-9B Mercury Area B.mxd





\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-10A Nickel Area A.mxd



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon nickel results.
- No ponar sample was collected at RB15-12 due to field conditions.

Nickel Concentrations

🟥 >3x PEC (145.8 mg/kg)

🟧 >2x PEC (97.2 mg/kg) and ≤3x PEC (145.8 mg/kg)

🟨 >PEC (48.6 mg/kg) and ≤2x PEC (97.2 mg/kg)

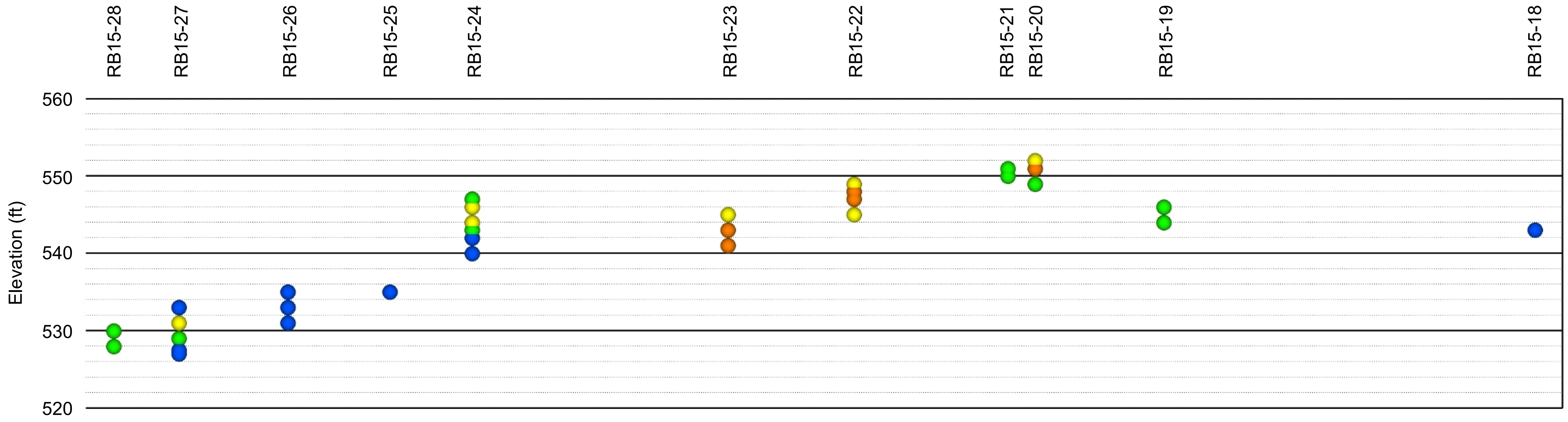
🟩 >TEC (22.7 mg/kg) and ≤PEC (48.6 mg/kg)

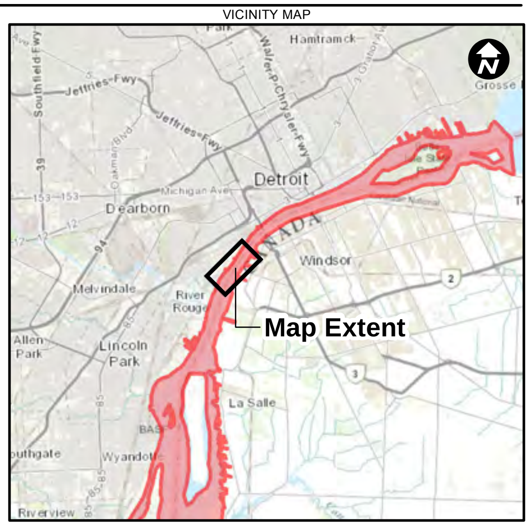
🟦 ≤TEC (22.7 mg/kg)

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

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-10A
Nickel Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon nickel results.

Nickel Concentrations

🟥 >3x PEC (145.8 mg/kg)

🟧 >2x PEC (97.2 mg/kg) and ≤3x PEC (145.8 mg/kg)

🟨 >PEC (48.6 mg/kg) and ≤2x PEC (97.2 mg/kg)

🟩 >TEC (22.7 mg/kg) and ≤PEC (48.6 mg/kg)

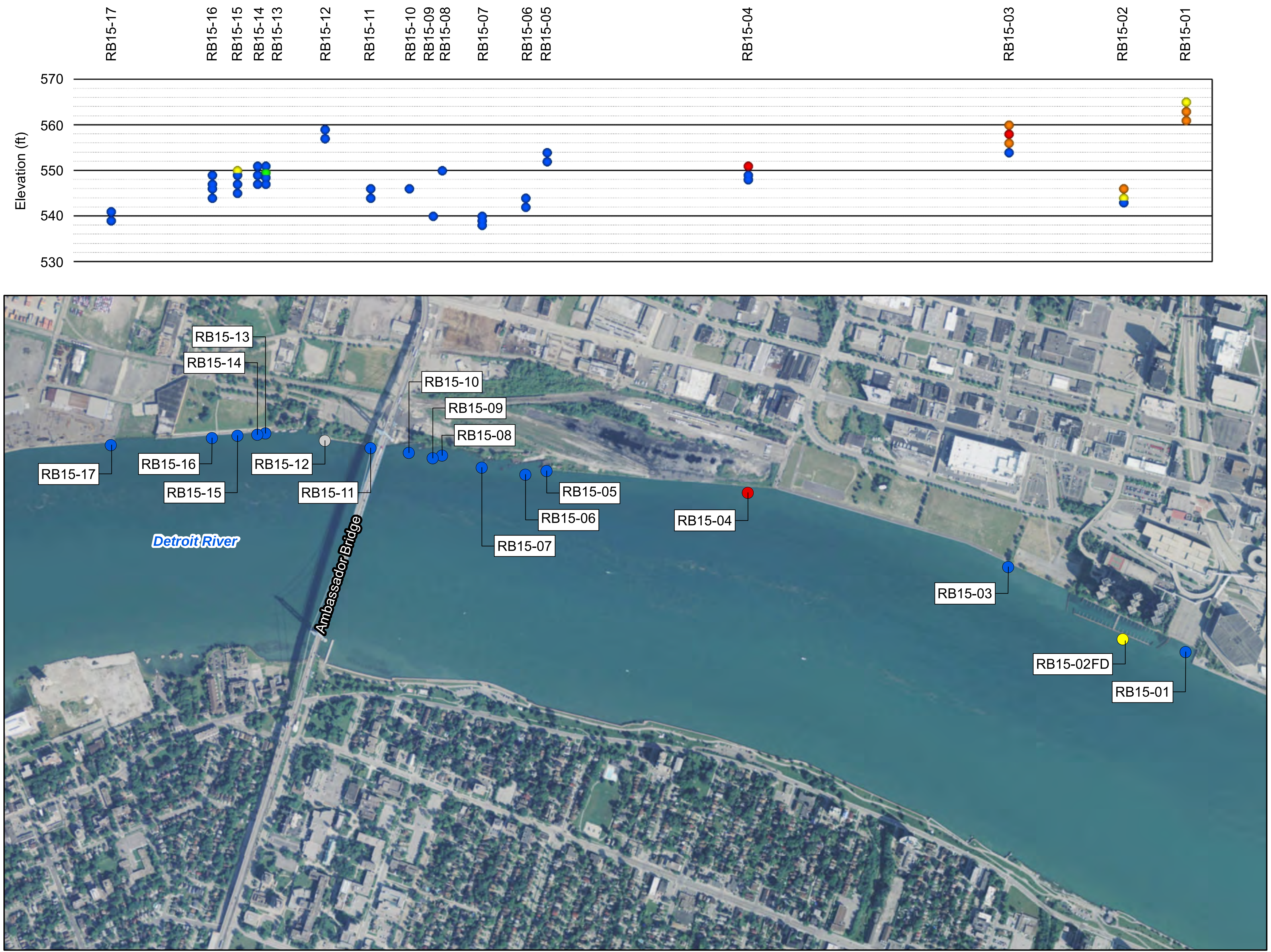
🟦 ≤TEC (22.7 mg/kg)

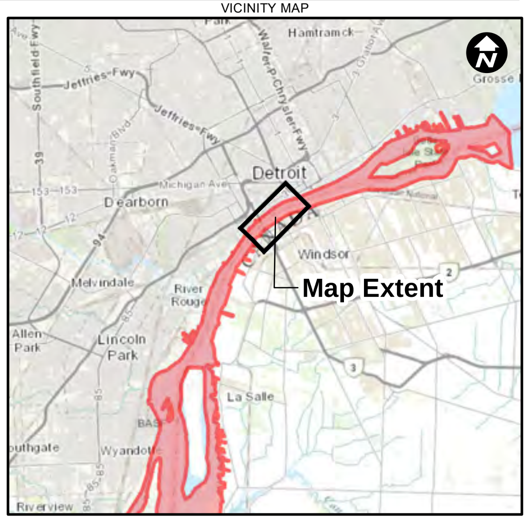
0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-10B
Nickel Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-10B Nickel Area B.mxd





Legend

○ Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon silver results.
- No ponar sample was collected at RB15-12 due to field conditions.

Silver Concentrations

🟥 >3x PEC (6.6 mg/kg)

🟧 >2x PEC (4.4 mg/kg) and ≤3x PEC (6.6 mg/kg)

🟨 >PEC (2.2 mg/kg) and ≤2x PEC (4.4 mg/kg)

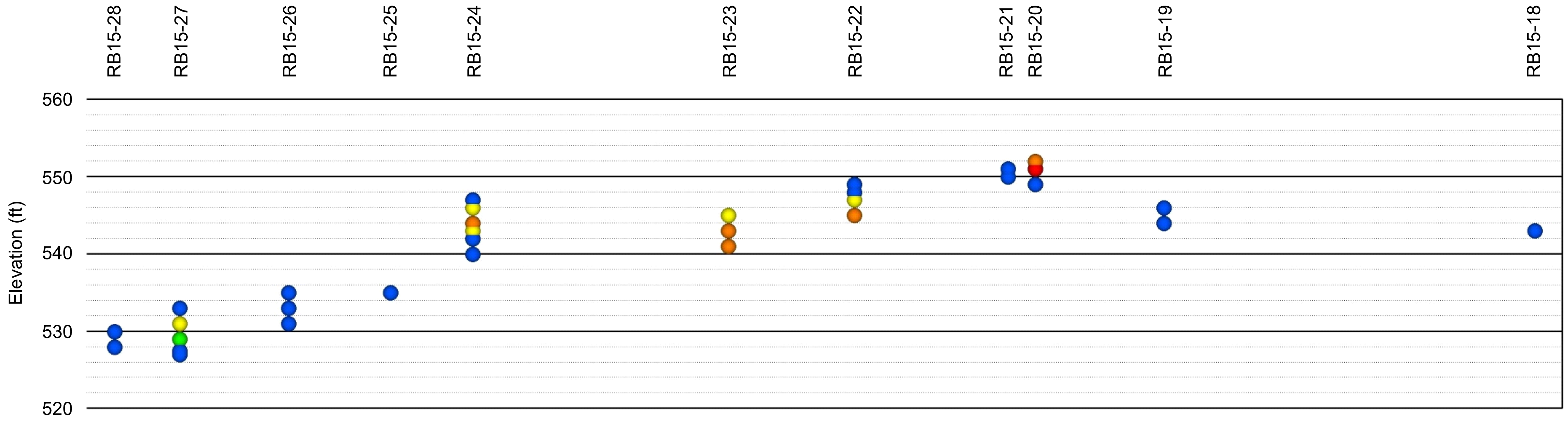
🟩 >TEC (1.6 mg/kg) and ≤PEC (2.2 mg/kg)

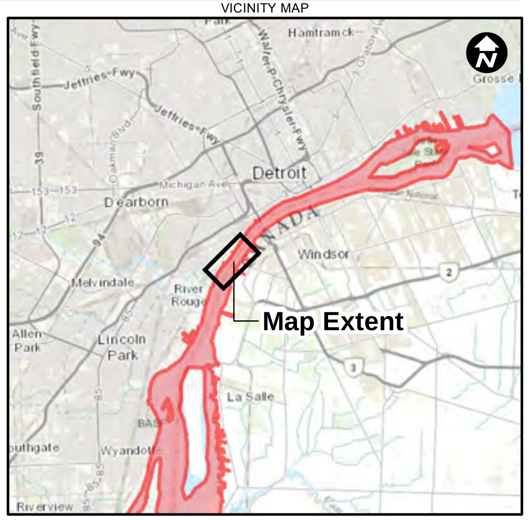
🟦 ≤TEC (1.6 mg/kg)

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

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-11A
Silver Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon silver results.

Silver Concentrations

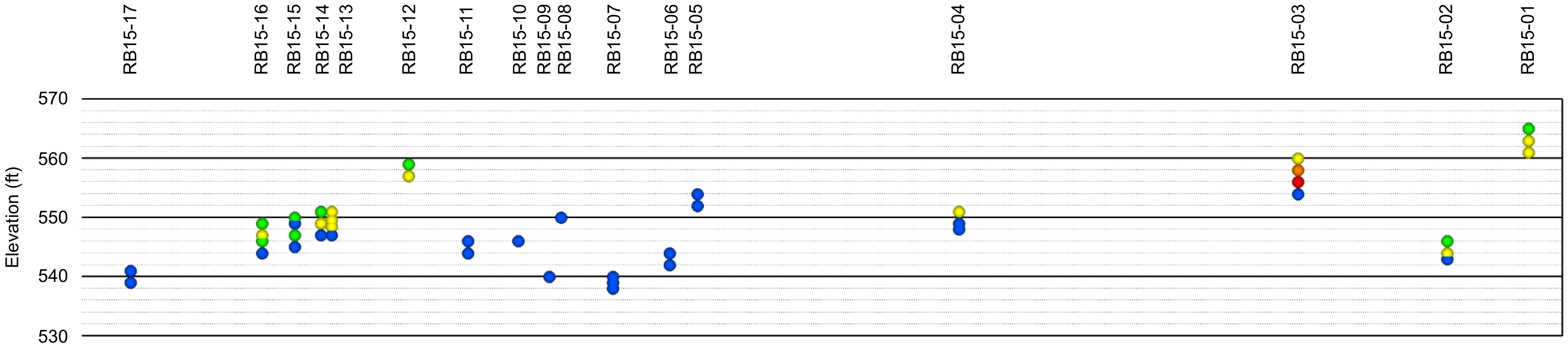
🟥	>3x PEC (6.6 mg/kg)
🟧	>2x PEC (4.4 mg/kg) and ≤3x PEC (6.6 mg/kg)
🟨	>PEC (2.2 mg/kg) and ≤2x PEC (4.4 mg/kg)
🟩	>TEC (1.6 mg/kg) and ≤PEC (2.2 mg/kg)
🟦	≤TEC (1.6 mg/kg)

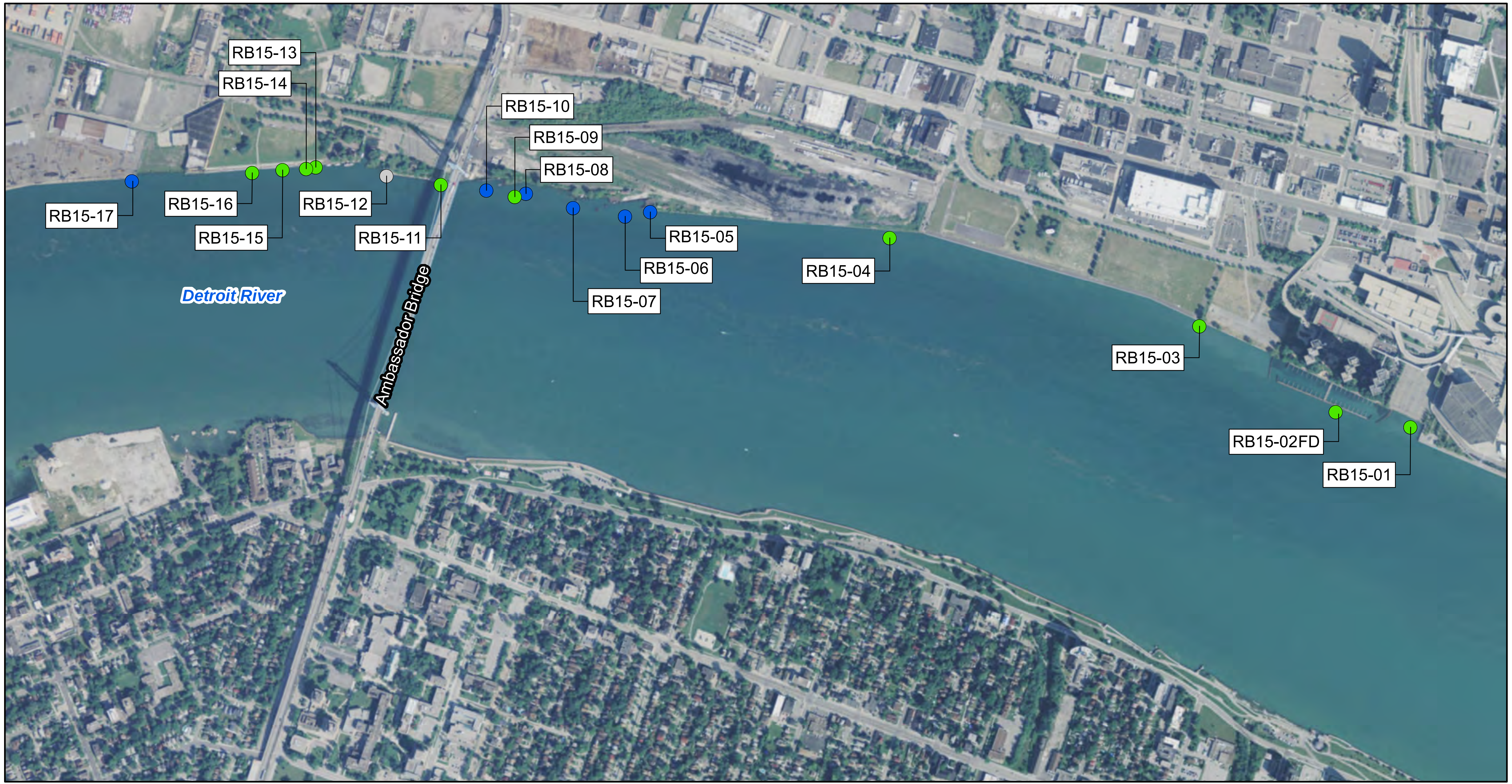
0 400 800 1,200 1,600
Feet

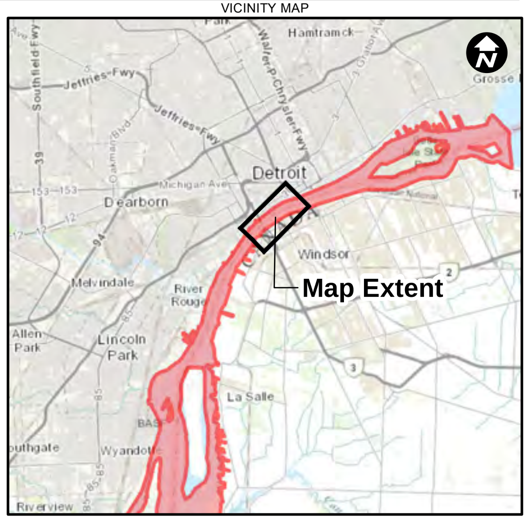
Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-11B
Silver Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-11B Silver Area B.mxd







Legend

● Sample Location

▨ Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon zinc results.
- No ponar sample was collected at RB15-12 due to field conditions.

Zinc Concentrations

🟥 >3x PEC (1,377 mg/kg)

🟧 >2x PEC (918 mg/kg) and ≤3x PEC (1,377 mg/kg)

🟨 >PEC (459 mg/kg) and ≤2x PEC (918 mg/kg)

🟩 >TEC (121 mg/kg) and ≤PEC (459 mg/kg)

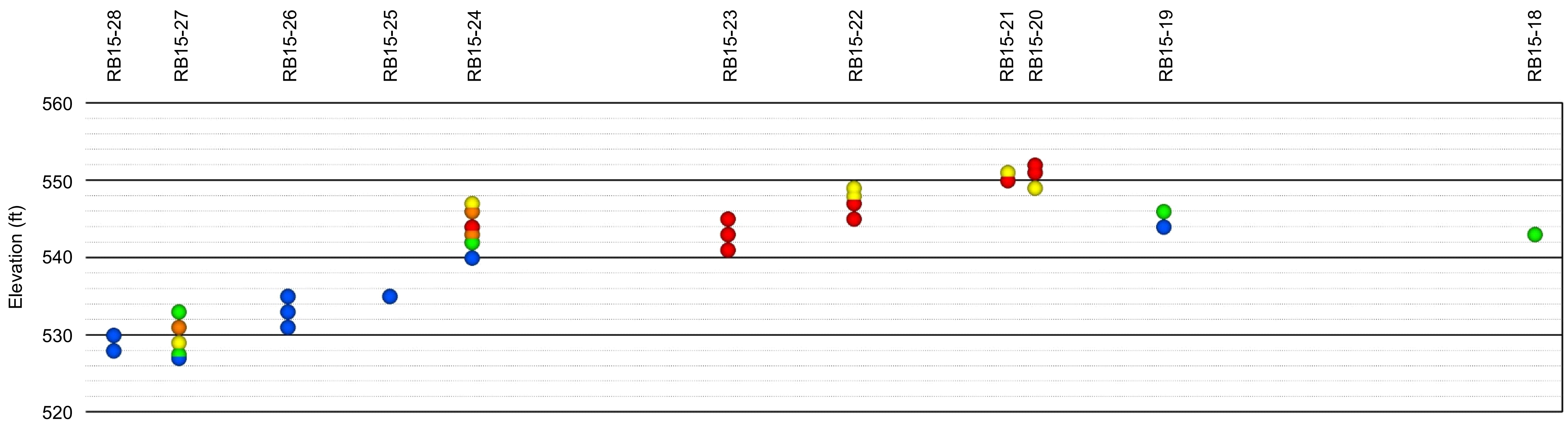
🟦 ≤TEC (121 mg/kg)

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

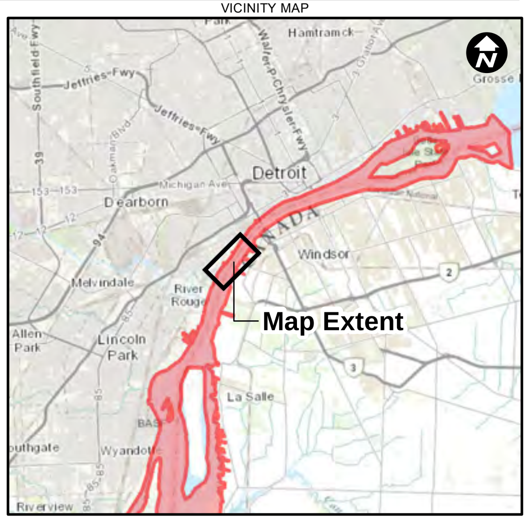
Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-12A
Zinc Concentrations (mg/kg)
Detected in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-12A Zinc Area A.mxd



\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-12B Zinc Area B.mxd



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon zinc results.

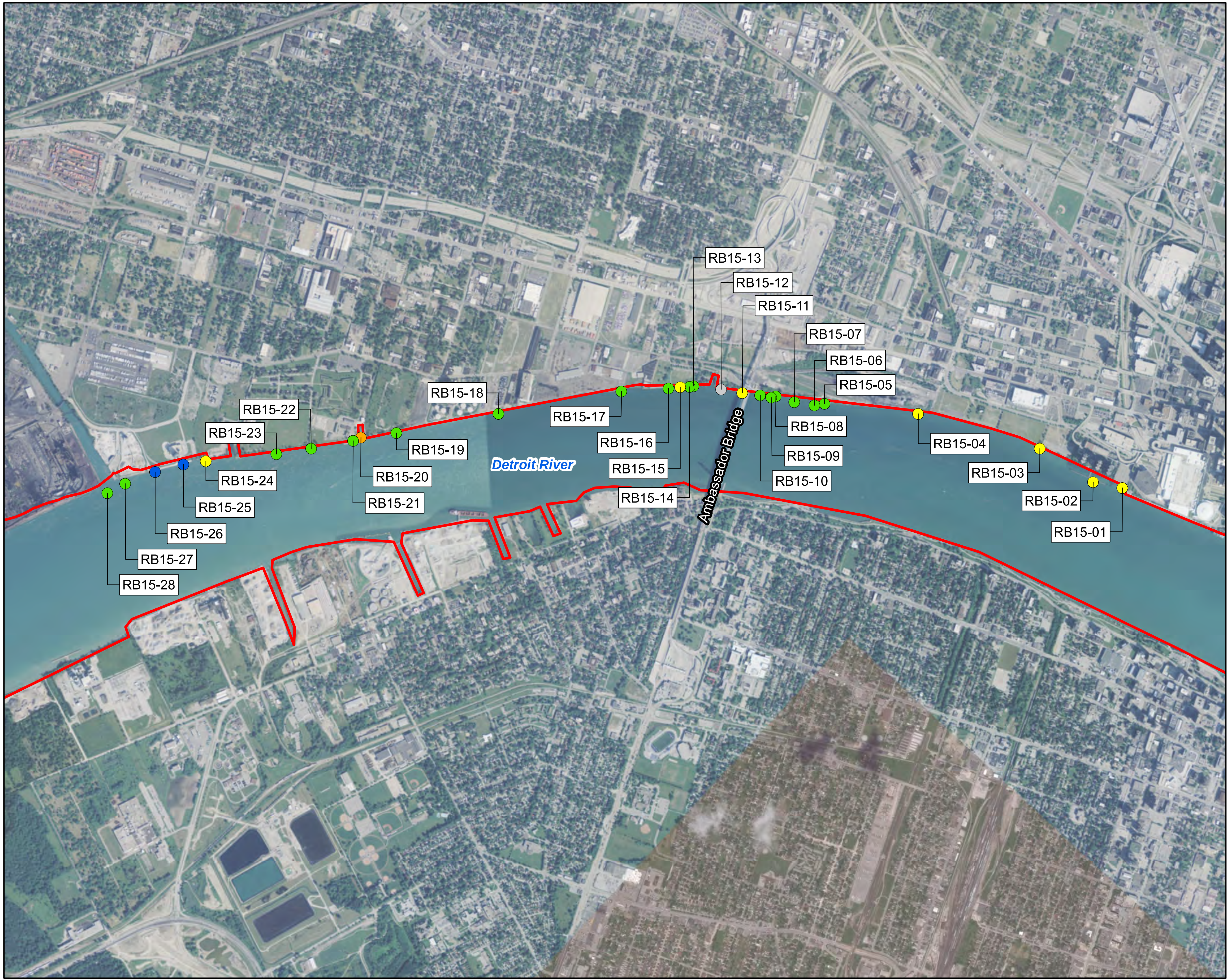
Zinc Concentrations

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

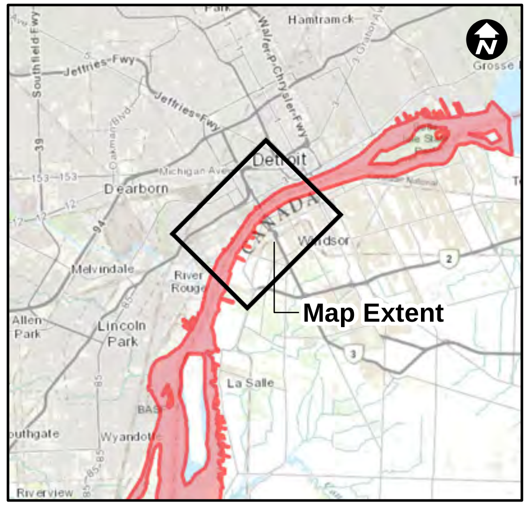
0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 3-12B
Zinc Concentrations (mg/kg)
Detected in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan



VICINITY MAP



Legend

TPH Concentrations

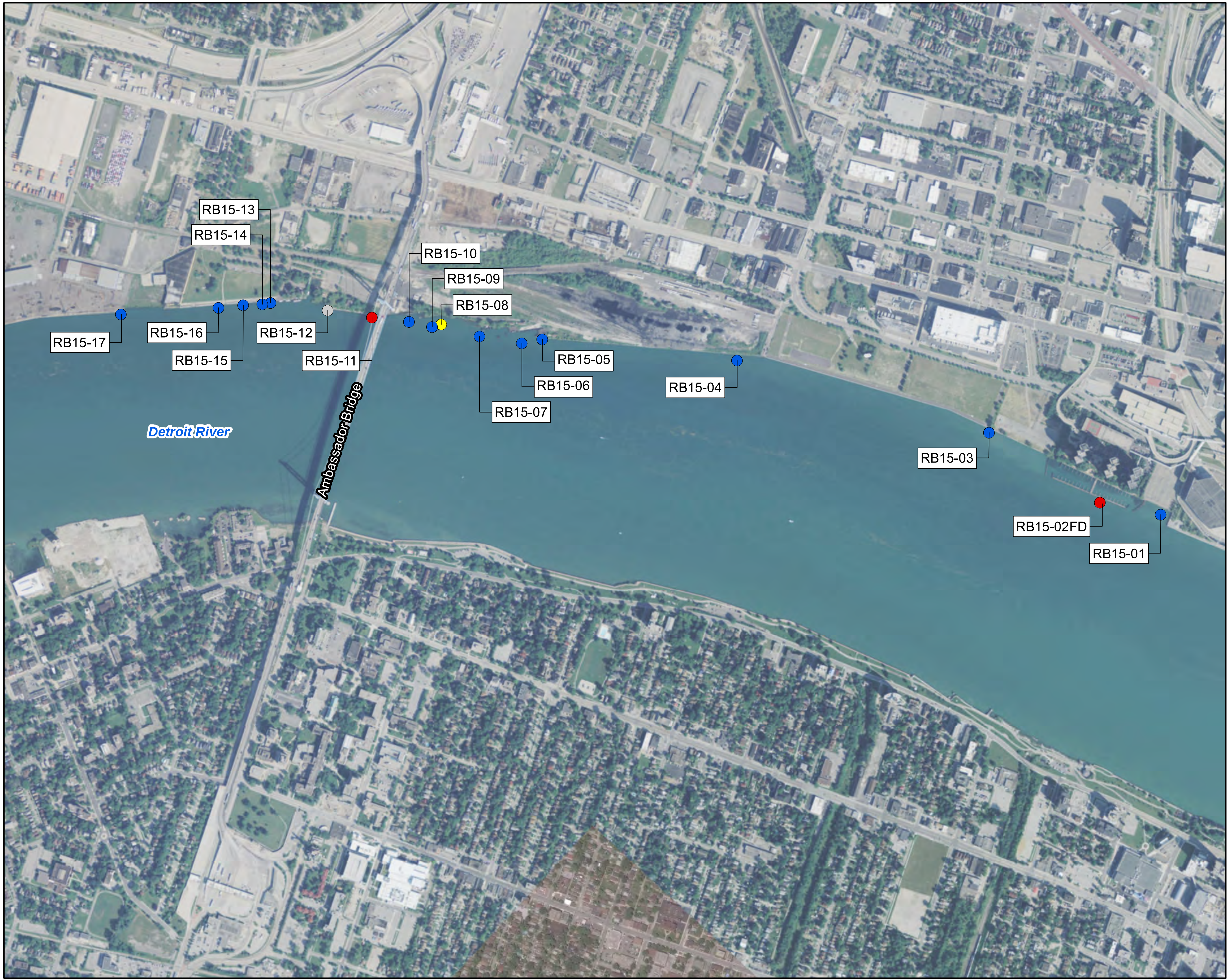
- ● Sample Location
- ● >10,000 mg/kg
- ● ≤ 10,000 mg/kg
- ● ≤ 5,000 mg/kg
- ● ≤ 1,000 mg/kg
- ● ≤ 100 mg/kg
- 🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- No ponar sample was collected at RB15-12 due to field conditions.

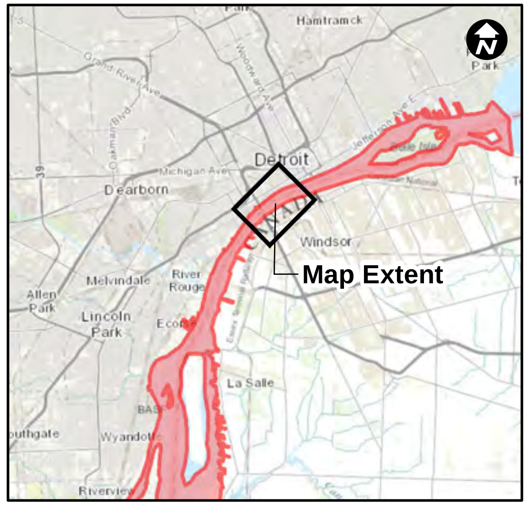
0 1,000 2,000 3,000 4,000
Feet

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 3-13
Total Petroleum Hydrocarbons (ΣDRO+ORO) (mg/kg)
Detected in the Riverbend Area
Riverbend Assessment of Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan



VICINITY MAP



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Sample results and SSRSLs are displayed on Table 3-8.
- No ponar sample was collected at RB15-12 due to field conditions.

TPH-DRO Concentrations

🟥	≥ 3x Sample-Specific Risk Screening Level mg/kg
🟧	≥ 2x Sample-Specific Risk Screening Level mg/kg
🟨	≥ 1x Sample-Specific Risk Screening Level mg/kg
🟦	Does Not Exceed SSRSL

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

Map Date: 6/23/2016
Basemap: ESRI 2014

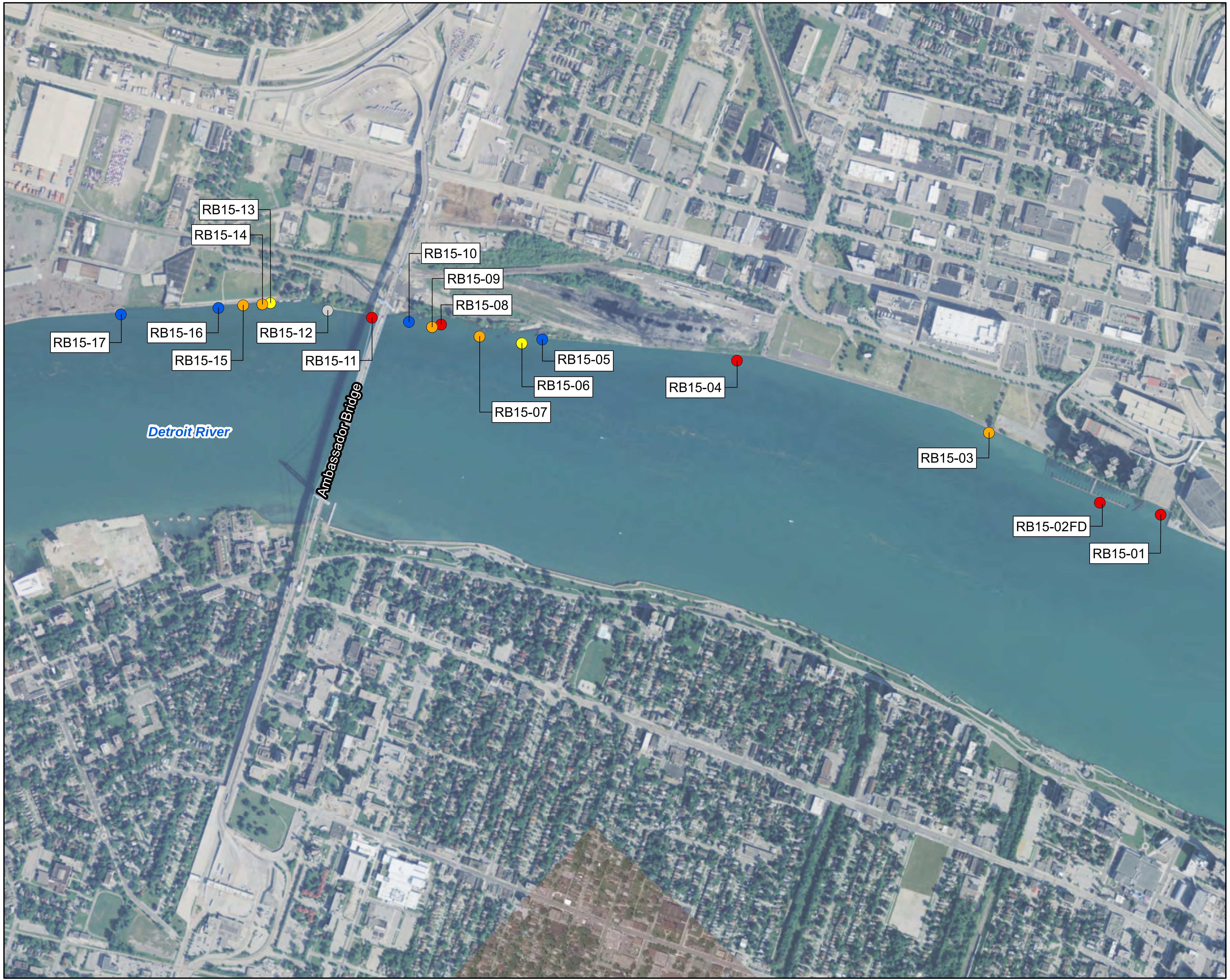
FIGURE 3-14A
Diesel Range Organics (mg/kg)
in Area A Compared to
Sample-Specific Risk Screening Levels
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

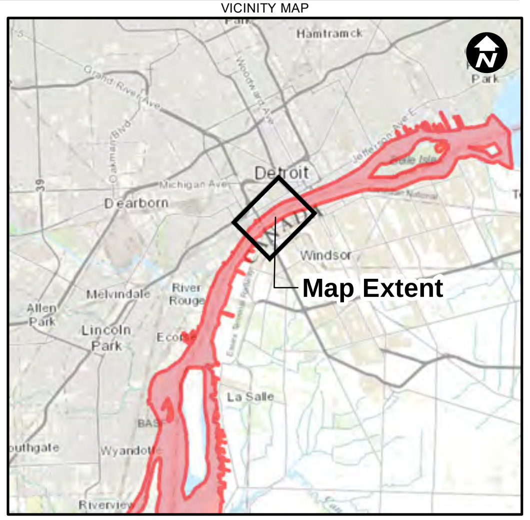
\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-14A TPH-DRO Area A.mxd

Map Date: 6/23/2016
Basemap: ESRI 2014

FIGURE 3-14B
Diesel Range Organics (mg/kg)
in Area B Compared to
Sample-Specific Risk Screening Levels
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-14B TPH-DRO Area B.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Sample results and SSRSLs are displayed on Table 3-8.
- No ponar sample was collected at RB15-12 due to field conditions.

TPH-ORO Concentrations

🟥 ≥ 3x Sample-Specific Risk Screening Level mg/kg

🟧 ≥ 2x Sample-Specific Risk Screening Level mg/kg

🟨 ≥ 1x Sample-Specific Risk Screening Level mg/kg

🟦 Does Not Exceed SSRSL

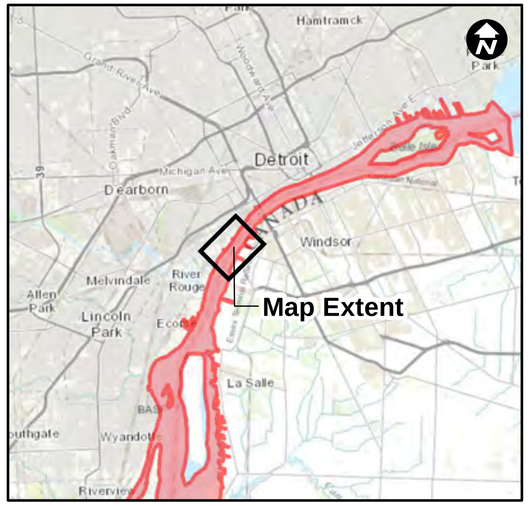
0 500 1,000 1,500 2,000
Feet

Map Date: 6/23/2016
Basemap: ESRI 2014

FIGURE 3-15A
Oil Range Organics (mg/kg)
in Area A Compared to
Sample-Specific Risk Screening Levels
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-15A TPH-ORO Area A.mxd

VICINITY MAP



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Sample results and SSRSLs are displayed on Table 3-8.

TPH-ORO Concentrations

🟥 ≥ 3x Sample-Specific Risk Screening Level mg/kg

🟧 ≥ 2x Sample-Specific Risk Screening Level mg/kg

🟨 ≥ 1x Sample-Specific Risk Screening Level mg/kg

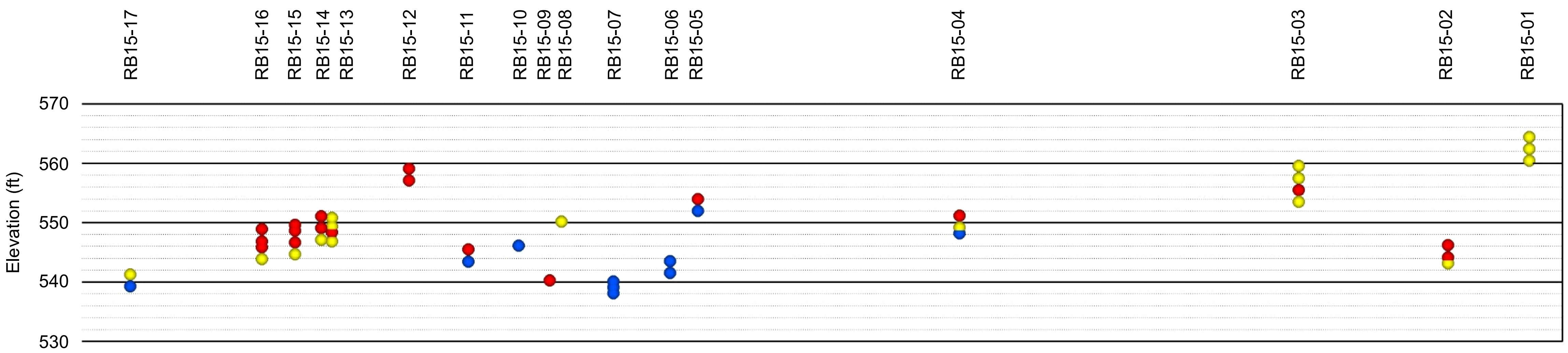
🟦 Does Not Exceed SSRSL

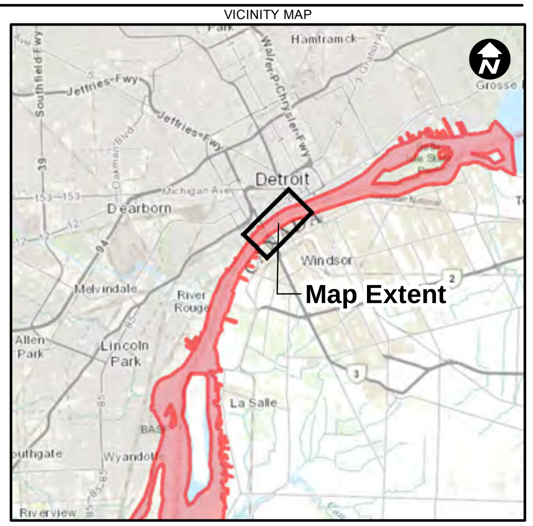
0 400 800 1,200 1,600
Feet

Map Date: 6/23/2016
Basemap: ESRI 2014

FIGURE 3-15B
Oil Range Organics (mg/kg)
in Area B Compared to
Sample-Specific Risk Screening Levels
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 3-15B TPH-ORO Area B.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon ESBTU results.
- ESBTUs were calculated using total 34 PAHs.
- No ponar sample was collected at RB15-12 due to field conditions.

ESBTUs for PAHs

🟥 > 10

🟧 > 7.5 and ≤ 10

🟨 > 1 and ≤ 7.5

🟦 ≤ 1

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

Map Date: 6/1/2016
Basemap: ESRI 2014

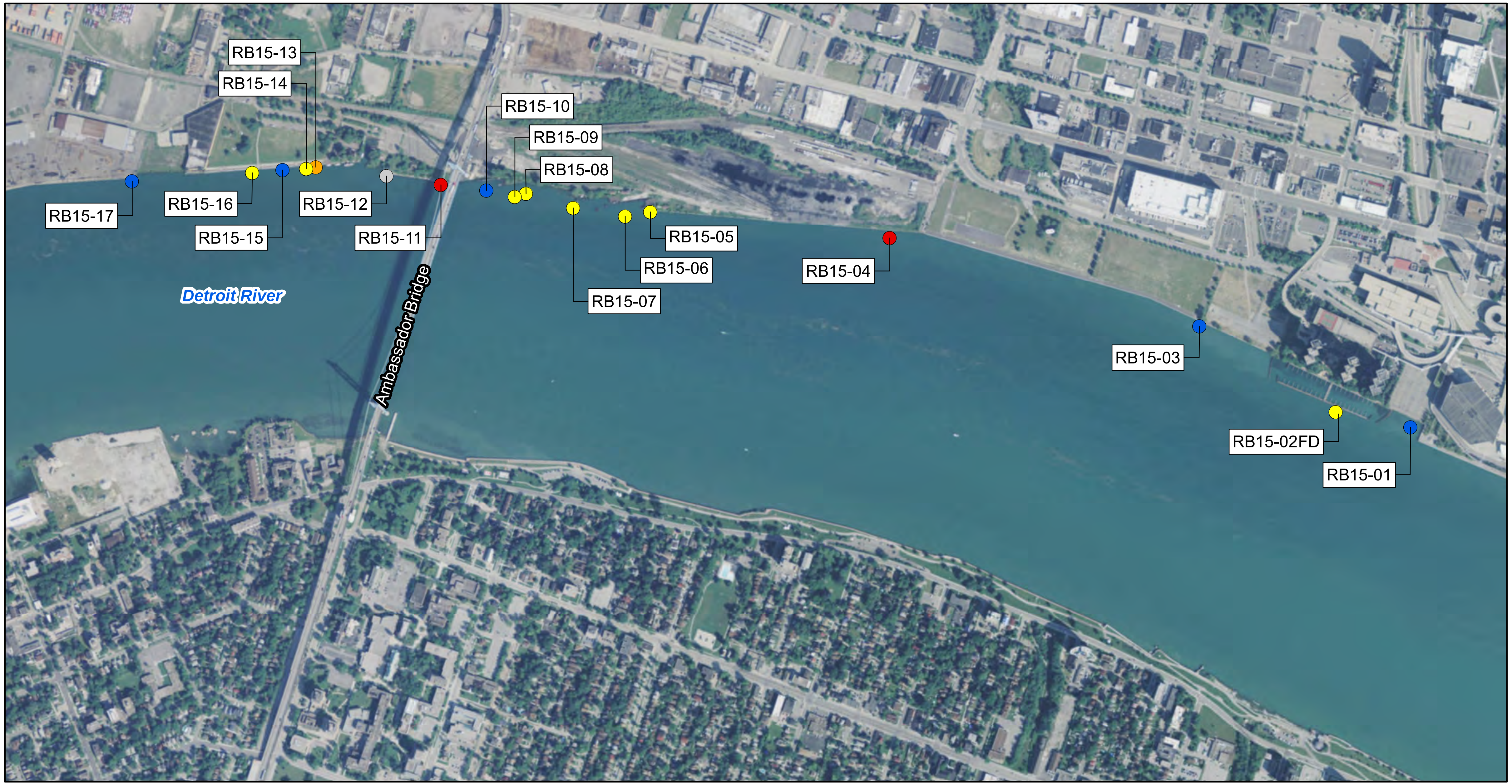
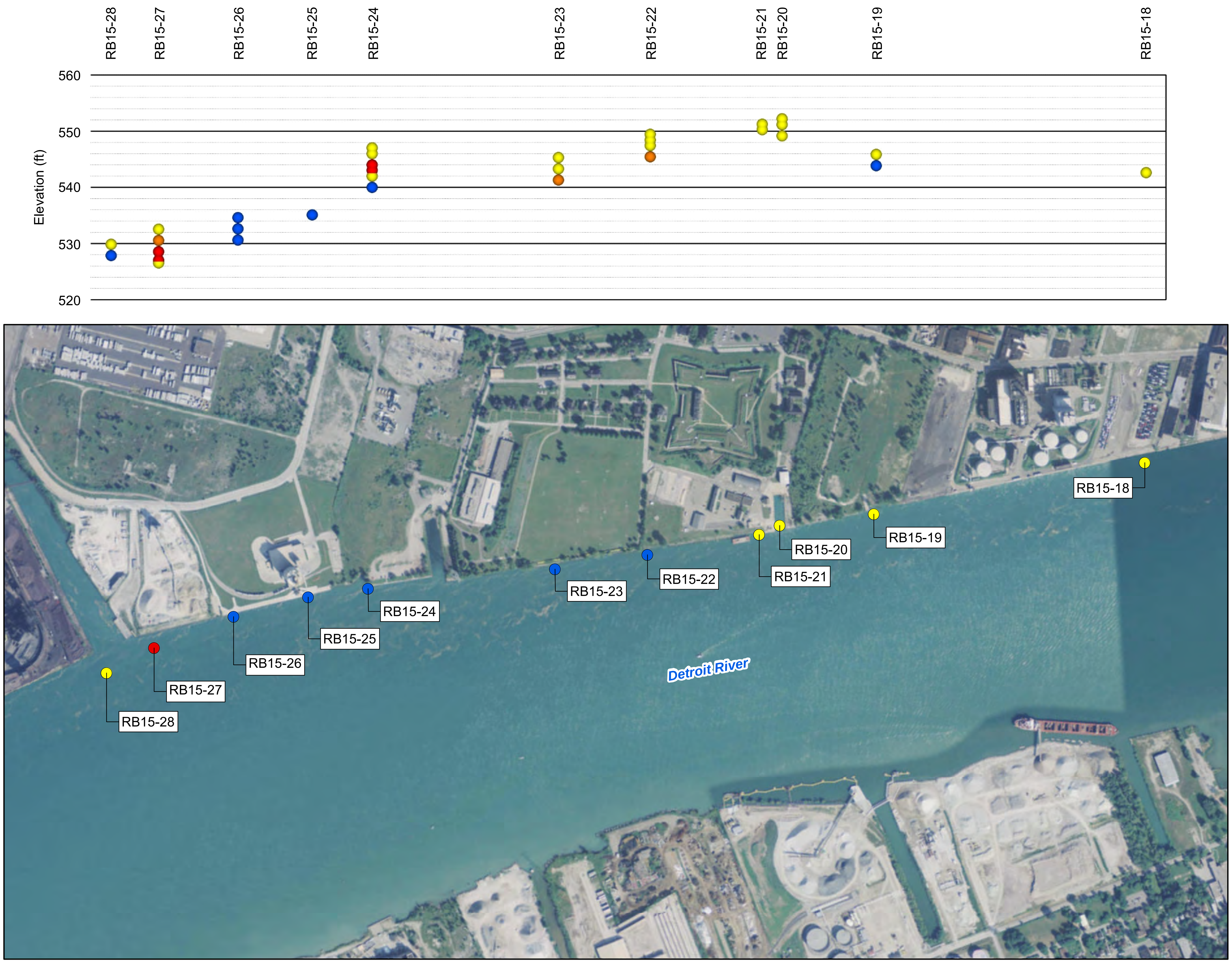
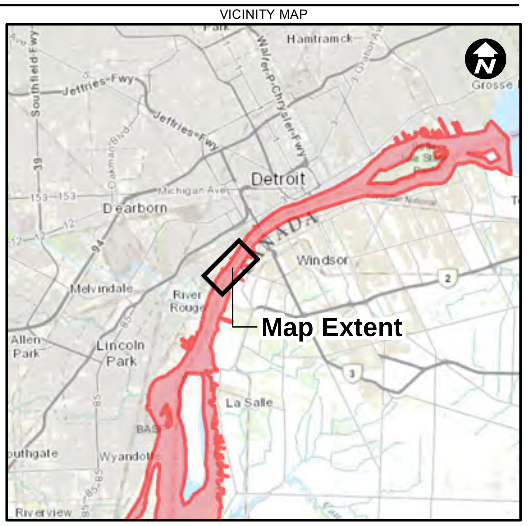


FIGURE 4-1A
ESBTUs for PAHs in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 4-1A ESBTU Area A.mxd





Legend

○ Sample Location

▨ Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon ESBTU results.
- ESBTUs were calculated using total 34 PAHs.

ESBTUs for PAHs

🟥 > 10

🟧 > 7.5 and ≤ 10

🟨 > 1 and ≤ 7.5

🟦 ≤ 1

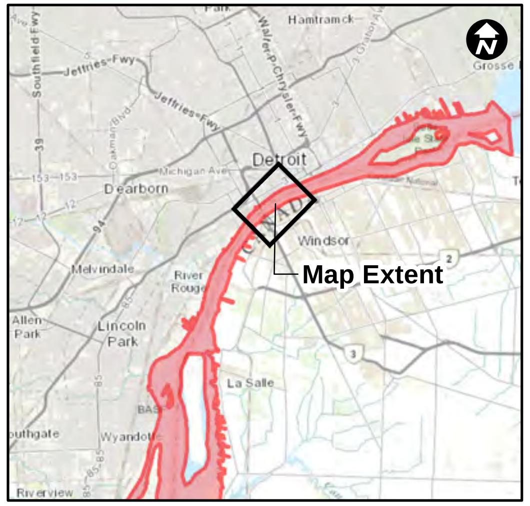
0 400 800 1,200 1,600
Feet

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 4-1B
ESBTUs for PAHs in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 4-1B ESBTU Area B.mxd

VICINITY MAP



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map
represent the ponar sample results (0-0.5 feet).
- Locations are color coded based
upon ESBTU results.
- No ponar sample was collected at RB15-12
due to field conditions.

ESBTU Metals Concentrations

🟥 $>3{,}000\ \mu mol/g_{oc}$

🟨 $>130\ \mu mol/g_{oc}$ and $\leq 3{,}000\ \mu mol/g_{oc}$

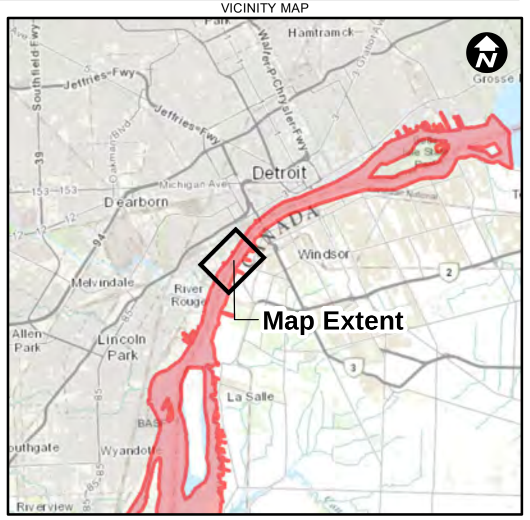
🟦 $\leq 130\ \mu mol/g_{oc}$

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

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 4-2A
ESBTUs for Metals in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 4-2A ESBTU Metals Area A.mxd



Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Locations are color coded based upon ESBTU results.

ESBTU Metals Concentrations

🟥 >3,000 μmol/g_{oc}

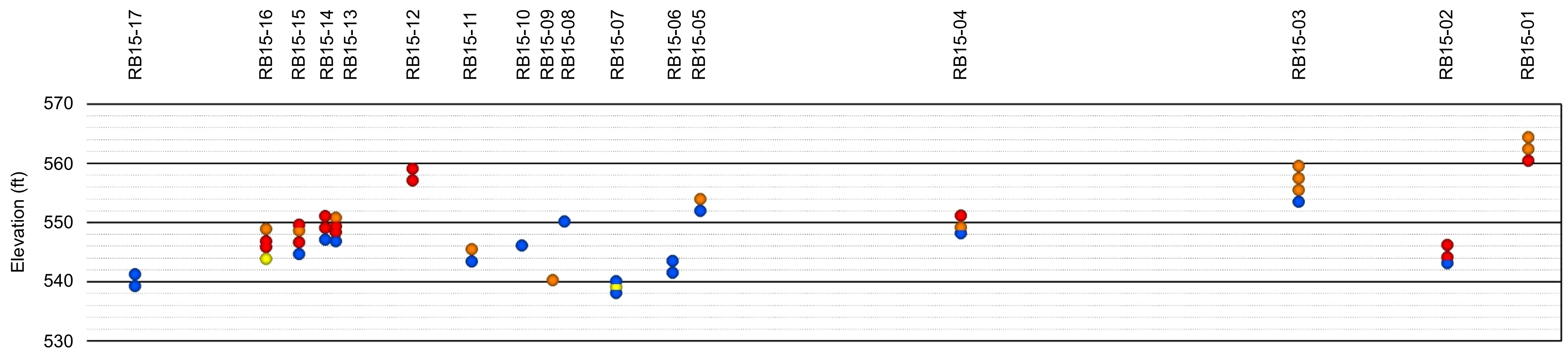
🟨 >130 μmol/g_{oc} and ≤3,000 μmol/g_{oc}

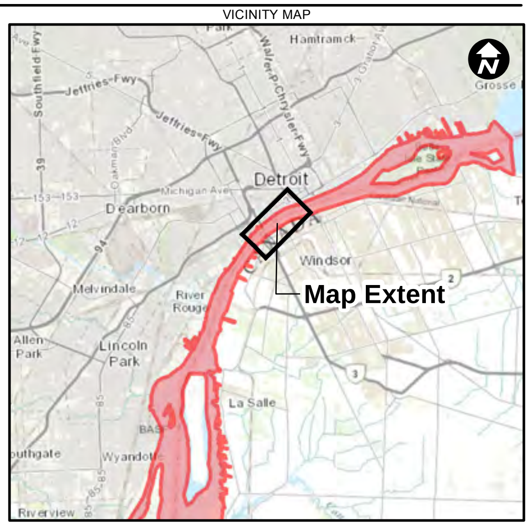
🟦 ≤130 μmol/g_{oc}

0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 4-2B
ESBTUs for Metals in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon PEC-Q results.
- No ponar sample was collected at RB15-12 due to field conditions.

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

🟥 > 5

🟧 > 1 and ≤ 5

🟨 > 0.5 and ≤ 1

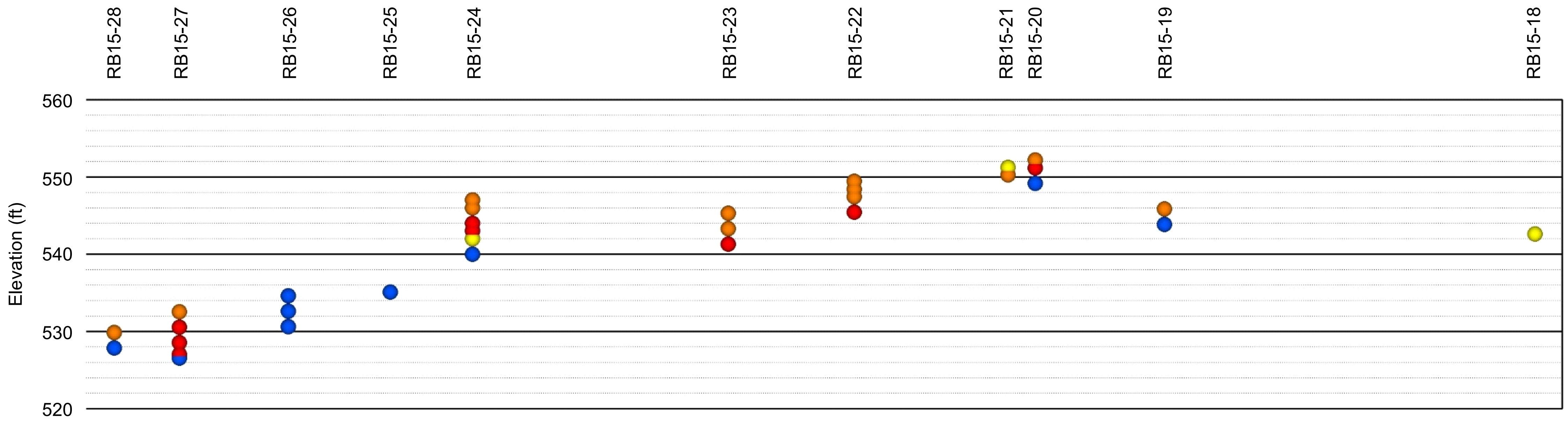
🟦 ≤ 0.5

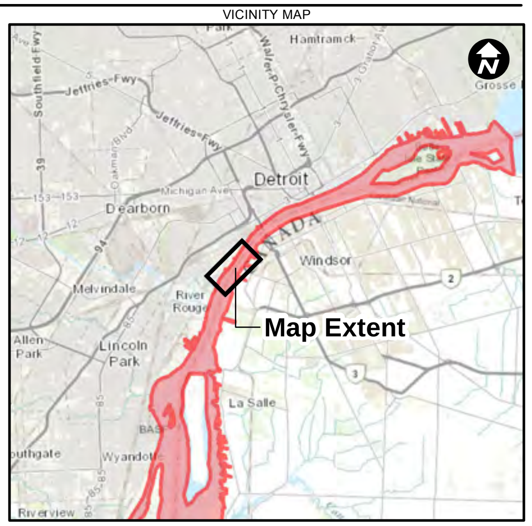
0 500 1,000 1,500 2,000
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 5-1A
PEC-Qs for Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 5-1A PECQ Area A.mxd





Legend

● Sample Location

🟥 Detroit River Area of Concern (AOC)

- Colored symbols on the map represent the ponar sample results (0-0.5 feet).
- Colored symbols on the graphs represent the sonic core sample results (generally 0-1 foot; 1-3 feet; and 2 foot intervals thereafter).
- Locations are color coded based upon PEC-Q results.

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

🟥 > 5

🟧 > 1 and ≤ 5

🟨 > 0.5 and ≤ 1

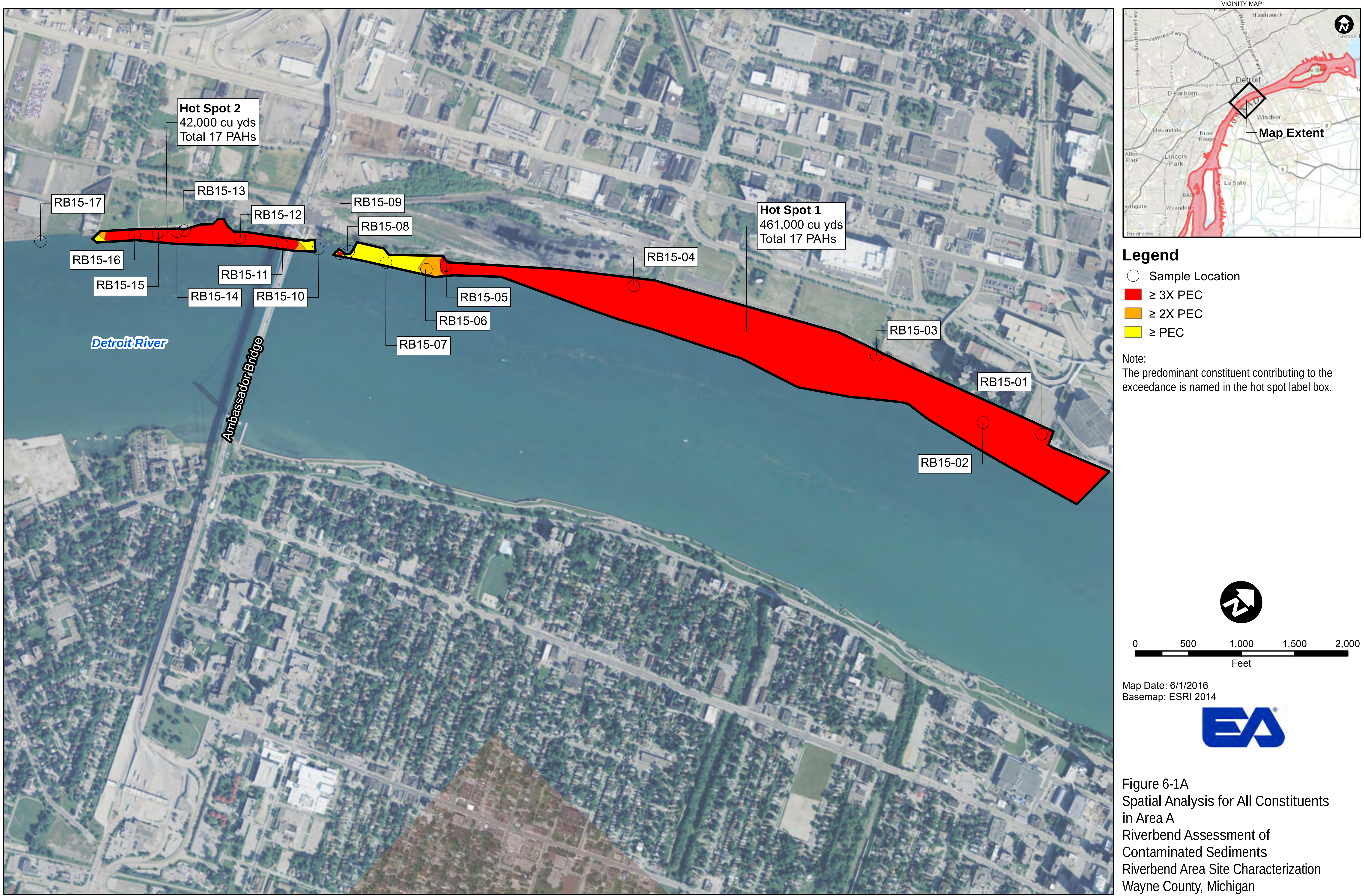
🟦 ≤ 0.5

0 400 800 1,200 1,600
Feet

Map Date: 5/4/2016
Basemap: ESRI 2014

FIGURE 5-1B
PEC-Qs for Area B
Riverbend Assessment of Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 5-1B PECQ Area B.mxd



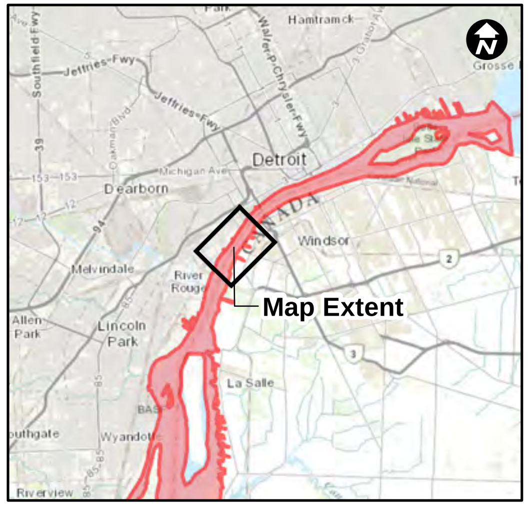
Note:
The predominant constituent contributing to the exceedance is named in the hot spot label box.

Map Date: 6/1/2016
Basemap: ESRI 2014

Figure 6-1A
Spatial Analysis for All Constituents in Area A
Riverbend Assessment of Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-1A Kriging Results Area A.mxd

VICINITY MAP



Legend

○ Sample Location
🟥 ≥ 3X PEC
🟧 ≥ 2X PEC
🟨 ≥ PEC

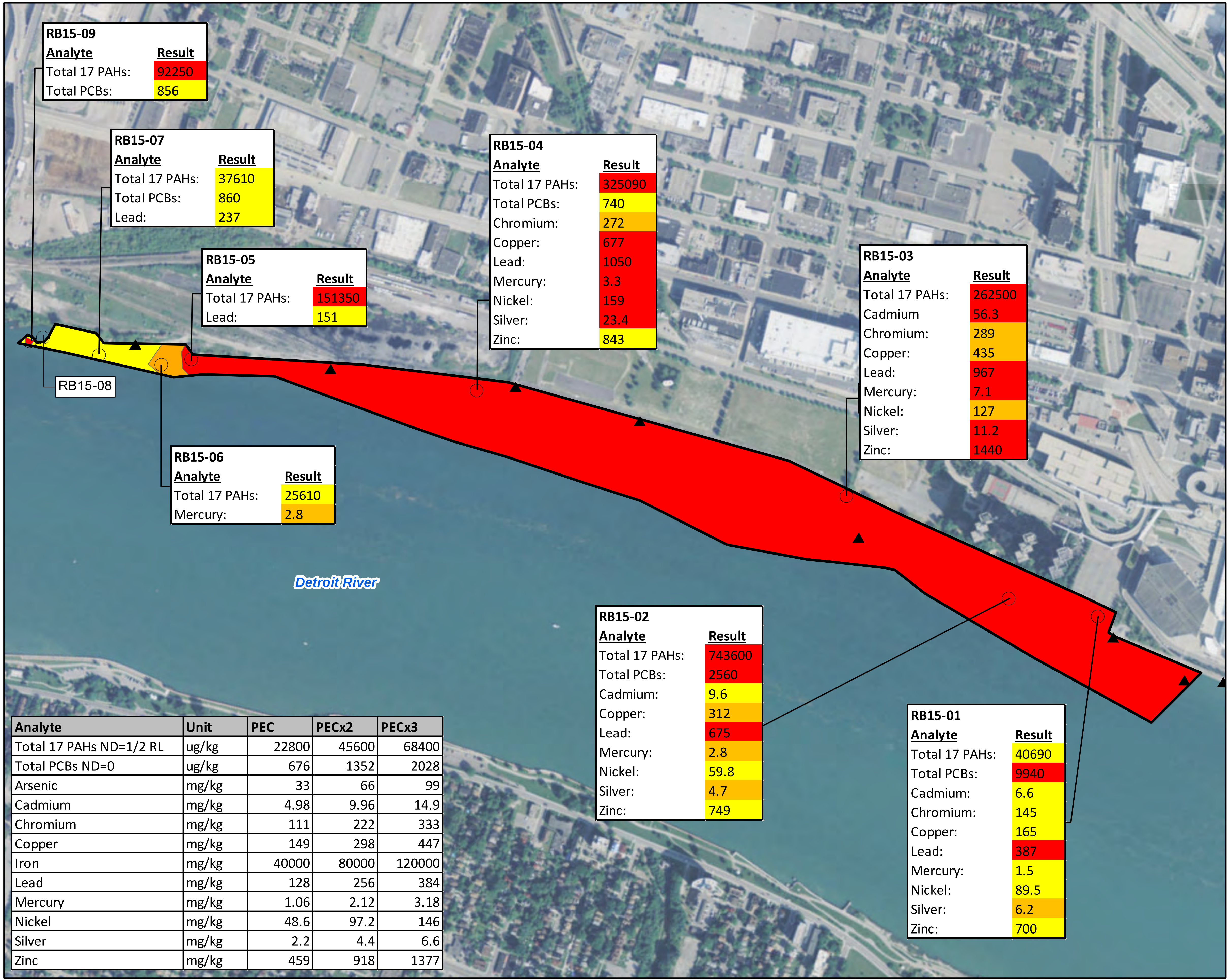
Note:
The predominant constituent contributing to the exceedance is named in the hot spot label box.

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

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 6-1B
Spatial Analysis for All Constituents in Area A
Riverbend Assessment of Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-1B Kriging Results Area B.mxd



RB15-09

Analyte	Result
Total 17 PAHs:	92250
Total PCBs:	856

RB15-07

Analyte	Result
Total 17 PAHs:	37610
Total PCBs:	860
Lead:	237

RB15-05

Analyte	Result
Total 17 PAHs:	151350
Lead:	151

RB15-04

Analyte	Result
Total 17 PAHs:	325090
Total PCBs:	740
Chromium:	272
Copper:	677
Lead:	1050
Mercury:	3.3
Nickel:	159
Silver:	23.4
Zinc:	843

RB15-03

Analyte	Result
Total 17 PAHs:	262500
Cadmium	56.3
Chromium:	289
Copper:	435
Lead:	967
Mercury:	7.1
Nickel:	127
Silver:	11.2
Zinc:	1440

RB15-06

Analyte	Result
Total 17 PAHs:	25610
Mercury:	2.8

RB15-02

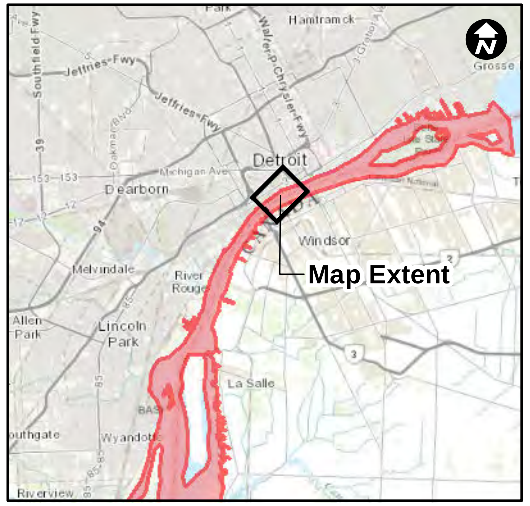
Analyte	Result
Total 17 PAHs:	743600
Total PCBs:	2560
Cadmium:	9.6
Copper:	312
Lead:	675
Mercury:	2.8
Nickel:	59.8
Silver:	4.7
Zinc:	749

RB15-01

Analyte	Result
Total 17 PAHs:	40690
Total PCBs:	9940
Cadmium:	6.6
Chromium:	145
Copper:	165
Lead:	387
Mercury:	1.5
Nickel:	89.5
Silver:	6.2
Zinc:	700

Analyte	Unit	PEC	PECx2	PECx3
Total 17 PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Arsenic	mg/kg	33	66	99
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Iron	mg/kg	40000	80000	120000
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Silver	mg/kg	2.2	4.4	6.6
Zinc	mg/kg	459	918	1377

VICINITY MAP



Legend

- ○ Sample Location
- ▲ CSO
- ■ Industrial Outfall
- 🟥 ≥ 3X PEC
- 🟧 ≥ 2X PEC
- 🟨 ≥ PEC

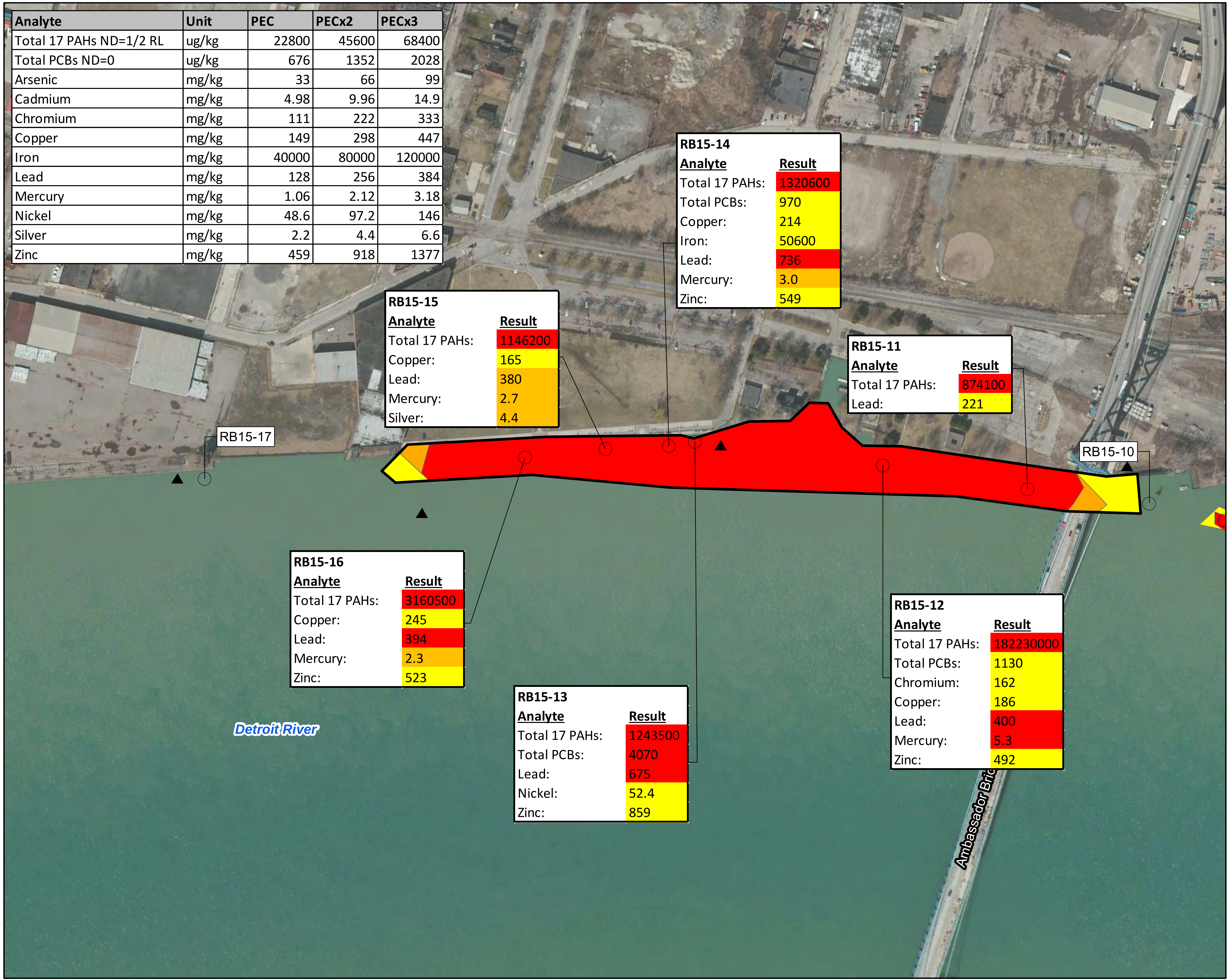
NOTE:
Results shown are maximum exceedances of PEC.
Estimated volume = 461,000 cu yd

0 200 400 600 800
Feet

Map Date: 6/6/2016
Basemap: ESRI 2014

FIGURE 6-2
Hot Spot 1
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\gisdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-2 Hot Spot 1.mxd



Analyte	Unit	PEC	PECx2	PECx3
Total 17 PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Arsenic	mg/kg	33	66	99
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Iron	mg/kg	40000	80000	120000
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Silver	mg/kg	2.2	4.4	6.6
Zinc	mg/kg	459	918	1377

RB15-14

Analyte	Result
Total 17 PAHs:	1320600
Total PCBs:	970
Copper:	214
Iron:	50600
Lead:	736
Mercury:	3.0
Zinc:	549

RB15-15

Analyte	Result
Total 17 PAHs:	1146200
Copper:	165
Lead:	380
Mercury:	2.7
Silver:	4.4

RB15-11

Analyte	Result
Total 17 PAHs:	874100
Lead:	221

RB15-16

Analyte	Result
Total 17 PAHs:	3160500
Copper:	245
Lead:	394
Mercury:	2.3
Zinc:	523

RB15-13

Analyte	Result
Total 17 PAHs:	1243500
Total PCBs:	4070
Lead:	675
Nickel:	52.4
Zinc:	859

RB15-12

Analyte	Result
Total 17 PAHs:	182230000
Total PCBs:	1130
Chromium:	162
Copper:	186
Lead:	400
Mercury:	5.3
Zinc:	492

VICINITY MAP

Legend

- ○ Sample Location
- ▲ CSO
- ■ Industrial Outfall
- 🟥 ≥ 3X PEC
- 🟧 ≥ 2X PEC
- 🟨 ≥ PEC

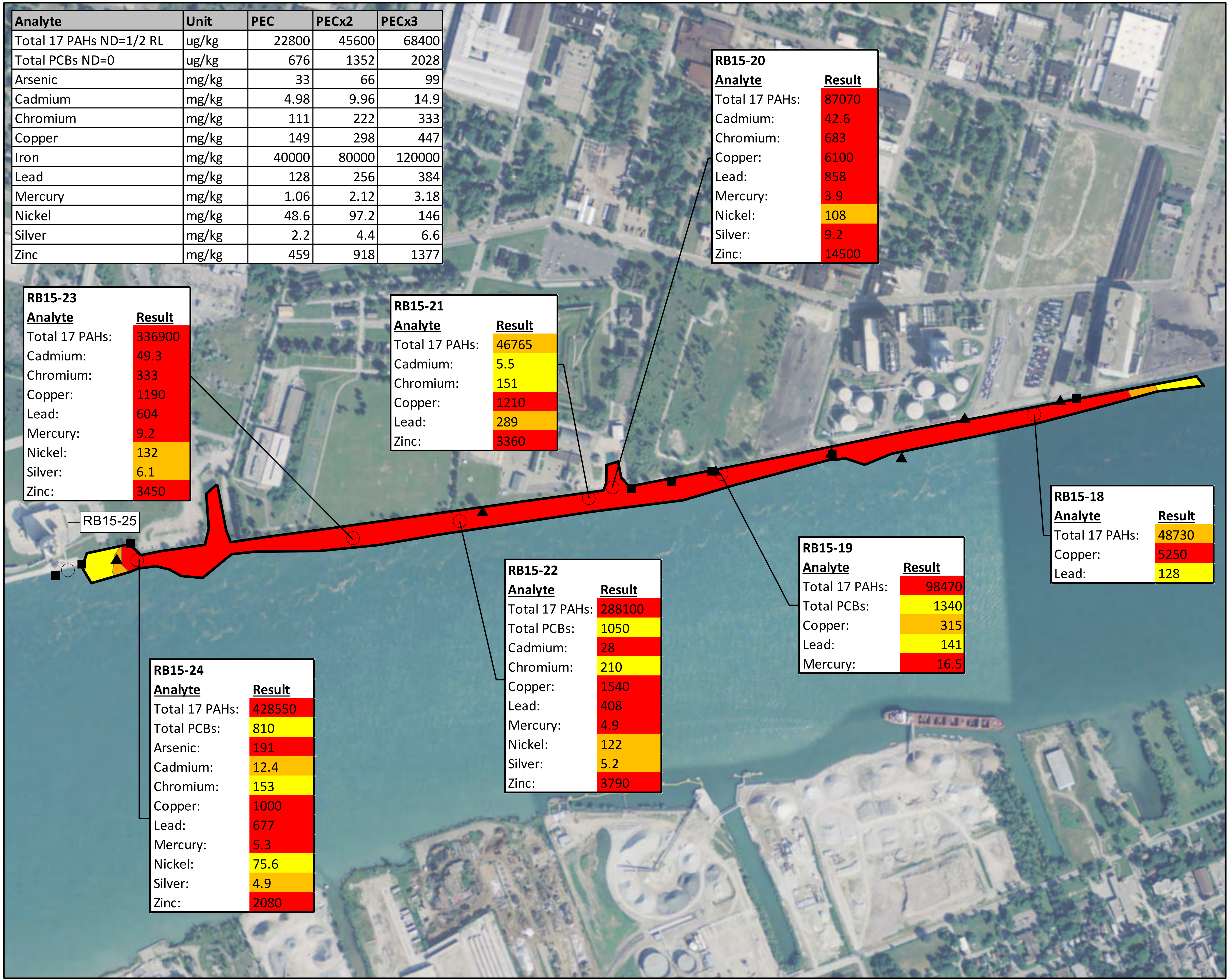
NOTE:
Results shown are maximum exceedances of PEC.
Estimated volume = 42,000 cu yd

0 100 200 300 400
Feet

Map Date: 6/6/2016
Basemap: ESRI 2014

FIGURE 6-3
Hot Spot 2
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\gisdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-3 Hot Spot 2.mxd



Analyte	Unit	PEC	PECx2	PECx3
Total 17 PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Arsenic	mg/kg	33	66	99
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Iron	mg/kg	40000	80000	120000
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Silver	mg/kg	2.2	4.4	6.6
Zinc	mg/kg	459	918	1377

RB15-23

Analyte	Result
Total 17 PAHs:	🟥 336900
Cadmium:	🟥 49.3
Chromium:	🟥 333
Copper:	🟥 1190
Lead:	🟥 604
Mercury:	🟥 9.2
Nickel:	🟧 132
Silver:	🟧 6.1
Zinc:	🟥 3450

RB15-21

Analyte	Result
Total 17 PAHs:	🟧 46765
Cadmium:	🟨 5.5
Chromium:	🟨 151
Copper:	🟥 1210
Lead:	🟧 289
Zinc:	🟥 3360

RB15-20

Analyte	Result
Total 17 PAHs:	🟥 87070
Cadmium:	🟥 42.6
Chromium:	🟥 683
Copper:	🟥 6100
Lead:	🟥 858
Mercury:	🟥 3.9
Nickel:	🟧 108
Silver:	🟥 9.2
Zinc:	🟥 14500

RB15-18

Analyte	Result
Total 17 PAHs:	🟧 48730
Copper:	🟥 5250
Lead:	🟨 128

RB15-19

Analyte	Result
Total 17 PAHs:	🟥 98470
Total PCBs:	🟨 1340
Copper:	🟧 315
Lead:	🟨 141
Mercury:	🟥 16.5

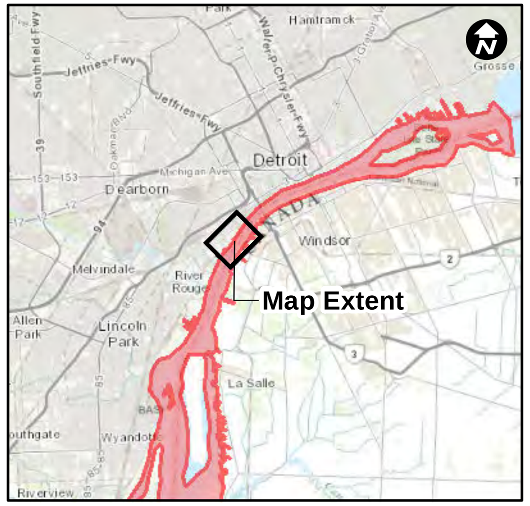
RB15-22

Analyte	Result
Total 17 PAHs:	🟥 288100
Total PCBs:	🟨 1050
Cadmium:	🟥 28
Chromium:	🟨 210
Copper:	🟥 1540
Lead:	🟥 408
Mercury:	🟥 4.9
Nickel:	🟧 122
Silver:	🟧 5.2
Zinc:	🟥 3790

RB15-24

Analyte	Result
Total 17 PAHs:	🟥 428550
Total PCBs:	🟨 810
Arsenic:	🟥 191
Cadmium:	🟧 12.4
Chromium:	🟨 153
Copper:	🟥 1000
Lead:	🟥 677
Mercury:	🟥 5.3
Nickel:	🟨 75.6
Silver:	🟧 4.9
Zinc:	🟥 2080

VICINITY MAP



Legend

- ○ Sample Location
- ▲ CSO
- ■ Industrial Outfall
- 🟥 ≥ 3X PEC
- 🟧 ≥ 2X PEC
- 🟨 ≥ PEC

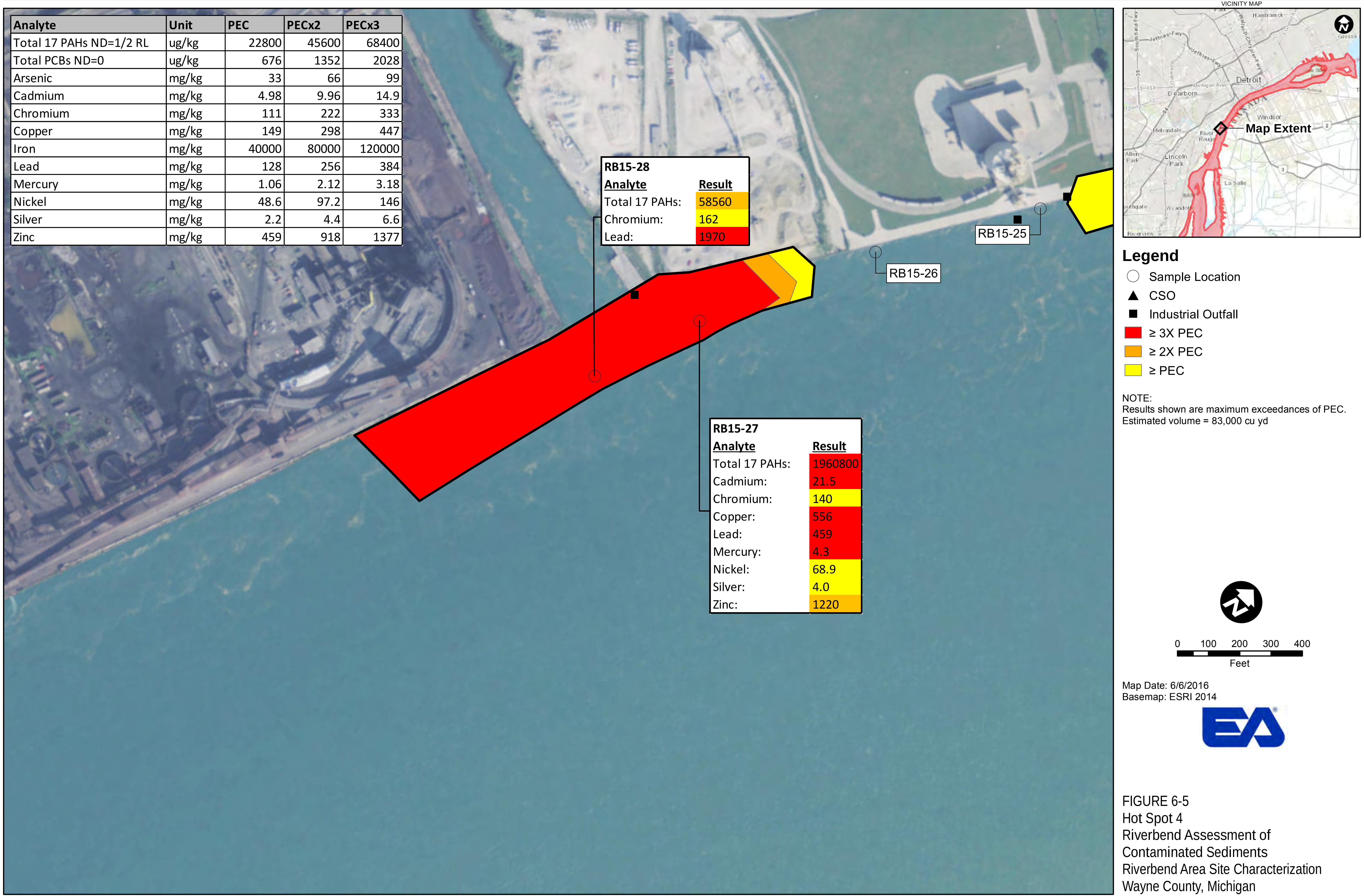
NOTE:
Results shown are maximum exceedances of PEC.
Estimated volume = 163,000 cu yd

0 200 400 600 800
Feet

Map Date: 6/6/2016
Basemap: ESRI 2014

FIGURE 6-4
Hot Spot 3
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\gisdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-4 Hot Spot 3.mxd



Analyte	Unit	PEC	PECx2	PECx3
Total 17 PAHs ND=1/2 RL	ug/kg	22800	45600	68400
Total PCBs ND=0	ug/kg	676	1352	2028
Arsenic	mg/kg	33	66	99
Cadmium	mg/kg	4.98	9.96	14.9
Chromium	mg/kg	111	222	333
Copper	mg/kg	149	298	447
Iron	mg/kg	40000	80000	120000
Lead	mg/kg	128	256	384
Mercury	mg/kg	1.06	2.12	3.18
Nickel	mg/kg	48.6	97.2	146
Silver	mg/kg	2.2	4.4	6.6
Zinc	mg/kg	459	918	1377

RB15-28

Analyte	Result
Total 17 PAHs:	58560
Chromium:	162
Lead:	1970

RB15-27

Analyte	Result
Total 17 PAHs:	1960800
Cadmium:	21.5
Chromium:	140
Copper:	556
Lead:	459
Mercury:	4.3
Nickel:	68.9
Silver:	4.0
Zinc:	1220

Legend

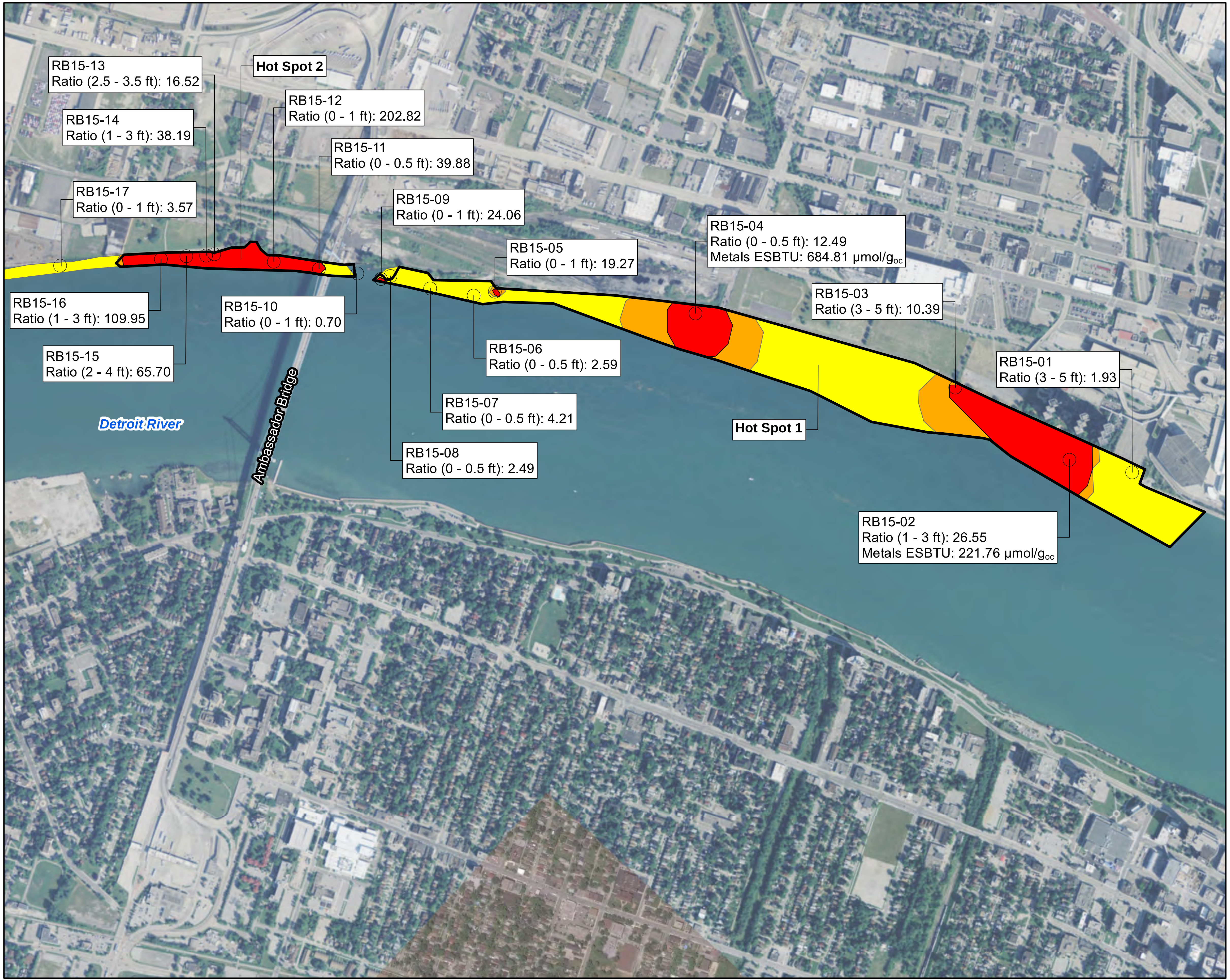
○ Sample Location
▲ CSO
■ Industrial Outfall
🟥 ≥ 3X PEC
🟧 ≥ 2X PEC
🟨 ≥ PEC

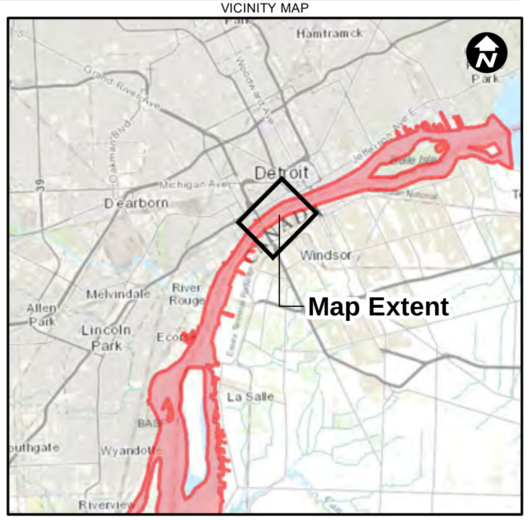
NOTE:
Results shown are maximum exceedances of PEC.
Estimated volume = 83,000 cu yd

Map Date: 6/6/2016
Basemap: ESRI 2014

FIGURE 6-5
Hot Spot 4
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\gisdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-5 Hot Spot 4.mxd





Legend

○ Sample Location
🟥 ESBTU ≥ 10
🟧 7.5 ≤ ESBTU < 10
🟨 1 ≤ ESBTU < 7.5
☐ Hot Spot

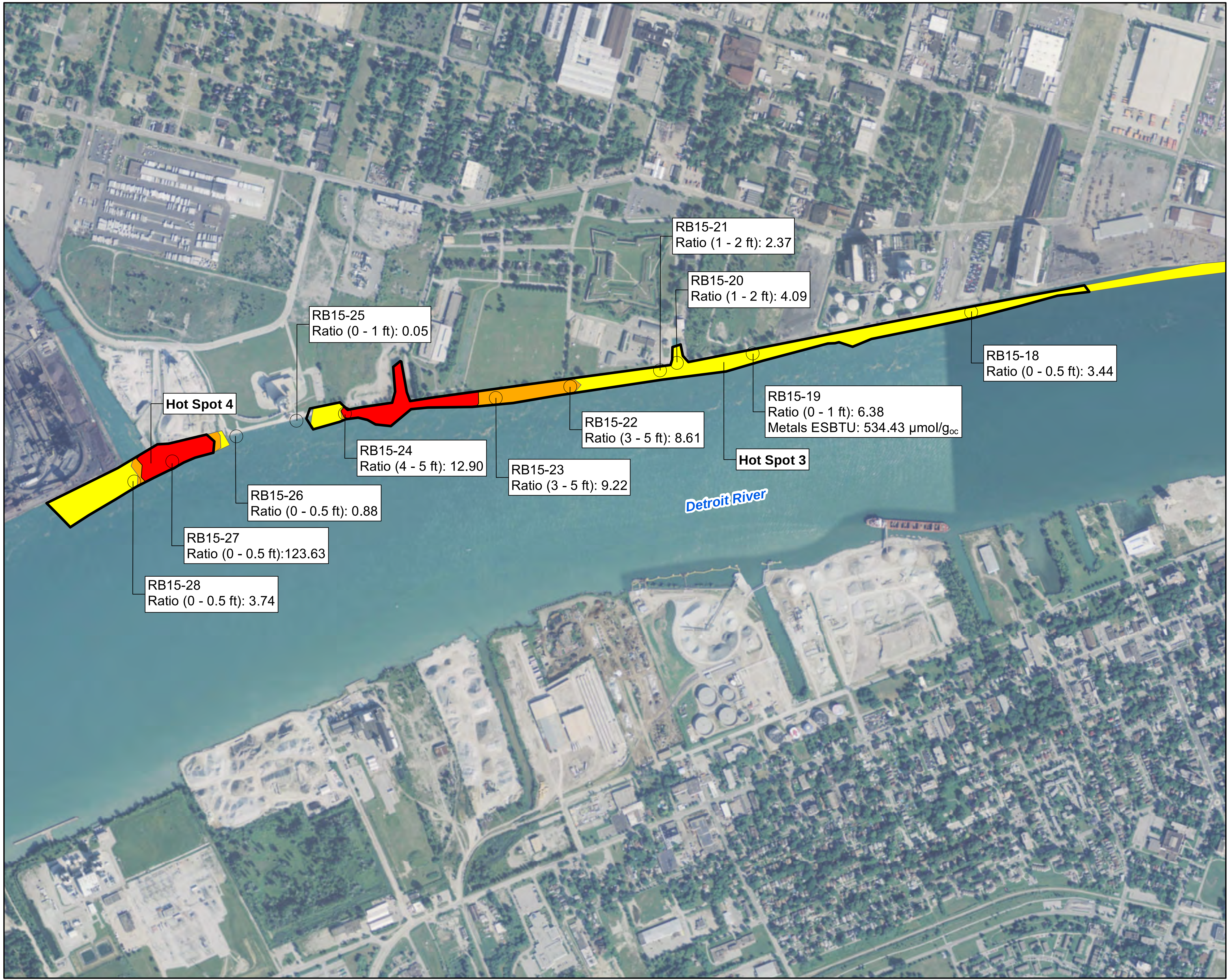
NOTE: Ratio value shown represents highest
ESBTU PAH result with associated depth (ft)
ESBTUs were calculated using total 34 PAHs.

Metals ESBTUs are noted for reference only and were
not included as inputs for the spatial analysis.
Only values greater than 130 µmol/g_{oc} are shown.

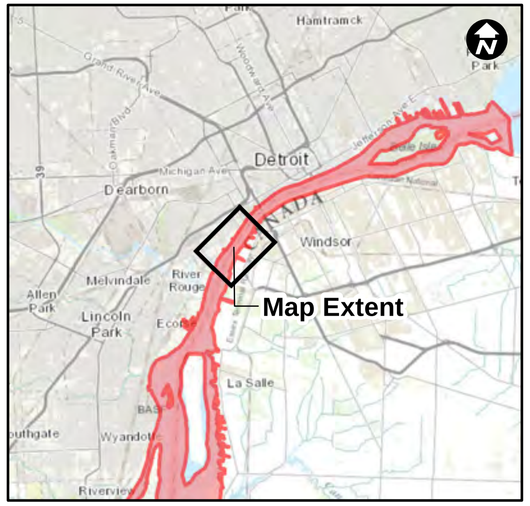
0 500 1,000 1,500 2,000
Feet

Map Date: 6/21/2016
Basemap: ESRI 2014

FIGURE 6-6A
Spatial Analysis for total PAH ESBTUs
in Area A
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan



VICINITY MAP



Legend

○ Sample Location
🟥 ESBTU ≥ 10
🟧 7.5 ≤ ESBTU < 10
🟨 1 ≤ ESBTU < 7.5
☐ Hot Spot

NOTE: Ratio value shown represents highest
ESBTU PAH result with associated depth (ft)
ESBTUs were calculated using total 34 PAHs.

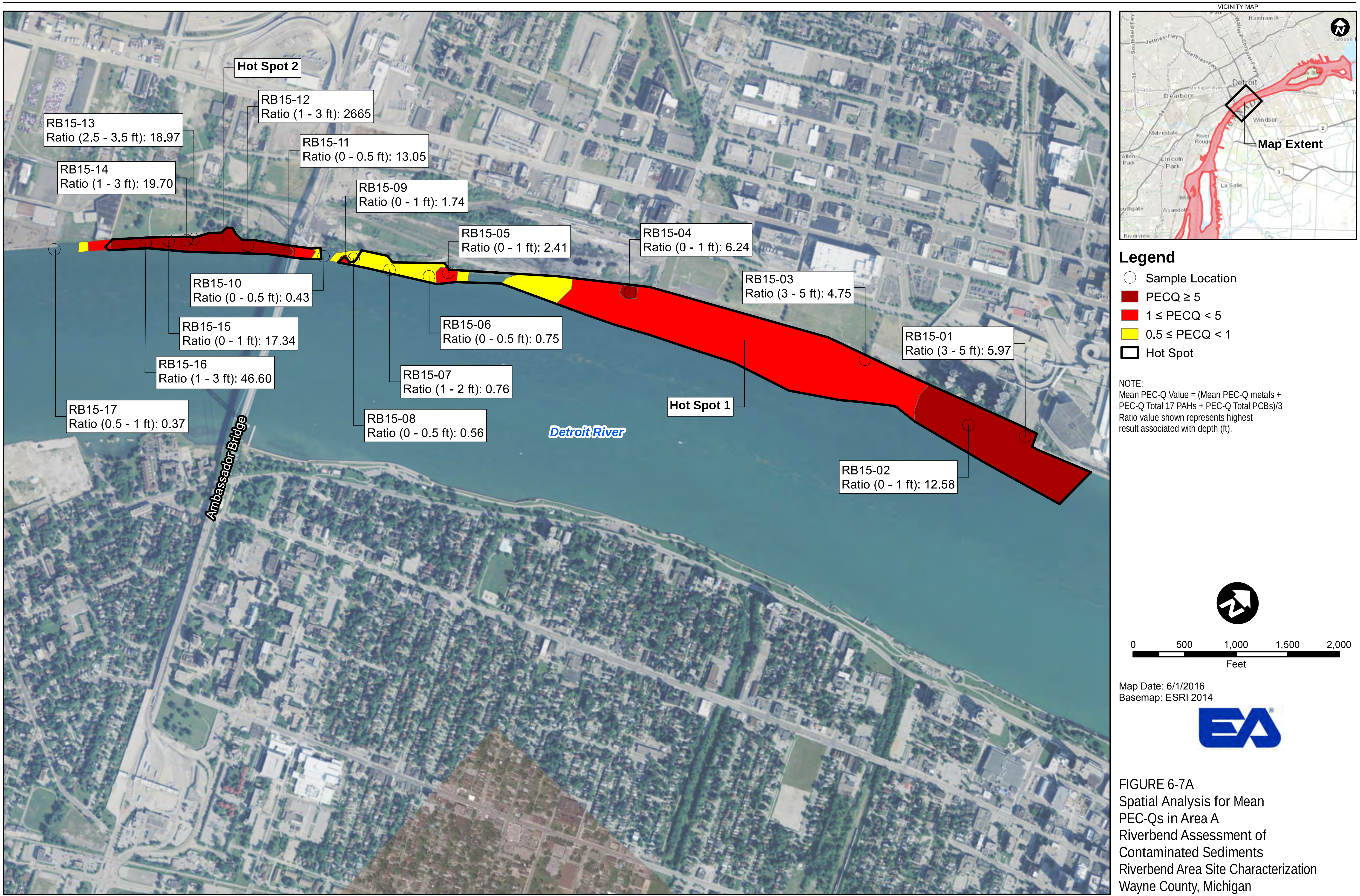
Metals ESBTUs are noted for reference only and were
not included as inputs for the spatial analysis.
Only values greater than 130 μmol/g$_{oc}$ are shown.

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

Map Date: 6/21/2016
Basemap: ESRI 2014

FIGURE 6-6B
Spatial Analysis for Total PAH ESBTUs
in Area B
Riverbend Assessment of
Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-6B ESBTU Kriging Results Area B.mxd



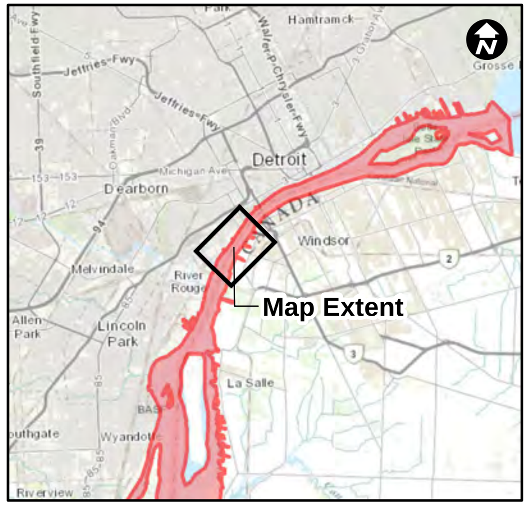
NOTE:
Mean PEC-Q Value = (Mean PEC-Q metals + PEC-Q Total 17 PAHs + PEC-Q Total PCBs)/3
Ratio value shown represents highest result associated with depth (ft).

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 6-7A
Spatial Analysis for Mean PEC-Qs in Area A
Riverbend Assessment of Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-7A PECQ Kriging Results Area A.mxd

VICINITY MAP



Legend

○ Sample Location
🟥 PECQ ≥ 5
🟥 1 ≤ PECQ < 5
🟨 0.5 ≤ PECQ < 1
☐ Hot Spot

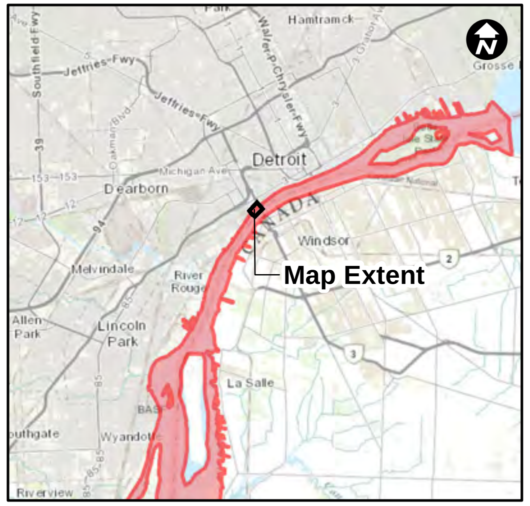
NOTE:
Mean PEC-Q Value = (Mean PEC-Q metals + PEC-Q Total 17 PAHs + PEC-Q Total PCBs)/3
Ratio value shown represents highest result associated with depth (ft).

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 6-7B
Spatial Analysis for Mean PEC-Qs in Area B
Riverbend Assessment of Contaminated Sediments
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 6-7B PECQ Kriging Results Area B.mxd

VICINITY MAP



Legend

- ● Sample Location
- 🟥 Detroit River Area of Concern (AOC)

NOTE:
No samples from RB15-11 were selected by the MDEQ onsite representative to be submitted for the additional analyses.

0 50 100 150 200
Feet

Map Date: 6/1/2016
Basemap: ESRI 2014

FIGURE 7-1
MDEQ Split Sample Locations
Riverbend Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Riverbend\MXD\SCR\RB_Figure 7-1 MDEQ Split Sample Locations.mxd

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Tables

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Tables for
Section 2: Riverbend Area Site Investigation

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TABLE 2-1 RIVERBEND AREA SITE CHARACTERIZATION COORDINATES AND SAMPLE COLLECTION DATA DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER - NOVEMBER 2015)

Location ID	Date Sampled	Time Sampled (local)[a]	Target Coordinates		Actual Coordinates (Approximate)		Distance from Target Coordinates[b] (ft)	Surface Sample Description	Field Notes
			Y	X	Y	X			
			NAD83 State Plane Michigan South (US Survey Feet)						
Riverbend Area									
RB15-01	10/30/15	15:15	303119.2759	13478755.93	303114.1238	13478751.65	7	Brown silt with a few pieces of woody organic debris. Mild sewage odor.	Location moved during coring attempts to try for more complete recovery.
RB15-02	10/31/15	9:25	302806.1002	13478282.10	302803.4944	13478284.54	4	Brown fine to medium sand, sheen visible, clam shells up to 8 inches wide to fragments, wood debris up to 1 inch long.	
RB15-03	10/31/15	10:30	302546.1503	13477129.12	302541.7349	13477127.41	5	Very soft brown-gray silt/silty clay. Trace very fine sand.	
RB15-04	10/31/15	12:30	301396.3341	13475062.97	301388.6472	13475051.61	14	Brown sand with riprap, gravel/pebbles, slight sheen, brick, shell hash. A live crayfish; moving slowly.	Location moved ~13 ft due to riprap and windy conditions. Local fishermen on pier mentioned submerged car in vicinity of target location.
RB15-05	10/31/15	14:00	300297.6834	13473657.45	300277.1294	13473669.49	24	Trace silt, whole mussel shells loose, unconsolidated.	Pivoted outwards from seawall for better recovery. Mussel shells at the sediment surface extremely dense, very little fine material. May not be enough recovery for analytical sample on surface; however, core recovery was adequate. Mussel shells visible in top 6 inches of core.
RB15-06	10/31/15	15:00	300112.8224	13473557.50	300121.9898	13473562.32	10	Gray to dark gray silt with fine sand and unconsolidated whole mussel shells/hash.	
RB15-07	11/1/15	12:45	299895.9100	13473269.25	299894.6902	13473247.83	21	Unconsolidated mussel shells with some dark gray silt and very fine sand. Collected double volume for analytical sample.	
RB15-08	11/1/15	10:35	299802.4140	13472924.45	299724.9505	13472924.87	77	Brown fine to medium sand, small shells ~1/2 inch across	Location moved ~70 ft S due to visible submerged pilings along seawall in vicinity of target location.
RB15-09	11/1/15	9:30	299640.4805	13472869.60	299650.7507	13472884.62	18	Dark gray sandy silt, sand very fine to fine, and mussel shells.	Location moved ~20 ft S due to riprap/submerged pilings along seawall. High clay content in core.
RB15-10	11/1/15	8:15	299607.7387	13472707.26	299535.7009	13472703.94	72	Whole mussels shells with some dark gray silt and very fine sand. Collected double volume for analytical sample.	Location moved ~70 ft S of target location due to pilings/old dolphins visible in water. Target location appears to be on land.
RB15-11[c]	11/3/15	11:55	299342.7071	13472441.37	299326.1613	13472438.05	17	Lots of mussel shells with brown sand/silt, some gravel and some woody organic debris.	John Barkach (GLEC) advised EA that location should be as close to seawall as possible, and sample location should match that of aerial map provided by MDEQ. Location moved 15 ft S and 20 ft E to avoid seawall obstructions. Rex Johnson (Global Remediation Technologies, Inc.) observed sample location moves. Extra surface sample volume collected due to large quantity of mussel shells.
RB15-12	11/3/15	10:40	299110.5585	13472109.24	299089.6418	13472109.45	21	5 attempts, zero recovery with each one.	Location moved to avoid seawall. Rex Johnson (Global Remediation Technologies, Inc.) observed sample location moves. Visible black material with strong fuel smell at bottom of the core. Sheen visible. Third coring attempt met refusal after 3.1 ft due to rock and brick fragments.
RB15-13[c]	11/2/15	15:10	298777.7199	13471698.84	298768.1725	13471695.17	10	Brown sand silt mixed with some gravel and mussel shells.	John Barkach (GLEC) advised EA that location should be as close to seawall as possible, and sample location should match that of aerial map provided by MDEQ. Location shifted 9 ft S and 23 ft E to avoid seawall obstructions.

TABLE 2-1 RIVERBEND AREA SITE CHARACTERIZATION COORDINATES AND SAMPLE COLLECTION DATA
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER - NOVEMBER 2015)

Location ID	Date Sampled	Time Sampled (local)[a]	Target Coordinates		Actual Coordinates (Approximate)		Distance from Target Coordinates[b] (ft)	Surface Sample Description	Field Notes
			Y	X	Y	X			
			NAD83 State Plane Michigan South (US Survey Feet)						
RB15-14[c]	11/2/15	14:20	298726.3685	13471653.64	298709.5326	13471652.25	17	Brown sand silt mixed with some gravel, mussel shells and fishing line. A few pieces of SAV.	John Barkach (GLEC) advised EA that location should be as close to seawall as possible, and sample location should match that of aerial map provided by MDEQ. Actual location was 16 ft S and 26 ft E of target.
RB15-15[c]	11/2/15	13:00	298589.0095	13471537.26	298580.3028	13471534.44	9	Brown sand and silt mixed with lots of mussel shells. One metal bottle cap.	John Barkach (GLEC) advised EA that location should be as close to seawall as possible, and sample location should match that of aerial map provided by MDEQ. Clay at bottom of core.
RB15-16	11/2/15	11:35	298421.3300	13471392.39	298406.4232	13471393.35	15	Mostly mussel shells with some sand, trash and woody organic debris.	Location moved ~11 ft S. Sheen and brown/black globs observed. Tar odor evident.
RB15-17	11/2/15	9:05	297799.8530	13470814.87	297738.1345	13470808.93	62	Gray clay, small amount of gravel, and a few mussel shells.	Location moved 5 ft west and 60 ft S to avoid concrete seawall obstructions.
RB15-18	11/1/15	15:15	295801.3752	13469465.07	295807.5784	13469470.10	8	Highly variable lithology based on 4 ponar grabs -- gray clay with mussel shells, gray sand (fine to medium) with pebbles and cobbles, Campbell's soup can, wood debris.	
RB15-19	11/2/15	17:05	294282.1580	13468374.28	294193.7416	13468371.58	88	Brown sand/silt mixed with mussel shells and gravel.	Location shifted ~75 ft south due to riprap and wood pilings near target location.
RB15-20	11/4/15	14:15	293669.6243	13467949.03	293665.0127	13467957.89	10	Brown silt. Sheen and fuel odor detected, a few pieces of woody organic debris.	
RB15-21	11/4/15	12:10	293524.8325	13467894.14	293515.2830	13467900.73	12	Sand with some silt, mussel shells and woody organic debris.	Twelve ponar grabs taken to get sufficient volume for surface sample. Rock jammed in the core catcher.
RB15-22	11/3/15	16:50	292895.1547	13467419.06	292855.5143	13467442.56	46	Brown sand and silt mixed with lots of SAV.	Location moved ~45 ft to try for more complete recovery in core attempts.
RB15-23	11/3/15	15:05	292383.4085	13467053.94	292321.1254	13467052.43	62	Brown sand and silt with some gravel, organic woody debris, mussel shells and a few pieces of SAV.	Location moved ~6 ft W and ~50 ft S to avoid shoreline rip rap. Location moved an additional 10 ft SE to try for more complete recovery in core attempts.
RB15-24[d]	11/4/15	9:20	291306.1658	13466117.17	291288.2774	13466213.38	98	Brown silt with just a few pieces of woody organic debris.	Target location moved to avoid major pipelines in the vicinity. Location moved an additional ~60 ft E and ~80 ft S of revised location due to seawall obstructions.
RB15-25[d]	11/4/15	10:30	291113.4885	13466028.34	290944.5181	13465955.96	184	Sand with some silt, mussel shells and woody organic debris.	Target location moved to avoid major pipelines in the vicinity. Location moved an additional ~60 ft S and ~10 ft E of revised location due to seawall obstructions.
RB15-26	11/3/15	8:00	290464.6998	13465685.50	290473.2091	13465681.29	10	Mostly gravel with some brown clay and silt. A few mussel shells.	Location moved ~ 8 ft S. Ten ponar attempts produced mostly gravel. Collected sediment that was recovered, but lots of rocks included in sample.
RB15-27	10/26/15	15:30	289924.1451	13465438.72	289919.4702	13465438.51	5	Sand with gravel and black stone/coal (slag), mussel shells and one 2-inch stone.	Slight sheen noted from ponar. Did not reach clay with core, still sandy material at the bottom.
RB15-28	10/26/15	13:45	289554.1278	13465335.49	289556.6609	13465326.50	9	Gray silt with a small amount of sand and a few gravel size stones.	Location moved ~8 ft W and 2 ft N.

TABLE 2-1 RIVERBEND AREA SITE CHARACTERIZATION COORDINATES AND SAMPLE COLLECTION DATA
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER - NOVEMBER 2015)

Location ID	Date Sampled	Time Sampled (local)[a]	Target Coordinates		Actual Coordinates (Approximate)		Distance from Target Coordinates[b] (ft)	Surface Sample Description	Field Notes
			Y	X	Y	X			
			NAD83 State Plane Michigan South (US Survey Feet)						
Harbortown Area									
HBT15-A	10/27/15	10:45	306144.9972	13485665.28	306145.8477	13485672.20	7	Gray/brown silt, slight fuel odor.	Encountered refusal at 10 ft. Bottom of core is hard black clay with fuel odor. PID at bottom of core was 1.5 ppm.
HBT15-B	10/30/15	10:10	305931.9507	13485652.72	305883.7682	13485643.75	49	Sand and gravel with lots of mussel shells.	Sample location moved ~50 ft offshore to avoid riprap near shore. Three ponar grabs taken to get sufficient volume for surface sample. Three different coring attempts were made at this location over the course of two days. The core kept for chemcial analysis was the second core collected, overall, and the first core collected on 10/30/2015.
HBT15-C	10/30/15	13:05	305815.6799	13485469.06	305772.7285	13485468.52	43	Sand and gravel mix, lots of mussel shells, some woody organic debris and bits of broken glass.	After consultation with EPA, shifted location ~44 ft SE of the target location due to rocks and shoreline riprap.

EPA = U.S. Environmental Protection Agency
ft = Foot (feet)
GLEC = Great Lakes Environmental Center, Inc.
MDEQ = Michigan Department of Environmental Quality
NAD83 = North American Datum of 1983
SAV = Submerged aquatic vegetation

a. All dates 10/31 and earlier have times in Eastern Daylight Time (EDT). All dates 11/1 and later have times in Eastern Standard Time (EST).
b. Distance of actual from proposed location calculated using GIS.
c. The target Riverside Park locations (RB15-11, -13, -14, and -15) were revised by MDEQ and submitted to EPA on 10/23/15, after the draft submittal of the Quality Assurance Project Plan. The coordinates provided in this table are the revised coordinates provided by GLEC.
d. The target locations of RB15-24 and RB15-25 were near two submerged pipelines. EA worked with representatives from Kinder Morgan and Plains All American to move sampling locations away from the pipelines to safe areas. The target locations provided in this table are the locations provided in the Qualiy Assurance Project Plan.

TABLE 2-2 RIVERBEND AREA SITE CHARACTERIZATION CORE DATA
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER - NOVEMBER 2015)

Location ID	Sample Processing Date	Processing Time (Local)[a]	Elevation at Deck of Barge NAVD88 (ft)	Depth from Deck of Barge to Sediment Surface NAVD88 (ft)	Sediment Surface Elevation NAVD88 (ft)	Surface (Ponar) Sample (Y/N)	Sediment Core[b]				
							Penetration Depth (ft)	Sediment Recovery (ft)	Percent Recovery	Collection Method	Collected to Refusal (Y/N)
Riverbend Area											
RB15-01	11/3/2015	15:15	579.1	13.60	565.5	Y	9.0	4.6	51	Sonic Coring	Y
RB15-02	11/3/2015	8:00	579.3	32.00	547.3	Y	10.0	11.0	110	Sonic Coring	N
RB15-03	11/2/2015	14:00	579.4	18.80	560.6	Y	10.0	11.0	110	Sonic Coring	N
RB15-04	11/3/2015	9:00	579.3	27.00	552.3	Y	10.0	9.4	94	Sonic Coring	Y
RB15-05	11/3/2015	9:45	579.2	24.10	555.1	Y	10.0	9.5	95	Sonic Coring	Y
RB15-06	11/3/2015	10:00	579.3	34.70	544.6	Y	10.0	10.5	105	Sonic Coring	Y
RB15-07	11/2/2015	8:30	578.2	37.00	541.2	Y	10.0	6.0	60	Sonic Coring	Y
RB15-08	11/2/2015	9:50	578.8	27.50	551.3	Y	10.0	9.5	95	Sonic Coring	Y
RB15-09	11/2/2015	10:15	578.8	37.40	541.4	Y	10.0	10.9	109	Sonic Coring	Y
RB15-10	11/2/2015	10:50	578.6	31.40	547.2	Y	10.0	10.9	109	Sonic Coring	Y
RB15-11	11/4/2015	15:15	578.9	32.30	546.6	Y	10.0	10.5	105	Sonic Coring	Y
RB15-12	11/4/2015	14:30	579.2	19.00	560.2	N	10.0	2.2	22	Sonic Coring	Y
RB15-13	11/4/2015	11:00	579.1	27.20	551.9	Y	10.0	10.9	109	Sonic Coring	Y
RB15-14	11/4/2015	10:20	579.2	27.00	552.2	Y	10.0	10.0	100	Sonic Coring	Y
RB15-15	11/4/2015	9:30	579.0	28.30	550.7	Y	10.0	10.0	100	Sonic Coring	Y
RB15-16	11/4/2015	8:30	579.4	29.40	550.0	Y	10.0	8.8	88	Sonic Coring	Y
RB15-17	11/3/2015	13:45	579.2	36.80	542.4	Y	10.0	8.6	86	Sonic Coring	Y
RB15-18	11/2/2015	16:15	578.7	35.00	543.7	Y	10.0	7.3	73	Sonic Coring	Y
RB15-19	11/3/2015	11:11	578.9	32.00	546.9	Y	10.0	10.5	105	Sonic Coring	Y
RB15-20	11/5/2015	8:45	578.9	25.60	553.3	Y	10.0	9.2	92	Sonic Coring	Y
RB15-21	11/5/2015	10:00	578.9	26.60	552.3	Y	4.2	2.0	48	Sonic Coring	Y
RB15-22	11/4/2015	15:45	579.1	28.60	550.5	Y	5.5	4.8	87	Sonic Coring	Y
RB15-23	11/5/2015	10:55	579.0	32.60	546.4	Y	10.0	5.0	50	Sonic Coring	Y
RB15-24	11/5/2015	9:15	579.1	31.00	548.1	Y	10.0	11.0	110	Sonic Coring	Y
RB15-25	11/5/2015	11:30	578.8	42.60	536.2	Y	10.0	8.2	82	Sonic Coring	Y
RB15-26	11/4/2015	13:20	579.1	43.40	535.7	Y	10.0	9.2	92	Sonic Coring	Y
RB15-27	10/28/2015	15:00	572.2	38.60	533.6	Y	10.0	7.0	70	Sonic Coring	Y
RB15-28	10/28/2015	14:30	579.2	48.30	530.9	Y	10.0	10.0	100	Sonic Coring	Y

TABLE 2-2 RIVERBEND AREA SITE CHARACTERIZATION CORE DATA
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER - NOVEMBER 2015)

Location ID	Sample Processing Date	Processing Time (Local)[a]	Elevation at Deck of Barge NAVD88 (ft)	Depth from Deck of Barge to Sediment Surface NAVD88 (ft)	Sediment Surface Elevation NAVD88 (ft)	Surface (Ponar) Sample (Y/N)	Sediment Core[b]				
							Penetration Depth (ft)	Sediment Recovery (ft)	Percent Recovery	Collection Method	Collected to Refusal (Y/N)
Harbortown Area											
HBT15-A	10/28/2015	11:00	579.6	15.40	564.2	Y	10.0	10.0	100	Sonic Coring	Y
HBT15-B	10/30/2015	10:10	579.1	24.10	555.0	Y	10.0	6.0	60	Sonic Coring	Y
HBT15-C	11/2/2015	15:15	579.4	27.40	552.0	Y	10.0	8.9	89	Sonic Coring	Y

Note: all samples collected by MATECO.

a. Sample times processed on 10/31 or earlier are in Eastern Daylight Time (EDT) zone. Sample times processed on 11/1 or later are in Eastern Standard Time (EST) zone.

b. Where mutiple coring attempts were made, core specifications are listed for core with the most complete recovery, which was the core that was processed.

ft = Foot (feet).

NAVD88 = North American Vertical Datum of 1988.

TABLE 2-3 RIVERBEND AREA SITE CHARACTERIZATION ACTUAL ANALYTICAL PROGRAM DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER - NOVEMBER 2015)

		Analytical Group and Method									Analtyical Interval[c]	
Sample Location/ Sample ID	Sample Depth Interval (ft)	34 PAHs[a] EPA CLP SOM02.2	Total Michigan Metals[b] + Iron & Nickel	PCB - Aroclors EPA CLP SOM02.2	SEM/AVS EPA-821-R-91-100/ SW846 6010C/7470A	Total Organic Carbon Lloyd Kahn	Percent Moisture ASTM D2216	Grain Size (with hydrometer) ASTM D422	Ammonia EPA Method 350.1	DRO/ORO SW846 8015B	Start of Interval (inches)	End of Interval (inches)
Riverbend Area												
RB15-01	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
	3.0-5.0	1	1	1	0	1	1	0	0	0	36	55
RB15-02	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	39
	3.0-4.0	1	1	1	0	1	1	0	0	0	39	52
RB15-03	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
	3.0-5.0	1	1	1	0	1	1	0	0	0	36	59
	5.0-7.0	1	1	1	0	1	1	0	0	0	59	84
RB15-04	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	39
	3.0-4.0	1	1	1	0	1	1	0	0	0	39	51
RB15-05	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
RB15-06	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
RB15-07	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	10
	1.0-2.0	1	1	1	0	1	1	0	0	0	10	20
	2.0-3.0	1	1	1	0	1	1	0	0	0	20	36
RB15-08	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
RB15-09	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	9
RB15-10	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	7
RB15-11	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
RB15-12	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	23
RB15-13	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-2.5	1	1	1	0	1	1	0	0	0	12	29
	2.5-3.5	1	1	1	0	1	1	0	0	0	29	43
	3.5-5.0	1	1	1	0	1	1	0	0	0	43	60
RB15-14	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	33
	3.0-5.0	1	1	1	0	1	1	0	0	0	33	60
RB15-15	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-2.0	1	1	1	0	1	1	0	0	0	12	26
	2.0-4.0	1	1	1	0	1	1	0	0	0	26	51
	4.0-6.0	1	1	1	0	1	1	0	0	0	51	72
RB15-16	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
	3.0-4.0	1	1	1	0	1	1	0	0	0	36	50
	4.0-6.0	1	1	1	0	1	1	0	0	0	50	72

		Analytical Group and Method									Analtyical Interval[c]	
Sample Location/ Sample ID	Sample Depth Interval (ft)	34 PAHs[a] EPA CLP SOM02.2	Total Michigan Metals[b] + Iron & Nickel	PCB - Aroclors EPA CLP SOM02.2	SEM/AVS EPA-821-R-91-100/ SW846 6010C/7470A	Total Organic Carbon Lloyd Kahn	Percent Moisture ASTM D2216	Grain Size (with hydrometer) ASTM D422	Ammonia EPA Method 350.1	DRO/ORO SW846 8015B	Start of Interval (inches)	End of Interval (inches)
RB15-17	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
RB15-18	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	10
RB15-19	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	10
	1.0-3.0	1	1	1	0	1	1	0	0	0	10	36
RB15-20	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-2.0	1	1	1	0	1	1	0	0	0	12	22
	2.0-4.0	1	1	1	0	1	1	0	0	0	22	50
RB15-21	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-2.0	1	1	1	0	1	1	0	0	0	12	24
RB15-22	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-2.0	1	1	1	0	1	1	0	0	0	12	24
	2.0-3.0	1	1	1	0	1	1	0	0	0	24	39
	3.0-5.0	1	1	1	0	1	1	0	0	0	39	58
RB15-23	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
	3.0-5.0	1	1	1	0	1	1	0	0	0	36	60
RB15-24	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-2.0	1	1	1	0	1	1	0	0	0	12	24
	2.0-4.0	1	1	1	0	1	1	0	0	0	24	46
	4.0-5.0	1	1	1	0	1	1	0	0	0	46	59
	5.0-6.0	1	1	1	0	1	1	0	0	0	59	68
	6.0-8.0	1	1	1	0	1	1	0	0	0	68	96
RB15-25	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
RB15-26	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
	3.0-5.0	1	1	1	0	1	1	0	0	0	36	60
RB15-27	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
	3.0-5.0	1	1	1	0	1	1	0	0	0	36	60
	5.0-6.5	1	1	1	0	1	1	0	0	0	60	75
	6.5-7.0	1	1	1	0	1	1	0	0	0	75	84
RB15-28	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	36
Harbortown Area												
HBT15-A	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	33
	3.0-5.0	1	1	1	0	1	1	0	0	0	33	60
	5.0-7.0	1	1	1	0	1	1	0	0	0	60	84
	7.0-10.0	1	1	1	0	1	1	0	0	0	84	120
HBT15-B	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	12
	1.0-3.0	1	1	1	0	1	1	0	0	0	12	39
	3.0-5.5	1	1	1	0	1	1	0	0	0	39	65
	5.5-6.0	1	1	1	0	1	1	0	0	0	65	70
HBT15-C	surf	1	1	1	1	1	1	1	1	1	0	6
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	13
	1.0-3.0	1	1	1	0	1	1	0	0	0	13	36
	3.0-4.0	1	1	1	0	1	1	0	0	0	36	51
	4.0-5.0	1	1	1	0	1	1	0	0	0	51	60

		Analytical Group and Method									Analtyical Interval[c]	
Sample Location/ Sample ID	Sample Depth Interval (ft)	34 PAHs[a] EPA CLP SOM02.2	Total Michigan Metals[b] + Iron & Nickel	PCB - Aroclors EPA CLP SOM02.2	SEM/AVS EPA-821-R-91-100/ SW846 6010C/7470A	Total Organic Carbon Lloyd Kahn	Percent Moisture ASTM D2216	Grain Size (with hydrometer) ASTM D422	Ammonia EPA Method 350.1	DRO/ORO SW846 8015B	Start of Interval (inches)	End of Interval (inches)
Total Sediment Samples		**119**	**119**	**119**	**30**	**119**	**119**	**30**	**30**	**30**		
Field Quality Control Samples												
Field Duplicate[d] (10% of samples)		**11**	**11**	**11**	**3**	**11**	**11**	**3**	**3**	**3**		
MS/MSD[e] (5% of samples and field duplicates)		**6**	**6**	**6**	**6**	**6**	**0**	**0**	**2**	**2**		
Total Samples		**136**	**136**	**136**	**39**	**136**	**130**	**33**	**35**	**35**		

a. 34 PAHs include: acenaphthene; acenaphthylene; anthracene; fluorine; naphthalene; 2-methylnapthalene; phenanthrene; benzo(a)anthracene; benzo(a)pyrene; benzo(e)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; chrysene; dibenz(a,h)anthracene; fluoranthene; indeno(1,2,3-c,d)pyrene; pyrene; C1 naphthalenes; C2 naphthalenes; C3 naphthalenes; C1 fluorenes; C4 naphthalenes; C1 phenanthrenes; C2 fluorenes; C2 phenanthrenes; C3 fluorenes; C1 fluoranthenes; C3 phenanthrenes; C4 phenanthrenes; C1 chrysenes; perylene; C2 chrysenes; C3 chrysenes; and C4

b. Total Michigan Metals includes the following analytes: arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc.

c. Analytical intervals were modified in the field based on consultation with EPA. They were defined by visible lithological changes in the core.

d. Field duplicate taken at sample intervals marked yellow.

e. Volume collected for matrix spike/matrix spike duplicates from the sample intervals and marked green.

AVS = Acid volatile sulfide
DRO = Diesel range organic
EPA = U.S. Environmental Protection Agency
MS = Matrix spike
MSD = Matrix spike duplicate
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
ORO = Oil range organic
SEM = Simultaneously extracted metal

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Tables for
Section 3: Results

TABLE 3-1 SUMMARY OF EXCEEDANCES

Analyte	Total Number of Submitted Samples	Total Number of Submitted Samples (Without FDs)	Total Number of Detects (Without FDs)	TEC	PEC	SEM/AVS Ratio > 1	TEC Exceedance	PEC Exceedance	Units	Percentage of Samples that Exceeded TEC	Percentage of Samples That Exceeded PEC	Percentage of Samples That Exceed SEM/AVS Ratio of 1
SEM/AVS												
SEM/AVS Ratio	30	27	16	NA	NA	1	NA	NA	none	NA	NA	**3.7**
PAHs												
Total PAH17 ND=1/2RL	112	103	103	1,610	22,800	NA	90	64	µg/kg	**87.4**	**62.1**	NA
PCB Aroclors												
Total PCBs ND=0	112	103	103	59.8	676	NA	66	18	µg/kg	**64.1**	**17.5**	NA
Metals												
Arsenic	112	103	103	9.79	33	NA	34	1	mg/kg	**33.0**	**1.0**	NA
Barium	112	103	103	NSL	NSL	NA	NSL	NSL	mg/kg	NSL	NSL	NA
Cadmium	112	103	101	0.99	4.98	NA	40	19	mg/kg	**38.8**	**18.4**	NA
Chromium	112	103	103	43.4	111	NA	38	19	mg/kg	**36.9**	**18.4**	NA
Copper	112	103	103	31.6	149	NA	69	36	mg/kg	**67.0**	**35.0**	NA
Iron	112	103	103	20000*	40000*	NA	38	1	mg/kg	**36.9**	**1.0**	NA
Lead	112	103	103	35.8	128	NA	72	48	mg/kg	**69.9**	**46.6**	NA
Mercury	112	103	83	0.18	1.06	NA	60	30	mg/kg	**58.3**	**29.1**	NA
Nickel	112	103	103	22.7	48.6	NA	63	20	mg/kg	**61.2**	**19.4**	NA
Selenium	112	103	84	NSL	NSL	NA	NSL	NSL	mg/kg	NSL	NSL	NA
Silver	112	103	79	1.6(a)	2.2(a)	NA	25	23	mg/kg	**24.3**	**22.3**	NA
Zinc	112	103	103	121	459	NA	61	32	mg/kg	**59.2**	**31.1**	NA

Notes:

AVS = Acid volatile sulfides

µg/kg = micrograms per kilogram

FD = Field Duplicate

mg/kg = milligrams per kilogram

NA = Not Applicable

ND = Non-detect

NSL = No Screening Level

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

RL= reporting limit

SEM = Simultaneously extracted metals

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

(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

*TEC and PEC values based on Guidelines for the Protection and Management of Aquatic Sediments in Ontario (Persaud et al. 1993)

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE

Location ID:		RB15-01	RB15-02	RB15-02	RB15-03	RB15-04	RB15-05	RB15-06	RB15-07
Sample Name:		RB15-01-SURF	RB15-02-SURF	RB15-02-SURFFD	RB15-03-SURF	RB15-04-SURF	RB15-05-SURF	RB15-06-SURF	RB15-07-SURF
Sample Date:		10/30/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	11/1/2015
Depth Interval (feet):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**								
Gravel	%	0.3	8.8	20.8	1.2	16.6	58.8	40.8	51.8
Coarse Sand	%	0.4	2.7	2.5	3.2	10.8	8.9	7.6	9.5
Medium Sand	%	1.3	3.8	3.4	14.4	29.7	4.3	3.8	12.2
Fine Sand	%	18.8	81.3	68.7	23.9	36.9	7.6	36.9	19.5
Sand	%	20.5	87.8	74.6	41.5	77.4	20.8	48.3	41.2
Silt	%	49.6	2.1	3.3	33.0	4.7	18.9	9.0	5.1
Clay	%	29.6	1.2	1.3	24.3	1.3	1.5	1.9	1.8
Silt + Clay	%	79.2	3.3	4.6	57.3	6.0	20.4	10.9	6.9
Hydrometer and Sieve Analysis									
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	85.4	100	95.8	82.3	100	85.7
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	85.4	100	95.8	82.3	100	82.3
Sieve Size 0.375 inch - Percent Finer	% passed	100	95.4	82.8	100	90.1	63.5	84.7	66
Sieve Size #4 - Percent Finer	% passed	99.7	91.2	79.2	98.8	83.4	41.2	59.2	48.2
Sieve Size #10 - Percent Finer	% passed	99.3	88.5	76.7	95.6	72.6	32.3	51.6	38.7
Sieve Size #20 - Percent Finer	% passed	98.7	87.3	75.6	88.4	58.8	29.6	49.8	32.8
Sieve Size #40 - Percent Finer	% passed	98	84.7	73.3	81.2	42.9	28	47.8	26.5
Sieve Size #60 - Percent Finer	% passed	96.5	71.8	61.6	72.8	23.8	25.2	41.9	19
Sieve Size #80 - Percent Finer	% passed	95.4	44.8	37.8	68.2	15.2	22.8	31.9	14.5
Sieve Size #100 - Percent Finer	% passed	94.1	26.5	23.1	65.6	11.4	21.8	23.3	12
Sieve Size #200 - Percent Finer	% passed	79.2	3.4	4.6	57.3	6	20.4	10.9	7
Hydrometer Reading 1 - Percent Finer	% passed	49.6	2.1	2.1	45.3	3	5.1	7.7	4.5
Hydrometer Reading 2 - Percent Finer	% passed	45.6	1.7	1.7	40.5	2.5	4.1	6.8	3.9
Hydrometer Reading 3 - Percent Finer	% passed	39	1.7	1.7	32.9	2.1	2	3.9	3
Hydrometer Reading 4 - Percent Finer	% passed	35	1.2	1.3	26.8	1.7	1.5	2.4	2.4
Hydrometer Reading 5 - Percent Finer	% passed	29.6	1.2	1.3	24.3	1.3	1.5	1.9	1.8
Hydrometer Reading 6 - Percent Finer	% passed	21.6	0.5	0.5	17.3	1	0.6	1.6	1
Hydrometer Reading 7 - Percent Finer	% passed	15	0.4	0.4	11	0.4	0.6	1.1	0.9

Notes:
% = percent passed
FD = Field Duplicate
RB= Riverbend Area

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE

Location ID:		RB15-08	RB15-08	RB15-09	RB15-09	RB15-10	RB15-11	RB15-13	RB15-14
Sample Name:		RB15-08-SURF	RB15-08-SURFFD	RB15-09-SURF	RB15-09-SURFFD	RB15-10-SURF	RB15-11-SURF	RB15-13-SURF	RB15-14-SURF
Sample Date:		11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/3/2015	11/2/2015	11/2/2015
Depth Interval (feet):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**								
Gravel	%	9.8	8.3	22.4	31.4	54	56.7	16.1	20.3
Coarse Sand	%	7.2	8.4	11.4	10.3	11.6	6.8	12	9
Medium Sand	%	17	16.5	10.5	7.8	6.7	5	15.4	10.1
Fine Sand	%	61.9	62.6	36.9	32.6	14.7	12.5	47.8	50.1
Sand	%	86.1	87.5	58.8	50.7	33	24.3	75.2	69.2
Silt	%	2.7	2.8	13.7	12.8	12.5	10.2	6.5	6.9
Clay	%	1.4	1.4	5.1	5.1	0.5	8.8	2.2	3.6
Silt + Clay	%	4.1	4.2	18.8	17.9	13.0	19.0	8.7	10.5
Hydrometer and Sieve Analysis									
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	100	100	70.2	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	96.7	98.8	90.9	81.7	68.5	63	94	89.9
Sieve Size #4 - Percent Finer	% passed	90.2	91.7	77.6	68.6	46	43.3	83.9	79.7
Sieve Size #10 - Percent Finer	% passed	83	83.3	66.2	58.3	34.4	36.5	71.9	70.7
Sieve Size #20 - Percent Finer	% passed	76	76.5	61.5	55.1	30.2	34.4	65.3	67.3
Sieve Size #40 - Percent Finer	% passed	66	66.8	55.7	50.5	27.7	31.5	56.5	60.6
Sieve Size #60 - Percent Finer	% passed	47	49	47.8	43.9	23.5	27.8	43.4	49.5
Sieve Size #80 - Percent Finer	% passed	27.9	30	39.1	36.5	19.5	25.1	31.2	37
Sieve Size #100 - Percent Finer	% passed	16.9	17.5	32.8	30.6	16.9	23.4	23	27.3
Sieve Size #200 - Percent Finer	% passed	4.1	4.2	18.8	17.9	13	19	8.8	10.5
Hydrometer Reading 1 - Percent Finer	% passed	3.2	2.6	13.9	15.7	5.3	18.1	4.8	11.1
Hydrometer Reading 2 - Percent Finer	% passed	2.7	2.6	11.4	12.9	4.5	15.2	4.3	5.8
Hydrometer Reading 3 - Percent Finer	% passed	2.3	1.8	8.9	9.3	2.3	13.1	3.9	4.9
Hydrometer Reading 4 - Percent Finer	% passed	1.8	1.4	7	6.5	1	10.9	3.1	4.1
Hydrometer Reading 5 - Percent Finer	% passed	1.4	1.4	5.1	5.1	0.5	8.8	2.2	3.6
Hydrometer Reading 6 - Percent Finer	% passed	1.4	0.9	3.3	3	0.5	6.6	1.4	2.3
Hydrometer Reading 7 - Percent Finer	% passed	1	0.5	2	2.3	0.5	4.5	1.6	2.1

Notes:
% = percent passed
FD = Field Duplicate
RB= Riverbend Area

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE

Location ID:		RB15-15	RB15-16	RB15-17	RB15-18	RB15-19	RB15-20	RB15-21	RB15-22
Sample Name:		RB15-15-SURF	RB15-16-SURF	RB15-17-SURF	RB15-18-SURF	RB15-19-SURF	RB15-20-SURF	RB15-21-SURF	RB15-22-SURF
Sample Date:		11/2/2015	11/2/2015	11/2/2015	11/1/2015	11/2/2015	11/4/2015	11/4/2015	11/3/2015
Depth Interval (feet):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**								
Gravel	%	31.3	48.8	4.7	44.1	54.3	4.5	10.4	25.1
Coarse Sand	%	8.2	11.1	7.2	9.5	6.7	3.3	7.8	4.5
Medium Sand	%	5.9	4.5	5.9	10	8.3	4.9	7.8	7.1
Fine Sand	%	39.8	25.1	7.7	16.5	27.1	18.1	66.1	34.3
Sand	%	53.9	40.7	20.8	36	42.1	26.3	81.7	45.9
Silt	%	10.4	8.6	33.2	10.0	1.9	43.9	4.9	20.6
Clay	%	4.4	1.9	41.3	9.9	1.7	25.3	3.0	8.4
Silt + Clay	%	14.8	10.5	74.5	19.9	3.6	69.2	7.9	29.0
Hydrometer and Sieve Analysis									
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	82.9	86.8	100	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	92.7	71.1	100	68.5	61.5	100	97.9	84.2
Sieve Size #4 - Percent Finer	% passed	68.7	51.2	95.3	55.9	45.7	95.5	89.6	74.9
Sieve Size #10 - Percent Finer	% passed	60.5	40.1	88.1	46.4	39	92.2	81.8	70.4
Sieve Size #20 - Percent Finer	% passed	58.2	38.4	84.6	41.1	37	89.3	78.1	67.9
Sieve Size #40 - Percent Finer	% passed	54.6	35.6	82.2	36.4	30.7	87.3	74	63.3
Sieve Size #60 - Percent Finer	% passed	45.2	29.4	80	27.2	13.4	84.9	57.1	53
Sieve Size #80 - Percent Finer	% passed	34.1	22.7	78.6	22.3	7.6	82.1	31.7	45.4
Sieve Size #100 - Percent Finer	% passed	27.5	18.1	77.7	20.5	5.8	79.6	19	40.3
Sieve Size #200 - Percent Finer	% passed	14.8	10.5	74.5	19.9	3.6	69.2	7.9	29
Hydrometer Reading 1 - Percent Finer	% passed	9.1	9.1	56.6	15.4	3.5	46.4	5.8	18.8
Hydrometer Reading 2 - Percent Finer	% passed	8.2	7.9	53.4	14.1	3.2	40.2	4.9	15.8
Hydrometer Reading 3 - Percent Finer	% passed	6.3	5.5	48.6	12.8	2.6	32.7	4.4	13.6
Hydrometer Reading 4 - Percent Finer	% passed	5.3	3.7	44.5	11.5	2	29	3.9	10.6
Hydrometer Reading 5 - Percent Finer	% passed	4.4	1.9	41.3	9.9	1.7	25.3	3	8.4
Hydrometer Reading 6 - Percent Finer	% passed	3	0.7	34.1	7.6	1.3	19	2.5	6.1
Hydrometer Reading 7 - Percent Finer	% passed	2.7	1	26	5.6	0.4	11.5	1.5	3.9

Notes:
% = percent passed
FD = Field Duplicate
RB= Riverbend Area

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE

Location ID:		RB15-23	RB15-24	RB15-25	RB15-26	RB15-27	RB15-28
Sample Name:		RB15-23-SURF	RB15-24-SURF	RB15-25-SURF	RB15-26-SURF	RB15-27-SURF	RB15-28-SURF
Sample Date:		11/3/2015	11/4/2015	11/4/2015	11/3/2015	10/26/2015	10/26/2015
Depth Interval (feet):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**						
Gravel	%	37.4	0.3	1.3	77.1	20.1	10.5
Coarse Sand	%	18.2	0.9	0.3	5	17.5	6.7
Medium Sand	%	15.3	0.7	1.5	0.8	14.9	6.8
Fine Sand	%	18.5	6.9	93.2	3.8	42.1	17.2
Sand	%	52	8.5	95	9.6	74.5	30.7
Silt	%	7.0	52.2	3.7	11.6	3.6	36.4
Clay	%	3.6	39.0	0.1	1.7	1.8	22.4
Silt + Clay	%	10.6	91.2	3.8	13.3	5.4	58.8
Hydrometer and Sieve Analysis							
Sieve Size 3 inch - Percent Finer	% passed	100	100	100	100	100	100
Sieve Size 2 inch - Percent Finer	% passed	100	100	100	100	100	100
Sieve Size 1.5 inch - Percent Finer	% passed	100	100	100	100	100	100
Sieve Size 1 inch - Percent Finer	% passed	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	92.3	100	100	73.1	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	85.5	100	100	35.2	91.3	100
Sieve Size #4 - Percent Finer	% passed	62.6	99.7	98.7	22.9	79.9	89.5
Sieve Size #10 - Percent Finer	% passed	44.4	98.8	98.4	17.9	62.4	82.8
Sieve Size #20 - Percent Finer	% passed	37.1	98.5	98.2	17.3	54.6	79.5
Sieve Size #40 - Percent Finer	% passed	29.1	98.1	96.9	17.1	47.5	76
Sieve Size #60 - Percent Finer	% passed	19.8	97.4	85.9	16.8	35.6	71.8
Sieve Size #80 - Percent Finer	% passed	15.6	96.6	58.5	16.4	21.6	67.4
Sieve Size #100 - Percent Finer	% passed	13.8	95.7	37.4	16.1	14	64.6
Sieve Size #200 - Percent Finer	% passed	10.6	91.2	3.8	13.3	5.4	58.8
Hydrometer Reading 1 - Percent Finer	% passed	7.5	65.2	0.5	5.5	3.5	56.8
Hydrometer Reading 2 - Percent Finer	% passed	6.7	58.9	0.5	4.1	3	43.2
Hydrometer Reading 3 - Percent Finer	% passed	5.4	50.2	0.5	3.2	2.6	35.9
Hydrometer Reading 4 - Percent Finer	% passed	4	44	0.1	2.2	1.8	27.6
Hydrometer Reading 5 - Percent Finer	% passed	3.6	39	0.1	1.7	1.8	22.4
Hydrometer Reading 6 - Percent Finer	% passed	2.3	27.7	0.1	1.3	1.3	15.9
Hydrometer Reading 7 - Percent Finer	% passed	1.4	19	-0.3	0.8	0.9	10.7

Notes:
% = percent passed
FD = Field Duplicate
RB= Riverbend Area

TABLE 3-3 SEDIMENT RESULTS FOR AMMONIA

	Location ID:	RB15-01	RB15-02	RB15-02	RB15-03	RB15-04	RB15-05
	Sample Name:	RB15-01-SURF	RB15-02-SURF	RB15-02-SURFFD	RB15-03-SURF	RB15-04-SURF	RB15-05-SURF
	Sample Date:	10/30/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**						
Ammonia	mg/kg	211	7.5 U	7.3 U	198	7.6 U	112

NOTES:

FD = Field duplicate

RB = Riverbend Area

mg/kg = milligram per kilogram

J = compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated).

U = Indicates the analyte was analyzed but not detected.

TABLE 3-3 SEDIMENT RESULTS FOR AMMONIA

	Location ID:	RB15-06	RB15-07	RB15-08	RB15-08	RB15-09	RB15-09
	Sample Name:	RB15-06-SURF	RB15-07-SURF	RB15-08-SURF	RB15-08-SURFFD	RB15-09-SURF	RB15-09-SURFFD
	Sample Date:	10/31/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**						
Ammonia	mg/kg	49.6	12.8	7.1	8.8	128	169

NOTES:

FD = Field duplicate

RB = Riverbend Area

mg/kg = milligram per kilogram

J = compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated).

U = Indicates the analyte was analyzed but not detected.

TABLE 3-3 SEDIMENT RESULTS FOR AMMONIA

	Location ID:	RB15-10	RB15-11	RB15-13	RB15-14	RB15-15	RB15-16
	Sample Name:	RB15-10-SURF	RB15-11-SURF	RB15-13-SURF	RB15-14-SURF	RB15-15-SURF	RB15-16-SURF
	Sample Date:	11/1/2015	11/3/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**						
Ammonia	mg/kg	191	70.7	5.8 J	23.8	12.1	222

NOTES:

FD = Field duplicate

RB = Riverbend Area

mg/kg = milligram per kilogram

J = compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated).

U = Indicates the analyte was analyzed but not detected.

TABLE 3-3 SEDIMENT RESULTS FOR AMMONIA

	Location ID:	RB15-17	RB15-18	RB15-19	RB15-20	RB15-21	RB15-22	RB15-23
	Sample Name:	RB15-17-SURF	RB15-18-SURF	RB15-19-SURF	RB15-20-SURF	RB15-21-SURF	RB15-22-SURF	RB15-23-SURF
	Sample Date:	11/2/2015	11/1/2015	11/2/2015	11/4/2015	11/4/2015	11/3/2015	11/3/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
Ammonia	mg/kg	6.6 U	5.9 U	6.4 J	197	7.9 U	27.2	14.3

NOTES:

FD = Field duplicate

RB = Riverbend Area

mg/kg = milligram per kilogram

J = compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated).

U = Indicates the analyte was analyzed but not detected.

TABLE 3-3 SEDIMENT RESULTS FOR AMMONIA

	Location ID:	RB15-24	RB15-25	RB15-26	RB15-27	RB15-28
	Sample Name:	RB15-24-SURF	RB15-25-SURF	RB15-26-SURF	RB15-27-SURF	RB15-28-SURF
	Sample Date:	11/4/2015	11/4/2015	11/3/2015	10/26/2015	10/26/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**					
Ammonia	mg/kg	297	5.1 J	5.8 U	4.7 J	35.3

NOTES:

FD = Field duplicate

RB = Riverbend Area

mg/kg = milligram per kilogram

J = compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated).

U = Indicates the analyte was analyzed but not detected.

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TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-01	RB15-01	RB15-01	RB15-01	RB15-02	RB15-02	RB15-02
			Sample Name:	RB15-01-SURF	RB15-01-0010	RB15-01-1030	RB15-01-3050	RB15-02-SURF	RB15-02-SURFFD	RB15-02-0010
			Sample Date:	10/30/2015	11/3/2015	11/3/2015	11/3/2015	10/31/2015	10/31/2015	11/3/2015
			Depth Interval (ft):	0-0.5	0-1	1-3	3-5	0-0.5	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	76 U	69 U	70 U	64 U	47 U	47 U	44 U
Aroclor-1221	NSL	NSL	ug/kg	76 U	69 U	70 U	64 U	47 U	47 U	44 U
Aroclor-1232	NSL	NSL	ug/kg	76 U	69 U	70 U	64 U	47 U	47 U	44 U
Aroclor-1242	NSL	NSL	ug/kg	22 J	85 J	200	340	69	120	590
Aroclor-1248	NSL	NSL	ug/kg	76 U	69 U	70 U	64 U	47 U	47 U	44 U
Aroclor-1254	NSL	NSL	ug/kg	76 U	500	1900	5300	47 U	47 U	1200
Aroclor-1260	NSL	NSL	ug/kg	190	420	1400	4300	610	430	770
Aroclor-1262	NSL	NSL	ug/kg	76 U	69 U	70 U	64 U	47 U	47 U	44 U
Aroclor-1268	NSL	NSL	ug/kg	76 U	69 U	70 U	64 U	47 U	47 U	44 U
Total PCBs ND=0	59.8	676	ug/kg	**212**	**1005**	**3500**	**9940**	**679**	**550**	**2560**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

Location ID:				RB15-02	RB15-02	RB15-03	RB15-03	RB15-03	RB15-03	RB15-03	RB15-04
Sample Name:				RB15-02-1030	RB15-02-3040	RB15-03-SURF	RB15-03-0010	RB15-03-1030	RB15-03-3050	RB15-03-5070	RB15-04-SURF
Sample Date:				11/3/2015	11/3/2015	10/31/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015	10/31/2015
Depth Interval (ft):				1-3	3-4	0-0.5	0-1	1-3	3-5	5-7	0-0.5
Analyte	**TEC**	**PEC**	**Unit**								
Aroclor-1016	NSL	NSL	ug/kg	53 UJ	41 U	78 U	60 U	64 U	58 U	41 U	50 U
Aroclor-1221	NSL	NSL	ug/kg	53 UJ	41 U	78 U	60 U	64 U	58 U	41 U	50 U
Aroclor-1232	NSL	NSL	ug/kg	53 UJ	41 U	78 U	60 U	64 U	58 U	41 U	50 U
Aroclor-1242	NSL	NSL	ug/kg	53 UJ	41 U	27 J	50 J	40 J	58 U	41 U	18 J
Aroclor-1248	NSL	NSL	ug/kg	53 UJ	41 U	78 U	60 U	64 U	58 U	41 U	50 U
Aroclor-1254	NSL	NSL	ug/kg	32 J-	41 U	78 U	60 U	74	58 U	41 U	50 U
Aroclor-1260	NSL	NSL	ug/kg	26 J-	41 U	110 J	340	52 J	58 U	41 U	79
Aroclor-1262	NSL	NSL	ug/kg	53 UJ	41 U	78 U	60 U	64 U	58 U	41 U	50 U
Aroclor-1268	NSL	NSL	ug/kg	53 UJ	41 U	78 U	60 U	64 U	58 U	41 U	50 U
Total PCBs ND=0	59.8	676	ug/kg	58	0	**137**	**390**	**166**	0	0	**97**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-04	RB15-04	RB15-04	RB15-04	RB15-05	RB15-05	RB15-05
			Sample Name:	RB15-04-0010	RB15-04-1030	RB15-04-1030FD	RB15-04-3040	RB15-05-SURF	RB15-05-0010	RB15-05-1030
			Sample Date:	11/3/2015	11/3/2015	11/3/2015	11/3/2015	10/31/2015	11/3/2015	11/3/2015
			Depth Interval (ft):	0-1	1-3	1-3	3-4	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	49 UJ	43 U	41 U	40 U	53 U	41 U	40 U
Aroclor-1221	NSL	NSL	ug/kg	49 UJ	43 U	41 U	40 U	53 U	41 U	40 U
Aroclor-1232	NSL	NSL	ug/kg	49 UJ	43 U	41 U	40 U	53 U	41 U	40 U
Aroclor-1242	NSL	NSL	ug/kg	170 J	43 U	41 U	40 U	25 J	96	6.7 J
Aroclor-1248	NSL	NSL	ug/kg	49 UJ	43 U	41 U	40 U	53 U	41 U	40 U
Aroclor-1254	NSL	NSL	ug/kg	410 J	43 U	41 U	40 U	53 U	78	5.4 J
Aroclor-1260	NSL	NSL	ug/kg	160 J-	43 U	41 U	40 U	33 J	38 J	3 J
Aroclor-1262	NSL	NSL	ug/kg	49 UJ	43 U	41 U	40 U	53 U	41 U	40 U
Aroclor-1268	NSL	NSL	ug/kg	49 UJ	43 U	41 U	40 U	53 U	41 U	40 U
Total PCBs ND=0	59.8	676	ug/kg	**740**	0	0	0	58	**212**	15.1

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-06	RB15-06	RB15-06	RB15-07	RB15-07	RB15-07	RB15-07
			Sample Name:	RB15-06-SURF	RB15-06-0010	RB15-06-1030	RB15-07-SURF	RB15-07-0010	RB15-07-1020	RB15-07-2030
			Sample Date:	10/31/2015	11/3/2015	11/3/2015	11/1/2015	11/2/2015	11/2/2015	11/2/2015
			Depth Interval (ft):	0-0.5	0-1	1-3	0-0.5	0-1	1-2	2-3
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	47 U	45 U	46 U	51 U	43 U	44 U	44 U
Aroclor-1221	NSL	NSL	ug/kg	47 U	45 U	46 U	51 U	43 U	44 U	44 U
Aroclor-1232	NSL	NSL	ug/kg	47 U	45 U	46 U	51 U	43 U	44 U	44 U
Aroclor-1242	NSL	NSL	ug/kg	34 J	45 U	46 U	19 J	48	310	8.5 J
Aroclor-1248	NSL	NSL	ug/kg	47 U	45 U	46 U	51 U	43 U	44 U	44 U
Aroclor-1254	NSL	NSL	ug/kg	47 U	38 J	46 U	51 U	120	400	17 J
Aroclor-1260	NSL	NSL	ug/kg	290	27 J	46 U	48 J	72	150	8.1 J
Aroclor-1262	NSL	NSL	ug/kg	47 U	45 U	46 U	51 U	43 U	44 U	44 U
Aroclor-1268	NSL	NSL	ug/kg	47 U	45 U	46 U	51 U	43 U	44 U	44 U
Total PCBs ND=0	59.8	676	ug/kg	**324**	**65**	0	**67**	**240**	**860**	33.6

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

Location ID:				RB15-08	RB15-08	RB15-08	RB15-09	RB15-09	RB15-09	RB15-10
Sample Name:				RB15-08-SURF	RB15-08-SURFFD	RB15-08-0010	RB15-09-SURF	RB15-09-SURFFD	RB15-09-0010	RB15-10-SURF
Sample Date:				11/1/2015	11/1/2015	11/2/2015	11/1/2015	11/1/2015	11/2/2015	11/1/2015
Depth Interval (ft):				0-0.5	0-0.5	0-1	0-0.5	0-0.5	0-1	0-0.5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	46 U	43 U	45 U	74 U	56 U	40 U	44 U
Aroclor-1221	NSL	NSL	ug/kg	46 U	43 U	45 U	74 U	56 U	40 U	44 U
Aroclor-1232	NSL	NSL	ug/kg	46 U	43 U	45 U	74 U	56 U	40 U	44 U
Aroclor-1242	NSL	NSL	ug/kg	37 J	27 J	20 J	76	63 J	130	34 J
Aroclor-1248	NSL	NSL	ug/kg	46 U	43 U	45 U	74 U	56 U	40 U	44 U
Aroclor-1254	NSL	NSL	ug/kg	46 U	43 U	45 U	74 U	56 U	40 U	44 U
Aroclor-1260	NSL	NSL	ug/kg	500	380	240	780	1500	510	410
Aroclor-1262	NSL	NSL	ug/kg	46 U	43 U	45 U	74 U	56 U	40 U	44 U
Aroclor-1268	NSL	NSL	ug/kg	46 U	43 U	45 U	74 U	56 U	40 U	44 U
Total PCBs ND=0	59.8	676	ug/kg	**537**	**407**	**260**	**856**	**1563**	**640**	**444**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-10	RB15-11	RB15-11	RB15-11	RB15-11	RB15-12	RB15-12
			Sample Name:	RB15-10-0010	RB15-11-SURF	RB15-11-0010	RB15-11-1030	RB15-11-1030FD	RB15-12-0010	RB15-12-1030
			Sample Date:	11/2/2015	11/3/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
			Depth Interval (ft):	0-1	0-0.5	0-1	1-3	1-3	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	44 U	64 U	48 U	45 U	50 U	42 U	270 U
Aroclor-1221	NSL	NSL	ug/kg	44 U	64 U	48 U	45 U	50 U	42 U	270 U
Aroclor-1232	NSL	NSL	ug/kg	44 U	64 U	48 U	45 U	50 U	42 U	270 U
Aroclor-1242	NSL	NSL	ug/kg	15 J	64 U	12 J	45 U	50 U	99 J+	670 J+
Aroclor-1248	NSL	NSL	ug/kg	44 U	64 U	48 U	45 U	50 U	42 U	270 U
Aroclor-1254	NSL	NSL	ug/kg	44 U	98	22 J	45 U	50 U	260 J	300 J
Aroclor-1260	NSL	NSL	ug/kg	80	110	22 J	45 U	50 U	82 J+	160 J
Aroclor-1262	NSL	NSL	ug/kg	44 U	64 U	48 U	45 U	50 U	42 U	270 U
Aroclor-1268	NSL	NSL	ug/kg	44 U	64 U	48 U	45 U	50 U	42 U	270 U
Total PCBs ND=0	59.8	676	ug/kg	**95**	**208**	56	0	0	**441**	**1130**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-13	RB15-13	RB15-13	RB15-13	RB15-13	RB15-14	RB15-14	RB15-14
			Sample Name:	RB15-13-SURF	RB15-13-0010	RB15-13-1025	RB15-13-2535	RB15-13-3550	RB15-14-SURF	RB15-14-0010	RB15-14-1030
			Sample Date:	11/2/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015	11/4/2015	11/4/2015
			Depth Interval (ft):	0-0.5	0-1	1-2.5	2.5-3.5	3.5-5	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**								
Aroclor-1016	NSL	NSL	ug/kg	52 U	42 U	48 U	53 U	43 U	49 U	44 U	49 U
Aroclor-1221	NSL	NSL	ug/kg	52 U	42 U	48 U	53 U	43 U	49 U	44 U	49 U
Aroclor-1232	NSL	NSL	ug/kg	52 U	42 U	48 U	53 U	43 U	49 U	44 U	49 U
Aroclor-1242	NSL	NSL	ug/kg	170	820 J	1500	240 J	43 U	220	140 J	21 J
Aroclor-1248	NSL	NSL	ug/kg	52 U	42 U	48 U	53 U	43 U	49 U	44 U	49 U
Aroclor-1254	NSL	NSL	ug/kg	720	1500 J	2100	490 J	43 U	590	270	30 J
Aroclor-1260	NSL	NSL	ug/kg	180	340	470	190	43 U	160	110	16 J
Aroclor-1262	NSL	NSL	ug/kg	52 U	42 U	48 U	53 U	43 U	49 U	44 U	49 U
Aroclor-1268	NSL	NSL	ug/kg	52 U	42 U	48 U	53 U	43 U	49 U	44 U	49 U
Total PCBs ND=0	59.8	676	ug/kg	**1070**	**2660**	**4070**	**920**	0	**970**	**520**	**67**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

Location ID:				RB15-14	RB15-15	RB15-15	RB15-15	RB15-15	RB15-15	RB15-15
Sample Name:				RB15-14-3050	RB15-15-SURF	RB15-15-0010	RB15-15-1020	RB15-15-2040	RB15-15-2040FD	RB15-15-4060
Sample Date:				11/4/2015	11/2/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
Depth Interval (ft):				3-5	0-0.5	0-1	1-2	2-4	2-4	4-6
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	42 U	50 U	47 U	39 U	45 U	42 U	41 U
Aroclor-1221	NSL	NSL	ug/kg	42 U	50 U	47 U	39 U	45 U	42 U	41 U
Aroclor-1232	NSL	NSL	ug/kg	42 U	50 U	47 U	39 U	45 U	42 U	41 U
Aroclor-1242	NSL	NSL	ug/kg	42 U	75	180	13 J	24 J	23 J	41 U
Aroclor-1248	NSL	NSL	ug/kg	42 U	50 U	47 U	39 U	45 U	42 U	41 U
Aroclor-1254	NSL	NSL	ug/kg	42 U	190	200	13 J	13 J	18 J	41 U
Aroclor-1260	NSL	NSL	ug/kg	42 U	91 J	85	5.9 J	9.6 J	10 J	41 U
Aroclor-1262	NSL	NSL	ug/kg	42 U	50 U	47 U	39 U	45 U	42 U	41 U
Aroclor-1268	NSL	NSL	ug/kg	42 U	50 U	47 U	39 U	45 U	42 U	41 U
Total PCBs ND=0	59.8	676	ug/kg	0	**356**	**465**	31.9	46.6	51	0

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

Location ID:				RB15-16	RB15-16	RB15-16	RB15-16	RB15-16	RB15-17	RB15-17	RB15-17
Sample Name:				RB15-16-SURF	RB15-16-0010	RB15-16-1030	RB15-16-3040	RB15-16-4060	RB15-17-SURF	RB15-17-0010	RB15-17-1030
Sample Date:				11/2/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015	11/3/2015	11/3/2015
Depth Interval (ft):				0-0.5	0-1	1-3	3-4	4-6	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**								
Aroclor-1016	NSL	NSL	ug/kg	55 U	42 U	49 U	49 U	44 U	44 U	39 U	40 U
Aroclor-1221	NSL	NSL	ug/kg	55 U	42 U	49 U	49 U	44 U	44 U	39 U	40 U
Aroclor-1232	NSL	NSL	ug/kg	55 U	42 U	49 U	49 U	44 U	44 U	39 U	40 U
Aroclor-1242	NSL	NSL	ug/kg	43 J	90 J	43 J	35 J	44 U	44 U	39 U	40 U
Aroclor-1248	NSL	NSL	ug/kg	55 U	42 U	49 U	49 U	44 U	44 U	39 U	40 U
Aroclor-1254	NSL	NSL	ug/kg	130	160	55 J	37 J	44 U	8.8 J	9.9 J	40 U
Aroclor-1260	NSL	NSL	ug/kg	63	70	20 J	20 J	44 U	9.3 J	7 J	40 U
Aroclor-1262	NSL	NSL	ug/kg	55 U	42 U	49 U	49 U	44 U	44 U	39 U	40 U
Aroclor-1268	NSL	NSL	ug/kg	55 U	42 U	49 U	49 U	44 U	44 U	39 U	40 U
Total PCBs ND=0	59.8	676	ug/kg	**236**	**320**	**118**	**92**	0	18.1	16.9	0

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-18	RB15-18	RB15-19	RB15-19	RB15-19	RB15-20	RB15-20
			Sample Name:	RB15-18-SURF	RB15-18-0010	RB15-19-SURF	RB15-19-0010	RB15-19-1030	RB15-20-SURF	RB15-20-0010
			Sample Date:	11/1/2015	11/2/2015	11/2/2015	11/3/2015	11/3/2015	11/4/2015	11/5/2015
			Depth Interval (ft):	0-0.5	0-1	0-0.5	0-1	1-3	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	40 U	37 U	47 U	43 U	39 U	86 U	66 U
Aroclor-1221	NSL	NSL	ug/kg	40 U	37 U	47 U	43 U	39 U	86 U	66 U
Aroclor-1232	NSL	NSL	ug/kg	40 U	37 U	47 U	43 U	39 U	86 U	66 U
Aroclor-1242	NSL	NSL	ug/kg	12 J	25 J	110	670	12 J	100 J	86
Aroclor-1248	NSL	NSL	ug/kg	40 U	37 U	47 U	43 U	39 U	86 U	66 U
Aroclor-1254	NSL	NSL	ug/kg	40 U	170	360	380	5.2 J	250	280
Aroclor-1260	NSL	NSL	ug/kg	18 J	150	410	290	39 U	180	220 J
Aroclor-1262	NSL	NSL	ug/kg	40 U	37 U	47 U	43 U	39 U	86 U	66 U
Aroclor-1268	NSL	NSL	ug/kg	40 U	37 U	47 U	43 U	39 U	86 U	66 U
Total PCBs ND=0	59.8	676	ug/kg	30	**345**	**880**	**1340**	17.2	**530**	**586**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

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J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

Location ID:				RB15-20	RB15-20	RB15-21	RB15-21	RB15-21	RB15-22	RB15-22	RB15-22
Sample Name:				RB15-20-1020	RB15-20-2040	RB15-21-SURF	RB15-21-0010	RB15-21-1020	RB15-22-SURF	RB15-22-0010	RB15-22-1020
Sample Date:				11/5/2015	11/5/2015	11/4/2015	11/5/2015	11/5/2015	11/3/2015	11/4/2015	11/4/2015
Depth Interval (ft):				1-2	2-4	0-0.5	0-1	1-2	0-0.5	0-1	1-2
Analyte	**TEC**	**PEC**	**Unit**								
Aroclor-1016	NSL	NSL	ug/kg	60 U	45 U	52 U	41 U	41 U	77 U	42 U	43 U
Aroclor-1221	NSL	NSL	ug/kg	60 U	45 U	52 U	41 U	41 U	77 U	42 U	43 U
Aroclor-1232	NSL	NSL	ug/kg	60 U	45 U	52 U	41 U	41 U	77 U	42 U	43 U
Aroclor-1242	NSL	NSL	ug/kg	170 J+	6 J	78 J	57 J	15 J	60 J	290 J	68
Aroclor-1248	NSL	NSL	ug/kg	60 U	45 U	52 U	41 U	41 U	77 U	42 U	43 U
Aroclor-1254	NSL	NSL	ug/kg	210 J+	5.7 J	170	140	40 J	250	470	140
Aroclor-1260	NSL	NSL	ug/kg	150 J	4.1 J	160	130	32 J	240	290	64
Aroclor-1262	NSL	NSL	ug/kg	60 U	45 U	52 U	41 U	41 U	77 U	42 U	43 U
Aroclor-1268	NSL	NSL	ug/kg	60 U	45 U	52 U	41 U	41 U	77 U	42 U	43 U
Total PCBs ND=0	59.8	676	ug/kg	**530**	15.8	**408**	**327**	**87**	**550**	**1050**	**272**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

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J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-22	RB15-22	RB15-23	RB15-23	RB15-23	RB15-23	RB15-23
			Sample Name:	RB15-22-2030	RB15-22-3050	RB15-23-SURF	RB15-23-0010	RB15-23-1030	RB15-23-1030FD	RB15-23-3050
			Sample Date:	11/4/2015	11/4/2015	11/3/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015
			Depth Interval (ft):	2-3	3-5	0-0.5	0-1	1-3	1-3	3-5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	26 UJ	52 U	53 U	49 U	59 U	58 U	59 U
Aroclor-1221	NSL	NSL	ug/kg	26 UJ	52 U	53 U	49 U	59 U	58 U	59 U
Aroclor-1232	NSL	NSL	ug/kg	26 UJ	52 U	53 U	49 U	59 U	58 U	59 U
Aroclor-1242	NSL	NSL	ug/kg	18 J-	27 J	43 J	48 J	52 J	33 J	41 J
Aroclor-1248	NSL	NSL	ug/kg	26 UJ	52 U	53 U	49 U	59 U	58 U	59 U
Aroclor-1254	NSL	NSL	ug/kg	33 J-	45 J	190	220	93	73	81
Aroclor-1260	NSL	NSL	ug/kg	33 J-	20 J	140	150	37 J	31 J	31 J
Aroclor-1262	NSL	NSL	ug/kg	26 UJ	52 U	53 U	49 U	59 U	58 U	59 U
Aroclor-1268	NSL	NSL	ug/kg	26 UJ	52 U	53 U	49 U	59 U	58 U	59 U
Total PCBs ND=0	59.8	676	ug/kg	**84**	**92**	**373**	**418**	**182**	**137**	**153**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

Location ID:				RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24
Sample Name:				RB15-24-SURF	RB15-24-0010	RB15-24-1020	RB15-24-2040	RB15-24-2040FD	RB15-24-4050	RB15-24-5060
Sample Date:				11/4/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015
Depth Interval (ft):				0-0.5	0-1	1-2	2-4	2-4	4-5	5-6
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	89 U	57 U	59 U	60 U	58 U	52 U	39 U
Aroclor-1221	NSL	NSL	ug/kg	89 U	57 U	59 U	60 U	58 U	52 U	39 U
Aroclor-1232	NSL	NSL	ug/kg	89 U	57 U	59 U	60 U	58 U	52 U	39 U
Aroclor-1242	NSL	NSL	ug/kg	58 J	100 J	39 J	25 J	34 J	15 J	39 U
Aroclor-1248	NSL	NSL	ug/kg	89 U	57 U	59 U	60 U	58 U	52 U	39 U
Aroclor-1254	NSL	NSL	ug/kg	150	440	220	49 J	64	25 J	39 U
Aroclor-1260	NSL	NSL	ug/kg	120	270	84 J	32 J	37 J	17 J	39 U
Aroclor-1262	NSL	NSL	ug/kg	89 U	57 U	59 U	60 U	58 U	52 U	39 U
Aroclor-1268	NSL	NSL	ug/kg	89 U	57 U	59 U	60 U	58 U	52 U	39 U
Total PCBs ND=0	59.8	676	ug/kg	**328**	**810**	**343**	**106**	**135**	57	0

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

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J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-24	RB15-25	RB15-25	RB15-26	RB15-26	RB15-26	RB15-26
			Sample Name:	RB15-24-6080	RB15-25-SURF	RB15-25-0010	RB15-26-SURF	RB15-26-0010	RB15-26-1030	RB15-26-1030FD
			Sample Date:	11/5/2015	11/4/2015	11/5/2015	11/3/2015	11/4/2015	11/4/2015	11/4/2015
			Depth Interval (ft):	6-8	0-0.5	0-1	0-0.5	0-1	1-3	1-3
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	41 U	44 U	39 U	37 U	42 U	41 U	41 U
Aroclor-1221	NSL	NSL	ug/kg	41 U	44 U	39 U	37 U	42 U	41 U	41 U
Aroclor-1232	NSL	NSL	ug/kg	41 U	44 U	39 U	37 U	42 U	41 U	41 U
Aroclor-1242	NSL	NSL	ug/kg	41 U	44 U	39 U	5.5 J	42 U	41 U	41 U
Aroclor-1248	NSL	NSL	ug/kg	41 U	44 U	39 U	37 U	42 U	41 U	41 U
Aroclor-1254	NSL	NSL	ug/kg	41 U	44 U	39 U	17 J	42 U	41 U	41 U
Aroclor-1260	NSL	NSL	ug/kg	41 U	44 U	39 U	5.5 J	42 U	41 U	41 U
Aroclor-1262	NSL	NSL	ug/kg	41 U	44 U	39 U	37 U	42 U	41 U	41 U
Aroclor-1268	NSL	NSL	ug/kg	41 U	44 U	39 U	37 U	42 U	41 U	41 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	0	28	0	0	0

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

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J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-26	RB15-27	RB15-27	RB15-27	RB15-27	RB15-27	RB15-27	RB15-28
			Sample Name:	RB15-26-3050	RB15-27-SURF	RB15-27-0010	RB15-27-1030	RB15-27-3050	RB15-27-5065	RB15-27-6570	RB15-28-SURF
			Sample Date:	11/4/2015	10/26/2015	10/28/2015	10/28/2015	10/28/2015	10/28/2015	10/28/2015	10/26/2015
			Depth Interval (ft):	3-5	0-0.5	0-1	1-3	3-5	5-6.5	6.5-7	0-0.5
Analyte	**TEC**	**PEC**	**Unit**								
Aroclor-1016	NSL	NSL	ug/kg	39 U	42 U	44 U	56 U	61 U	50 U	39 U	79 U
Aroclor-1221	NSL	NSL	ug/kg	39 U	42 U	44 U	56 U	61 U	50 U	39 U	79 U
Aroclor-1232	NSL	NSL	ug/kg	39 U	42 U	44 U	56 U	61 U	50 U	39 U	79 U
Aroclor-1242	NSL	NSL	ug/kg	39 U	70	74	56 U	61 U	50 U	39 U	100
Aroclor-1248	NSL	NSL	ug/kg	39 U	42 U	44 U	56 U	61 U	50 U	39 U	79 U
Aroclor-1254	NSL	NSL	ug/kg	39 U	76	78	43 J	61 U	50 U	39 U	160
Aroclor-1260	NSL	NSL	ug/kg	39 U	55	58	32 J	61 U	50 U	39 U	130
Aroclor-1262	NSL	NSL	ug/kg	39 U	42 U	44 U	56 U	61 U	50 U	39 U	79 U
Aroclor-1268	NSL	NSL	ug/kg	39 U	42 U	44 U	56 U	61 U	50 U	39 U	79 U
Total PCBs ND=0	59.8	676	ug/kg	0	**201**	**210**	**75**	0	0	0	**390**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

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J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-4 SEDIMENT RESULTS FOR PCB AROCLORS

			Location ID:	RB15-28	RB15-28
			Sample Name:	RB15-28-0010	RB15-28-1030
			Sample Date:	10/28/2015	10/28/2015
			Depth Interval (ft):	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**		
Aroclor-1016	NSL	NSL	ug/kg	56 U	40 U
Aroclor-1221	NSL	NSL	ug/kg	56 U	40 U
Aroclor-1232	NSL	NSL	ug/kg	56 U	40 U
Aroclor-1242	NSL	NSL	ug/kg	52 J	40 U
Aroclor-1248	NSL	NSL	ug/kg	56 U	40 U
Aroclor-1254	NSL	NSL	ug/kg	69	5.3 J
Aroclor-1260	NSL	NSL	ug/kg	54 J	3.8 J
Aroclor-1262	NSL	NSL	ug/kg	56 U	40 U
Aroclor-1268	NSL	NSL	ug/kg	56 U	40 U
Total PCBs ND=0	59.8	676	ug/kg	**175**	9.1

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PCB = Polychlorinated biphenyl

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

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J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

Location ID:				RB15-01	RB15-01	RB15-01	RB15-01	RB15-02	RB15-02	RB15-02	RB15-02	RB15-02	RB15-03	RB15-03	RB15-03
Sample Name:				RB15-01-SURF	RB15-01-0010	RB15-01-1030	RB15-01-3050	RB15-02-SURF	RB15-02-SURFFD	RB15-02-0010	RB15-02-1030	RB15-02-3040	RB15-03-SURF	RB15-03-0010	RB15-03-1030
Sample Date:				10/30/2015	11/3/2015	11/3/2015	11/3/2015	10/31/2015	10/31/2015	11/3/2015	11/3/2015	11/3/2015	10/31/2015	11/2/2015	11/2/2015
Depth Interval (ft):				0-0.5	0-1	1-3	3-5	0-0.5	0-0.5	0-1	1-3	3-4	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**												
1-Methylnaphthalene	NSL	NSL	ug/kg	250 U	480 U	450 U	630 U	980 U	940 U	11000 U	19000	530	150 U	600 U	3200
2-Methylnaphthalene**	NSL	NSL	ug/kg	250 U	72 J	350 J	570 J	240 J	940 U	11000 U	14000	430	25 J	190 J	3500
Acenaphthene**	6.71*	NSL	ug/kg	91 J	190 J	300 J	460 J	530 J	350 J	13000	25000	460	71 J	530 J	2600
Acenaphthylene**	5.87*	NSL	ug/kg	27 J	71 J	95 J	190 J	160 J	120 J	3500 J	3500 J	37 J	36 J	190 J	430 J
Anthracene**	57.2	845	ug/kg	**210 J**	**520**	**740**	**1000**	**1100**	**840 J**	**36000**	**42000**	**420**	**170**	**910**	**3500**
Benzo(a)anthracene**	108	1050	ug/kg	**1100**	**2500**	**2200**	**3300**	**4300**	**3200**	**68000**	**48000**	**410**	**850**	**3400**	**6500 J**
Benzo(a)pyrene**	150	1450	ug/kg	**1200**	**2300**	**2000**	**3000**	**4800**	**3600**	**59000**	**36000**	**310**	**950**	**2900**	**4900**
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	1400	2500	2100	3000	4000	2800	36000	19000	210	1000	2600	3600 J
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	770	1600	1400	2000	2500	2000	30000	17000	170	540	1400	2400
Benzo(k)fluoranthene**	240*	NSL	ug/kg	950	2200	1800	2500	3400	2700	35000	24000	210	650	2300	3800
Benzo[e]pyrene	150	1450	ug/kg	1000	1900	1600	2400	3300	2600	38000	22000	200	730	2200	3700
C1-Chrysenes	NSL	NSL	ug/kg	380 J	1000 J	1000 J	1900 J	1500 J	1300 J	29000 J	31000 J	240 J	340 J	2300 J	5700 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	1300 J	2900 J	3300 J	5100 J	5900 J	4700 J	130000 J	110000 J	890 J	1300 J	8000 J	18000 J
C1-Fluorenes	NSL	NSL	ug/kg	250 U	480 U	450 U	640 J	980 U	940 U	11000 U	13000 J	150 J	150 U	600 U	1800 J
C1-Naphthalenes	NSL	NSL	ug/kg	250 U	480 U	450 U	670 J	980 U	940 U	11000 U	22000 J	620 J	150 U	600 U	4600 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	390 J	970 J	2000 J	3200 J	1900 J	1500 J	62000 J	88000 J	710 J	390 J	5600 J	16000 J
C2-Chrysenes	NSL	NSL	ug/kg	250 U	490 J	630 J	1300 J	980 U	940 U	11000 U	14000 J	130 U	170 J	1800 J	4600 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	580 J	1400 J	1800 J	3300 J	2300 J	1700 J	35000 J	41000 J	360 J	520 J	5200 J	12000 J
C2-Fluorenes	NSL	NSL	ug/kg	250 U	480 U	900 J	1400 J	980 U	940 U	11000 U	10000 U	130 U	150 U	1100 J	3000 J
C2-Naphthalenes	NSL	NSL	ug/kg	250 U	480 U	2500 J	4400 J	980 U	940 U	24000 J	84000 J	1200 J	150 U	2700 J	19000 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	250 U	690 J	2100 J	3600 J	980 U	940 U	25000 J	43000 J	380 J	270 J	9300 J	17000 J
C3-Chrysenes	NSL	NSL	ug/kg	250 U	480 U	450 U	750 J	980 U	940 U	11000 U	10000 U	130 U	150 U	850 J	2400 J
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	250 U	690 J	1100 J	1800 J	980 U	940 U	11000 U	14000 J	130 J	180 J	2700 J	7700 J
C3-Fluorenes	NSL	NSL	ug/kg	250 U	480 U	1200 J	1700 J	980 U	940 U	11000 U	10000 U	130 U	150 U	2100 J	4100 J
C3-Naphthalenes	NSL	NSL	ug/kg	250 U	620 J	4100 J	6900 J	980 U	940 U	23000 J	58000 J	600 J	160 J	4700 J	18000 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	250 U	560 J	2200 J	3800 J	980 U	940 U	13000 J	21000 J	200 J	250 J	11000 J	22000 J
C4-Chrysenes	NSL	NSL	ug/kg	250 U	480 U	450 U	630 U	980 U	940 U	11000 U	10000 U	130 U	150 U	600 U	1600 U
C4-Naphthalenes	NSL	NSL	ug/kg	250 U	480 U	2700 J	4600 J	980 U	940 U	11000 U	15000 J	240 J	150 U	3900 J	8600 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	250 U	480 U	1100 J	2400 J	980 U	940 U	11000 U	10000 U	130 U	150 U	6400 J	13000 J
Chrysene**	166	1290	ug/kg	**1300**	**2700**	**2400**	**3600**	**4300**	**3400**	**63000**	**42000**	**370**	**890**	**3500**	**7000**
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	**250**	**540**	**450**	**680**	**690 J**	**540 J**	**8100 J**	**5200 J**	**45 J**	**150**	**410 J**	**860 J**
Fluoranthene**	423	2230	ug/kg	**2500**	**5200**	**5100**	**6800**	**7900**	**5900**	**92000**	**73000**	**670**	**1600**	**6200**	**9800**
Fluorene**	77.4	536	ug/kg	**84 J**	**220 J**	**370 J**	**540 J**	**400 J**	**280 J**	**12000**	**21000**	**310**	75 J	**440 J**	**2100**
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	800	1600	1300	1900	2600	2000	24000	15000	140	540	1200	2000
Naphthalene**	176	561	ug/kg	46 J	480 U	120 J	**250 J**	**480 J**	940 U	11000 U	**5000 J**	**260**	38 J	140 J	**1100 J**
Perylene	NSL	NSL	ug/kg	330	660	540	800	1200	940 U	11000	10000 U	130 U	250	710	1600 U
Phenanthrene**	204	1170	ug/kg	**1100**	**2200**	**2900**	**4200**	**4600**	**3300**	**92000**	**110000**	**1300**	**840**	**4000**	**14000**
Pyrene**	195	1520	ug/kg	**2100**	**4800**	**4700**	**6700**	**7900**	**6200**	**150000**	**100000**	**920**	**1500**	**5700**	**12000**
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**14053**	**29453**	**28325**	**40690**	**49900**	**38170**	**743600**	**599700**	**6672**	**9925**	**36010**	**80090**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an
approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported
sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

			Location ID:	RB15-03	RB15-03	RB15-04	RB15-04	RB15-04	RB15-04	RB15-04	RB15-05	RB15-05	RB15-05	RB15-06	RB15-06	RB15-06
			Sample Name:	RB15-03-3050	RB15-03-5070	RB15-04-SURF	RB15-04-0010	RB15-04-1030	RB15-04-1030FD	RB15-04-3040	RB15-05-SURF	RB15-05-0010	RB15-05-1030	RB15-06-SURF	RB15-06-0010	RB15-06-1030
			Sample Date:	11/2/2015	11/2/2015	10/31/2015	11/3/2015	11/3/2015	11/3/2015	11/3/2015	10/31/2015	11/3/2015	11/3/2015	10/31/2015	11/3/2015	11/3/2015
			Depth Interval (ft):	3-5	5-7	0-0.5	0-1	1-3	1-3	3-4	0-0.5	0-1	1-3	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**													
1-Methylnaphthalene	NSL	NSL	ug/kg	7800	190	2500 U	5000 U	860 U	1600 U	8.3	270 U	2700 U	9.9	460 U	23 U	5.4
2-Methylnaphthalene**	NSL	NSL	ug/kg	10000	190	750 J	800 J	300 J	590 J	7.1	55 J	2700 U	8.7	460 U	9.9 J	4.3 J
Acenaphthene**	6.71*	NSL	ug/kg	8500	210	2000 J	6000	1000	1700	4.4	130 J	310 J	2.3 J	250 J	11 J	1.9 J
Acenaphthylene**	5.87*	NSL	ug/kg	1200 J	28 J	2500 U	1300 J	230 J	250 J	1.7 J	93 J	1100 J	1.8 J	120 J	7.4 J	0.91 J
Anthracene**	57.2	845	ug/kg	**17000**	**310**	**5700**	**19000**	**3300**	**4600**	10	**370**	**3200**	5.4	**630**	34	3.8 J
Benzo(a)anthracene**	108	1050	ug/kg	**20000**	**480**	**9600**	**29000**	**6700**	**7400**	17	**1300**	**15000**	19	**2400 J**	**150**	5.7
Benzo(a)pyrene**	150	1450	ug/kg	**16000**	**370**	**8500**	**21000**	**5300**	**5700**	14	**1400**	**15000**	18	**2400**	130	4.7
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	9500	310	7000	15000	3900	4600	11	890	7100	19	1500 J	100	6.7
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	6300	190	4200	10000	2700	3200	17	670	8800	24	1200	81	9.7
Benzo(k)fluoranthene**	240*	NSL	ug/kg	12000	240	7100	15000	3600	4300	9.1	780	8900	13	1800	84	3.4 J
Benzo[e]pyrene	150	1450	ug/kg	9500	250	5500	14000	3300	3700	13	930	10000	19	1600	100	7.6
C1-Chrysenes	NSL	NSL	ug/kg	11000 J	290 J	3100 J	15000 J	2800 J	2900 J	19 J	680 J	5400 J	23 J	1000 J	87 J	16 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	52000 J	1100 J	11000 J	53000 J	9500 J	10000 J	47 J	2800 J	26000 J	45 J	4300 J	220 J	29 J
C1-Fluorenes	NSL	NSL	ug/kg	5900 U	110 J	2500 U	5000 U	860 U	1600 U	8.3 J	270 U	2700 U	8.8 J	460 U	23 U	7.5 J
C1-Naphthalenes	NSL	NSL	ug/kg	13000 J	250 J	2500 U	5000 U	860 U	1600 U	11 J	270 U	2700 U	12 J	460 U	23 U	6.4 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	37000 J	790 J	4600 J	39000 J	4800 J	5600 J	50 J	1200 J	9400 J	47 J	1200 J	160 J	50 J
C2-Chrysenes	NSL	NSL	ug/kg	7700 J	190 J	2500 U	7000 J	1100 J	1600 U	20 J	270 U	2700 U	22 J	460 U	46 J	16 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	20000 J	480 J	4600 J	22000 J	3800 J	3800 J	41 J	900 J	7000 J	57 J	1400 J	140 J	39 J
C2-Fluorenes	NSL	NSL	ug/kg	5900 U	93 J	2500 U	5600 J	860 U	1600 U	12 J	270 U	2700 U	16 J	460 U	37 J	15 J
C2-Naphthalenes	NSL	NSL	ug/kg	38000 J	850 J	2500 U	16000 J	1800 J	2300 J	43 J	300 J	2700 U	51 J	460 U	110 J	43 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	20000 J	510 J	2500 J	22000 J	2600 J	3000 J	50 J	580 J	4200 J	62 J	750 J	170 J	61 J
C3-Chrysenes	NSL	NSL	ug/kg	5900 U	100 J	2500 U	5000 U	860 U	1600 U	15 J	270 U	2700 U	24 J	460 U	47 J	18 J
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	6800 J	210 J	2500 U	8500 J	1600 J	1600 J	36 J	270 J	2700 U	44 J	460 U	89 J	39 J
C3-Fluorenes	NSL	NSL	ug/kg	5900 U	100 J	2500 U	5000 U	860 U	1600 U	18 J	270 U	2700 U	22 J	460 U	55 J	20 J
C3-Naphthalenes	NSL	NSL	ug/kg	26000 J	740 J	2500 U	22000 J	1700 J	2200 J	96 J	280 J	2700 U	120 J	460 U	430 J	150 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	19000 J	470 J	2500 U	15000 J	1600 J	1700 J	61 J	320 J	2700 U	71 J	600 J	180 J	71 J
C4-Chrysenes	NSL	NSL	ug/kg	5900 U	83 U	2500 U	5000 U	860 U	1600 U	7.2 J	270 U	2700 U	7.2 J	460 U	28 J	7.4 J
C4-Naphthalenes	NSL	NSL	ug/kg	9800 J	300 J	2500 U	9300 J	860 U	1600 U	94 J	270 U	2700 U	110 J	460 U	370 J	140 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	10000 J	260 J	2500 U	7900 J	860 U	1600 U	46 J	270 U	2700 U	56 J	460 U	130 J	56 J
Chrysene**	166	1290	ug/kg	**19000**	**430**	**9400**	**26000**	**5700**	**6300**	21	**1200**	**12000**	27	**2300**	150	12
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	**2000 J**	**44 J**	**1300 J**	**3200 J**	**850 J**	**1100 J**	2.8 J	**210 J**	**1800 J**	3.7 J	**300 J**	26	1.6 J
Fluoranthene**	423	2230	ug/kg	**31000**	**850**	**23000**	**49000**	**11000**	**13000**	27	**1800**	**20000**	33	**3600**	210	7.9
Fluorene**	77.4	536	ug/kg	**7700**	**180**	**2800**	**7100**	**860**	**2000**	5.5	**110 J**	**340 J**	3.8 J	**250 J**	16 J	2.7 J
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	5400 J	150	4600	9700	2500	3000	6.9	580	6500	10	1200	70	2.6 J
Naphthalene**	176	561	ug/kg	**3900 J**	87	**2100 J**	**990 J**	**290 J**	**850 J**	3.9 J	81 J	2700 U	4	130 J	7.7 J	2.4 J
Perylene	NSL	NSL	ug/kg	5900 U	87	2500 U	5000 U	1300	1600 U	9.1	270 U	2700 U	13	560	38	7.8
Phenanthrene**	204	1170	ug/kg	**50000**	**1100**	**23000**	**51000**	**7300**	**12000**	34	**1300**	**7900**	22	**2400**	160	20
Pyrene**	195	1520	ug/kg	**43000**	**920**	**19000**	**61000**	**13000**	**14000**	38	**2600**	**38000**	36	**4900**	**250**	13
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**262500**	**6089**	**132550**	**325090**	**68530**	**84590**	230.4	**13569**	**151350**	250.7	**25610**	1497	103.31

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

			Location ID:	RB15-07	RB15-07	RB15-07	RB15-07	RB15-08	RB15-08	RB15-08	RB15-09	RB15-09	RB15-09	RB15-10	RB15-10
			Sample Name:	RB15-07-SURF	RB15-07-0010	RB15-07-1020	RB15-07-2030	RB15-08-SURF	RB15-08-SURFFD	RB15-08-0010	RB15-09-SURF	RB15-09-SURFFD	RB15-09-0010	RB15-10-SURF	RB15-10-0010
			Sample Date:	11/1/2015	11/2/2015	11/2/2015	11/2/2015	11/1/2015	11/1/2015	11/2/2015	11/1/2015	11/1/2015	11/2/2015	11/1/2015	11/2/2015
			Depth Interval (ft):	0-0.5	0-1	1-2	2-3	0-0.5	0-0.5	0-1	0-0.5	0-0.5	0-1	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**												
1-Methylnaphthalene	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
2-Methylnaphthalene**	NSL	NSL	ug/kg	990 U	40 J	100 J	29 J	300 U	110 U	33 J	740 U	82 J	1200 J	210 U	150 U
Acenaphthene**	6.71*	NSL	ug/kg	280 J	120 J	230 J	32 J	140 J	56 J	71 J	280 J	300 J	2000	93 J	67 J
Acenaphthylene**	5.87*	NSL	ug/kg	190 J	37 J	250 J	89 U	57 J	31 J	260	130 J	78 J	370 J	210 U	31 J
Anthracene**	57.2	845	ug/kg	**1000**	**320**	**610**	24 J	**370 J**	**120 J**	**220 J**	**760**	**720**	**4700**	**590**	**230**
Benzo(a)anthracene**	108	1050	ug/kg	**3500**	**960**	**1200**	63 J	**1300**	**530**	**910**	**2100**	**1800**	**6900**	**740**	**900**
Benzo(a)pyrene**	150	1450	ug/kg	**3900**	**910**	**1200**	67 J	**1100**	**490**	**1800**	**2000**	**1800**	**4800**	**430**	**860**
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	2100	660	580	33 J	1200	490	1200	1700	1700	3600	460	720
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	1800	440	510	44 J	570	260	1000	1000	810	2000	200 J	540
Benzo(k)fluoranthene**	240*	NSL	ug/kg	2400	750	850	38 J	920	370	920	1600	1300	4400	430	610
Benzo[e]pyrene	150	1450	ug/kg	2400	600	780	89 U	840	360	1200	1400	1300	3000	330	530
C1-Chrysenes	NSL	NSL	ug/kg	1300 J	340 J	470 J	89 U	420 J	190 J	650 J	740 J	700 J	2300 J	210 U	320 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	6500 J	1300 J	2400 J	160 J	1400 J	710 J	1700 J	3000 J	2500 J	8700 J	1000 J	1400 J
C1-Fluorenes	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C1-Naphthalenes	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	2500 J	500 J	950 J	160 J	500 J	260 J	800 J	1400 J	1100 J	6200 J	400 J	530 J
C2-Chrysenes	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	410 J	740 U	540 U	2000 U	210 U	180 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	1900 J	530 J	730 J	89 U	630 J	290 J	960 J	1200 J	1100 J	3900 J	330 J	580 J
C2-Fluorenes	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C2-Naphthalenes	NSL	NSL	ug/kg	990 U	220 U	360 J	120 J	300 U	110 U	230 U	740 U	540 U	2800 J	210 U	150 U
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	1200 J	270 J	440 J	140 J	300 U	130 J	460 J	740 U	540 J	2500 J	210 U	350 J
C3-Chrysenes	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	330 J	740 U	540 U	2000 U	210 U	180 J
C3-Fluorenes	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C3-Naphthalenes	NSL	NSL	ug/kg	990 U	220 U	300 J	290 J	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	990 U	220 U	310 J	150 J	300 U	110 U	280 J	740 U	540 U	2000 U	210 U	280 J
C4-Chrysenes	NSL	NSL	ug/kg	990 U	220 U	290 U	89 U	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C4-Naphthalenes	NSL	NSL	ug/kg	990 U	220 U	290 U	270 J	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	150 U
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	990 U	220 U	290 U	93 J	300 U	110 U	230 U	740 U	540 U	2000 U	210 U	230 J
Chrysene**	166	1290	ug/kg	**3100**	**890**	**1100**	70 J	**1200**	**480**	**890**	**2000**	**1800**	**6200**	**740**	**760**
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	**520 J**	**160 J**	**130 J**	8 J	**210 J**	**91 J**	**320**	**410 J**	**250 J**	**680 J**	**63 J**	**150**
Fluoranthene**	423	2230	ug/kg	**5300**	**1800**	**2200**	78 J	**2400**	**1000**	**1800**	**4500**	**3700**	**17000**	**2300**	**1300**
Fluorene**	77.4	536	ug/kg	**230 J**	**110 J**	**310**	21 J	**160 J**	63 J	**92 J**	**310 J**	**310 J**	**2500**	**240**	64 J
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	1600	460	460	25 J	610	290	880	1100	850	2200	210	490
Naphthalene**	176	561	ug/kg	990 U	67 J	**340**	**250**	89 J	21 J	230 U	740 U	130 J	**2700**	210 U	150 U
Perylene	NSL	NSL	ug/kg	990 U	230	290 U	89 U	300 U	130	360	740 U	540 U	2000 U	210 U	210
Phenanthrene**	204	1170	ug/kg	**3300**	**1100**	**2900**	120	**1400**	**540**	**870**	**3600**	**2700**	**19000**	**1800**	**710**
Pyrene**	195	1520	ug/kg	**7400**	**1600**	**3200**	130	**1800**	**940**	**1700**	**4400**	**3000**	**12000**	**1400**	**1400**
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**37610**	**10424**	**16170**	1054.5	**13676**	**5827**	**13081**	**26630**	**21330**	**92250**	**10011**	**8982**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an
approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported
sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

			Location ID:	RB15-11	RB15-11	RB15-11	RB15-11	RB15-12	RB15-12	RB15-13	RB15-13	RB15-13	RB15-13	RB15-13	RB15-14
			Sample Name:	RB15-11-SURF	RB15-11-0010	RB15-11-1030	RB15-11-1030FD	RB15-12-0010	RB15-12-1030	RB15-13-SURF	RB15-13-0010	RB15-13-1025	RB15-13-2535	RB15-13-3550	RB15-14-SURF
			Sample Date:	11/3/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015
			Depth Interval (ft):	0-0.5	0-1	1-3	1-3	0-1	1-3	0-0.5	0-1	1-2.5	2.5-3.5	3.5-5	0-0.5
Analyte	**TEC**	**PEC**	**Unit**												
1-Methylnaphthalene	NSL	NSL	ug/kg	34000	4400	90	39	200000 U	11000000 U	5300 U	2100 U	16000	90000	1800	1000 U
2-Methylnaphthalene**	NSL	NSL	ug/kg	33000	4500	93	38	250000	5000000 J	870 J	690 J	4100 J	93000	660	410 J
Acenaphthene**	6.71*	NSL	ug/kg	22000	3400	65	21 J	220000	3200000 J	3200 J	3700	17000	86000	1500	700 J
Acenaphthylene**	5.87*	NSL	ug/kg	7800 J	730 J	15 J	3.1 J	20000 J	11000000 U	5300 U	670 J	1700 J	5900 J	45 J	410 J
Anthracene**	57.2	845	ug/kg	**50000**	**4900**	**77**	19 J	**360000**	**3700000 J**	**10000**	**5900**	**18000**	**83000**	**1600**	**1600**
Benzo(a)anthracene**	108	1050	ug/kg	**56000**	**5000**	64	9.7 J	**200000**	**1600000 J**	**23000**	**10000**	**21000**	**76000**	**1900**	**5900**
Benzo(a)pyrene**	150	1450	ug/kg	**44000**	**3800**	53	7.7 J	**150000 J**	**1000000 J**	**18000**	**8500**	**17000**	**65000**	**1300**	**5200**
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	31000	2700	40 J	12 J	130000 J	11000000 U	16000	6000	9900	35000	990	3900
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	20000	2000	36 J	16 J	83000 J	11000000 U	9800	4000	7800	25000	730	3300
Benzo(k)fluoranthene**	240*	NSL	ug/kg	29000	2700	36 J	5.5 J	130000 J	11000000 U	14000	7000	14000	44000	1200	4100
Benzo[e]pyrene	150	1450	ug/kg	26000	2300	45 U	25 U	200000 U	11000000 U	13000	5500	11000	40000	840	3600
C1-Chrysenes	NSL	NSL	ug/kg	34000 J	1900 J	56 J	35 J	200000 U	11000000 U	8100 J	4600 J	9000 J	33000 J	620 J	2800 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	86000 J	8200 J	140 J	54 J	260000 J	11000000 U	26000 J	16000 J	39000 J	140000 J	2600 J	7800 J
C1-Fluorenes	NSL	NSL	ug/kg	11000 U	1600 U	45 U	25 U	200000 U	11000000 U	5300 U	2100 U	4900 U	21000 U	430 U	1000 U
C1-Naphthalenes	NSL	NSL	ug/kg	42000 J	5600 J	110 J	50 J	310000 J	11000000 U	5300 U	2100 U	12000 J	120000 J	1500 J	1000 U
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	66000 J	6400 J	150 J	100 J	200000 U	11000000 U	12000 J	11000 J	27000 J	120000 J	1900 J	3200 J
C2-Chrysenes	NSL	NSL	ug/kg	11000 U	1600 U	51 J	34 J	200000 U	11000000 U	5300 U	2800 J	4900 U	21000 U	430 U	1100 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	27000 J	2800 J	90 J	71 J	200000 U	11000000 U	11000 J	5600 J	13000 J	44000 J	860 J	3300 J
C2-Fluorenes	NSL	NSL	ug/kg	11000 U	1600 U	45 U	35 J	200000 U	11000000 U	5300 U	2100 U	4900 U	21000 U	430 U	1000 U
C2-Naphthalenes	NSL	NSL	ug/kg	68000 J	8100 J	190 J	92 J	200000 U	11000000 U	5300 U	8100 J	39000 J	180000 J	3000 J	1200 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	28000 J	2800 J	130 J	130 J	200000 U	11000000 U	5700 J	5500 J	14000 J	52000 J	840 J	2100 J
C3-Chrysenes	NSL	NSL	ug/kg	11000 U	1600 U	45 U	39 J	200000 U	11000000 U	5300 U	2100 U	4900 U	21000 U	430 U	1000 U
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	11000 U	1600 U	73 J	74 J	200000 U	11000000 U	5300 U	2100 U	4900 U	21000 U	430 U	1200 J
C3-Fluorenes	NSL	NSL	ug/kg	11000 U	1600 U	45 U	49 J	200000 U	11000000 U	5300 U	2100 U	4900 U	21000 U	430 U	1000 U
C3-Naphthalenes	NSL	NSL	ug/kg	36000 J	4100 J	220 J	240 J	200000 U	11000000 U	5300 U	7100 J	21000 J	81000 J	1200 J	1300 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	14000 J	1600 U	150 J	140 J	200000 U	11000000 U	5300 U	3100 J	8500 J	23000 J	430 U	1200 J
C4-Chrysenes	NSL	NSL	ug/kg	11000 U	1600 U	45 U	25 U	200000 U	11000000 U	5300 U	2100 U	4900 U	21000 U	430 U	1000 U
C4-Naphthalenes	NSL	NSL	ug/kg	11000 U	1600 U	190 J	250 J	200000 U	11000000 U	5300 U	2200 J	6400 J	21000 U	430 U	1000 U
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	11000 U	1600 U	100 J	110 J	200000 U	11000000 U	5300 U	2100 U	4900 U	21000 U	430 U	1000 U
Chrysene**	166	1290	ug/kg	**40000**	**3700**	69	31	**170000 J**	**1500000 J**	**20000**	**9200**	**19000**	**67000**	**1600**	**5400**
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	**7300 J**	**620 J**	9.5 J	2.5 J	**28000 J**	11000000 U	**3700 J**	**1400 J**	**2700 J**	**8600 J**	**270 J**	**1000**
Fluoranthene**	423	2230	ug/kg	**120000**	**11000**	160 J	32 J	**540000**	**4800000 J**	**45000**	**17000**	**39000**	**140000**	**3800**	**10000**
Fluorene**	77.4	536	ug/kg	**41000**	**4500**	77	22 J	**230000**	**3300000 J**	**4400 J**	**2700**	**9800**	**56000**	**900**	**700 J**
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	22000	1900	24 J	4 J	82000 J	430000 J	9900	4200	7900	27000	750	3000
Naphthalene**	176	561	ug/kg	**41000**	**9000**	**590**	**340**	**2600000**	**99000000**	**1800 J**	**1200 J**	**4500 J**	**42000**	**1800**	**1000**
Perylene	NSL	NSL	ug/kg	11000	1600 U	45 U	25 U	200000 U	11000000 U	5300 U	2100	4900 U	21000 U	430 U	1300
Phenanthrene**	204	1170	ug/kg	**170000**	**18000**	**290 J**	75 J	**760000**	**7900000 J**	**35000**	**15000**	**47000**	**220000**	**3900**	**5600**
Pyrene**	195	1520	ug/kg	**140000**	**12000**	180 J	37 J	**440000**	**4300000 J**	**43000**	**20000**	**46000**	**170000**	**3200**	**11000**
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**874100**	**90450**	**1860.5**	667.5	**6351500**	**182230000**	**262970**	**117160**	**286400**	**1243500**	**26145**	**63220**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

			Location ID:	RB15-14	RB15-14	RB15-14	RB15-15	RB15-15	RB15-15	RB15-15	RB15-15	RB15-15	RB15-16	RB15-16	RB15-16	RB15-16
			Sample Name:	RB15-14-0010	RB15-14-1030	RB15-14-3050	RB15-15-SURF	RB15-15-0010	RB15-15-1020	RB15-15-2040	RB15-15-2040FD	RB15-15-4060	RB15-16-SURF	RB15-16-0010	RB15-16-1030	RB15-16-3040
			Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/2/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015	11/4/2015	11/4/2015	11/4/2015
			Depth Interval (ft):	0-1	1-3	3-5	0-0.5	0-1	1-2	2-4	2-4	4-6	0-0.5	0-1	1-3	3-4
Analyte	**TEC**	**PEC**	**Unit**													
1-Methylnaphthalene	NSL	NSL	ug/kg	33000	120000	880	260 U	110000	11000	110000	79000	900	550 U	17000	300000	360000
2-Methylnaphthalene**	NSL	NSL	ug/kg	35000	150000	1000	120 J	160000	15000	150000	100000	1200	110 J	10000	410000	410000
Acenaphthene**	6.71*	NSL	ug/kg	32000	90000	810	240 J	100000	8200	88000	63000	930	370 J	20000	270000	280000
Acenaphthylene**	5.87*	NSL	ug/kg	2700 J	4200 J	49 J	160 J	3100 J	240 J	3300 J	2400 J	36 J	260 J	1300 J	9500 J	10000 J
Anthracene**	57.2	845	ug/kg	**40000**	**80000**	**950**	**500**	**67000**	**5800**	**55000**	**37000**	**670**	**740**	**19000**	**190000**	**210000**
Benzo(a)anthracene**	108	1050	ug/kg	**35000**	**53000**	**940**	**2300 J**	**36000**	**2400**	**32000**	**22000**	**420**	**3600**	**15000**	**100000**	**87000 J**
Benzo(a)pyrene**	150	1450	ug/kg	**28000**	**42000**	**650**	**2400**	**26000**	**1700 J**	**23000**	**15000 J**	**360**	**3300**	**11000**	**77000 J**	**64000 J**
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	20000	23000	350	2200 J	15000 J	990 J	11000 J	6700 J	200 J	2100	6500	40000 J	23000 J
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	15000	19000 J	270	1500	11000 J	770 J	9200 J	5700 J	190 J	1900	5100	31000 J	24000 J
Benzo(k)fluoranthene**	240*	NSL	ug/kg	22000	31000	540	1500	18000 J	1100 J	14000 J	8700 J	200 J	2000	7800	49000 J	44000 J
Benzo[e]pyrene	150	1450	ug/kg	18000	26000	380	1600	24000 U	2000 U	18000 U	16000 U	230	2300	7000	97000 U	98000 U
C1-Chrysenes	NSL	NSL	ug/kg	15000 J	24000 J	390 J	960 J	24000 U	2000 U	21000 J	16000 U	250 J	1600 J	6900 J	97000 U	98000 U
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	54000 J	110000 J	1500 J	3200 J	84000 J	5000 J	93000 J	67000 J	990 J	6100 J	30000 J	240000 J	270000 J
C1-Fluorenes	NSL	NSL	ug/kg	8700 U	20000 U	240 J	260 U	24000 U	2000 U	22000 J	16000 U	210 U	550 U	4500 J	97000 U	98000 U
C1-Naphthalenes	NSL	NSL	ug/kg	43000 J	180000 J	1200 J	260 U	170000 J	16000 J	170000 J	120000 J	1300 J	550 U	17000 J	450000 J	560000 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	43000 J	100000 J	1100 J	990 J	77000 J	4900 J	93000 J	71000 J	850 J	2100 J	23000 J	230000 J	270000 J
C2-Chrysenes	NSL	NSL	ug/kg	8700 U	20000 U	210 U	480 J	24000 U	2000 U	18000 U	16000 U	210 U	620 J	4200 U	97000 U	98000 U
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	16000 J	32000 J	510 J	1300 J	24000 J	2000 U	34000 J	25000 J	390 J	2000 J	8200 J	97000 U	98000 U
C2-Fluorenes	NSL	NSL	ug/kg	8700 U	20000 U	210 U	260 U	24000 U	2000 U	18000 U	16000 U	210 U	550 U	4200 U	97000 U	98000 U
C2-Naphthalenes	NSL	NSL	ug/kg	63000 J	190000 J	1400 J	420 J	150000 J	11000 J	180000 J	130000 J	1600 J	550 U	31000 J	450000 J	560000 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	18000 J	40000 J	510 J	670 J	27000 J	2000 U	40000 J	28000 J	420 J	1200 J	9500 J	97000 U	120000 J
C3-Chrysenes	NSL	NSL	ug/kg	8700 U	20000 U	210 U	260 U	24000 U	2000 U	18000 U	16000 U	210 U	550 U	4200 U	97000 U	98000 U
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	8700 U	20000 U	210 U	430 J	24000 U	2000 U	18000 U	16000 U	210 U	550 U	4200 U	97000 U	98000 U
C3-Fluorenes	NSL	NSL	ug/kg	8700 U	20000 U	210 U	260 U	24000 U	2000 U	18000 U	16000 U	210 U	550 U	4200 U	97000 U	98000 U
C3-Naphthalenes	NSL	NSL	ug/kg	29000 J	74000 J	700 J	350 J	57000 J	3600 J	74000 J	54000 J	830 J	550 J	16000 J	170000 J	220000 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	8700 U	20000 U	300 J	460 J	24000 U	2000 U	21000 J	16000 U	240 J	650 J	4600 J	97000 U	98000 U
C4-Chrysenes	NSL	NSL	ug/kg	8700 U	20000 U	210 U	260 U	24000 U	2000 U	18000 U	16000 U	210 U	550 U	4200 U	97000 U	98000 U
C4-Naphthalenes	NSL	NSL	ug/kg	8700 U	20000 U	240 J	260 U	24000 U	2000 U	18000 U	16000 U	260 J	550 U	4200 U	97000 U	98000 U
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	8700 U	20000 U	210 U	260 U	24000 U	2000 U	18000 U	16000 U	210 U	550 U	4200 U	97000 U	98000 U
Chrysene**	166	1290	ug/kg	**32000**	**48000**	**760**	**2000**	**31000**	**2100**	**27000**	**18000**	**370**	**3000**	**13000**	**86000 J**	**80000 J**
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	**4900 J**	**5900 J**	**80 J**	**450**	**3100 J**	**240 J**	**3300 J**	**1900 J**	**46 J**	**550**	**1700 J**	**9000 J**	98000 U
Fluoranthene**	423	2230	ug/kg	**63000**	**110000**	**1800**	**3600**	**72000**	**4900**	**52000**	**34000**	**840**	**4400**	**26000**	**200000**	**150000**
Fluorene**	77.4	536	ug/kg	**22000**	**57000**	**520**	**190 J**	**53000**	**4100**	**41000**	**29000**	**470**	**260 J**	**12000**	**150000**	**140000**
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	14000	17000 J	260	1300	11000 J	710 J	8200 J	4900 J	130 J	1600	4900	29000 J	18000 J
Naphthalene**	176	561	ug/kg	**38000**	**250000**	**1500**	**240 J**	**270000**	**20000**	**210000**	**150000**	**2100**	**230 J**	**17000**	**700000**	**700000**
Perylene	NSL	NSL	ug/kg	8700 U	20000 U	210 U	550	24000 U	2000 U	18000 U	16000 U	210 U	670	4200 U	97000 U	98000 U
Phenanthrene**	204	1170	ug/kg	**80000**	**210000**	**2300**	**1600**	**170000**	**13000**	**150000**	**110000**	**1900**	**2000**	**45000**	**510000**	**450000**
Pyrene**	195	1520	ug/kg	**71000**	**140000**	**1900**	**3400**	**100000**	**6800**	**99000**	**69000**	**1400**	**7600**	**38000**	**300000**	**280000**
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**554600**	**1320600**	**14679**	**23700**	**1146200**	**88050**	**976000**	**677300**	**11462**	**34020**	**253300**	**3160500**	**3068000**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

Location ID:				RB15-16	RB15-17	RB15-17	RB15-17	RB15-18	RB15-18	RB15-19	RB15-19	RB15-19	RB15-20	RB15-20	RB15-20	RB15-20
Sample Name:				RB15-16-4060	RB15-17-SURF	RB15-17-0010	RB15-17-1030	RB15-18-SURF	RB15-18-0010	RB15-19-SURF	RB15-19-0010	RB15-19-1030	RB15-20-SURF	RB15-20-0010	RB15-20-1020	RB15-20-2040
Sample Date:				11/4/2015	11/2/2015	11/3/2015	11/3/2015	11/1/2015	11/2/2015	11/2/2015	11/3/2015	11/3/2015	11/4/2015	11/5/2015	11/5/2015	11/5/2015
Depth Interval (ft):				4-6	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5	0-1	1-3	0-0.5	0-1	1-2	2-4
Analyte	**TEC**	**PEC**	**Unit**													
1-Methylnaphthalene	NSL	NSL	ug/kg	3400	20	260 U	4.3	400 U	950 U	470 U	2100 U	5.8	500	3500	7100	600
2-Methylnaphthalene**	NSL	NSL	ug/kg	3600	9.3 J	50 J	4.7	210 J	130 J	120 J	560 J	6.3	350 J	2800	5500	420
Acenaphthene**	6.71*	NSL	ug/kg	2600	120	610	8.6	720	550 J	390 J	2000 J	9.1	410 J	1300	2300	340
Acenaphthylene**	5.87*	NSL	ug/kg	1100 U	6.4 J	97 J	2.7 J	91 J	260 J	210 J	410 J	2.5 J	270 J	500 J	1100 J	96 J
Anthracene**	57.2	845	ug/kg	**1200**	40	**1500**	13	**820**	**2200**	**670**	**3400**	13	**1000**	**2100**	**3500**	**310**
Benzo(a)anthracene**	108	1050	ug/kg	**620 J**	84	**1800**	18	**1700**	**4500**	**3400**	**9100**	26	**2600**	**4700**	**6500**	**490**
Benzo(a)pyrene**	150	1450	ug/kg	**490 J**	76	**1100**	13	**1600**	**4100**	**3000**	**6700**	21	**2500**	**3200**	**4700**	**360**
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	200 J	59	850	15	1300	2800	1900	5700	22	2000	3300	4300	290
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	250 J	69	580	10	760	2200	1600	3400	20	1300	1700	2400	200
Benzo(k)fluoranthene**	240*	NSL	ug/kg	370 J	60	820	9.2	1000	2600	1900	5200	15	1900	2700	3600	270
Benzo[e]pyrene	150	1450	ug/kg	1100 U	61	750	16	1000	2600	2000	4500	19	1800	3000	4200	280
C1-Chrysenes	NSL	NSL	ug/kg	1100 U	24 J	830 J	36 J	740 J	1700 J	1600 J	4300 J	29 J	2200 J	6400 J	9100 J	630 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	1400 J	42 J	3700 J	60 J	3000 J	7000 J	6300 J	13000 J	54 J	5500 J	11000 J	19000 J	1600 J
C1-Fluorenes	NSL	NSL	ug/kg	1100 U	15 U	430 J	22 J	400 U	950 U	470 U	2100 U	10 J	420 U	1700 J	2800 J	280 J
C1-Naphthalenes	NSL	NSL	ug/kg	5000 J	15 U	260 U	7.2 J	400 U	950 U	470 U	2100 U	7.6 J	570 J	3900 J	7900 J	630 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	1400 J	41 J	2800 J	110 J	1600 J	3100 J	1700 J	5200 J	55 J	3100 J	12000 J	21000 J	1600 J
C2-Chrysenes	NSL	NSL	ug/kg	1100 U	15 U	360 J	46 J	400 U	950 U	720 J	2100 U	22 J	1900 J	8100 J	7800 J	640 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	1100 U	15 U	1500 J	63 J	1200 J	2500 J	2300 J	6000 J	54 J	4100 J	11000 J	17000 J	1100 J
C2-Fluorenes	NSL	NSL	ug/kg	1100 U	15 U	440 J	38 J	400 U	950 U	470 U	2100 U	17 J	680 J	3500 J	5400 J	370 J
C2-Naphthalenes	NSL	NSL	ug/kg	3200 J	20 J	1100 J	51 J	1100 J	950 U	610 J	2300 J	29 J	2800 J	19000 J	36000 J	2700 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	1100 U	39 J	1500 J	130 J	850 J	1900 J	1300 J	2800 J	73 J	3600 J	18000 J	27000 J	1700 J
C3-Chrysenes	NSL	NSL	ug/kg	1100 U	15 U	260 U	33 J	400 U	950 U	470 U	2100 U	21 J	1200 J	5300 J	6600 J	340 J
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	1100 U	15 U	410 J	66 J	400 U	950 U	640 J	2100 U	37 J	2300 J	10000 J	15000 J	790 J
C3-Fluorenes	NSL	NSL	ug/kg	1100 U	15 U	260 U	55 J	400 U	950 U	470 U	2100 U	27 J	1100 J	5200 J	7600 J	450 J
C3-Naphthalenes	NSL	NSL	ug/kg	1200 J	33 J	1600 J	200 J	1100 J	1200 J	590 J	2400 J	84 J	3100 J	21000 J	35000 J	2700 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	1100 U	27 J	660 J	140 J	520 J	1000 J	760 J	2100 U	83 J	4900 J	22000 J	35000 J	1900 J
C4-Chrysenes	NSL	NSL	ug/kg	1100 U	15 U	260 U	17 J	400 U	950 U	470 U	2100 U	19 J	430 J	2400 J	3400 J	160 J
C4-Naphthalenes	NSL	NSL	ug/kg	1100 U	15 J	570 J	260 J	470 J	950 U	470 U	2100 U	100 J	2000 J	10000 J	16000 J	1300 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	1100 U	15 U	290 J	95 J	400 U	950 U	470 U	2100 U	63 J	3400 J	17000 J	26000 J	1300 J
Chrysene**	166	1290	ug/kg	**600 J**	94	**1500**	33	**1500**	**3800**	**2900**	**7600**	33	**2800**	**6000**	**7900**	**530**
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	1100 U	15	**200 J**	3.2 J	**230 J**	**620 J**	**410 J**	**1300 J**	3.9 J	**490**	**690**	**870 J**	**73 J**
Fluoranthene**	423	2230	ug/kg	**1200**	180	**3300**	27	**3300**	**8500**	**4300**	**17000**	42	**4200**	**7600**	**11000**	**910**
Fluorene**	77.4	536	ug/kg	**1100**	29	**480**	6.9	**390 J**	**380 J**	**330 J**	**2200**	10	**410 J**	**1500**	**2300**	**240**
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	180 J	45	570	5.4	760	2000	1400	3700	9.6	1300	1700	2300	170
Naphthalene**	176	561	ug/kg	**15000**	9.8 J	87 J	3.4 J	**480**	**190 J**	160 J	**1200 J**	9.3	**220 J**	**830**	**1800**	**180**
Perylene	NSL	NSL	ug/kg	1100 U	29	280	9.6	400 U	1000	600	2100 U	12	590	800	1200 U	150 U
Phenanthrene**	204	1170	ug/kg	**3000**	130	**2700**	42	**2400**	**2900**	**1700**	**11000**	28	**2500**	**8200**	**13000**	**1100**
Pyrene**	195	1520	ug/kg	**1700**	**200**	**3800**	39	**3400**	**11000**	**6200**	**18000**	42	**4700**	**8600**	**14000**	**1300**
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**33210**	1226.5	**20044**	254.1	**20661**	**48730**	**30590**	**98470**	312.7	**28840**	**57420**	**87070**	**7279**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an
approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported
sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

			Location ID:	RB15-21	RB15-21	RB15-21	RB15-22	RB15-22	RB15-22	RB15-22	RB15-22	RB15-23	RB15-23	RB15-23	RB15-23	RB15-23
			Sample Name:	RB15-21-SURF	RB15-21-0010	RB15-21-1020	RB15-22-SURF	RB15-22-0010	RB15-22-1020	RB15-22-2030	RB15-22-3050	RB15-23-SURF	RB15-23-0010	RB15-23-1030	RB15-23-1030FD	RB15-23-3050
			Sample Date:	11/4/2015	11/5/2015	11/5/2015	11/3/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/3/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015
			Depth Interval (ft):	0-0.5	0-1	1-2	0-0.5	0-1	1-2	2-3	3-5	0-0.5	0-1	1-3	1-3	3-5
Analyte	**TEC**	**PEC**	**Unit**													
1-Methylnaphthalene	NSL	NSL	ug/kg	170 U	280 U	1000 U	250 U	860 U	830 U	2000 U	5000 U	270 U	4200	12000	13000	13000
2-Methylnaphthalene**	NSL	NSL	ug/kg	74 J	82 J	470 J	90 J	320 J	260 J	710 J	1400 J	94 J	860 J	14000	15000	15000
Acenaphthene**	6.71*	NSL	ug/kg	180	200 J	610 J	140 J	540 J	620 J	3100	6200	150 J	4800	9300	9600	9700
Acenaphthylene**	5.87*	NSL	ug/kg	53 J	77 J	170 J	93 J	190 J	450 J	870 J	1800 J	56 J	1100 J	1800 J	1900 J	3100 J
Anthracene**	57.2	845	ug/kg	**380**	**530**	**1600**	**430**	**980**	**1800**	**6800**	**13000**	**420**	**10000**	**15000**	**16000**	**21000**
Benzo(a)anthracene**	108	1050	ug/kg	**1000**	**1700**	**4200**	**1400**	**2900**	**5300**	**11000**	**28000**	**1300**	**14000**	**15000**	**17000**	**30000**
Benzo(a)pyrene**	150	1450	ug/kg	**770**	**1400**	**3300**	**1300**	**2600**	**5000**	**7400**	**22000**	**1100**	**9600**	**10000**	**12000**	**20000**
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	720	1200	2300	1200	2200	3700	5400	13000	1100	5900	6800	7900	14000
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	410	840	2100	780	1300	2300	3400	11000	640	4600	5400	5400	10000
Benzo(k)fluoranthene**	240*	NSL	ug/kg	660	1300	2200	1000	2100	3500	5100	16000	920	6800	7000	7400	15000
Benzo[e]pyrene	150	1450	ug/kg	570	1100	3400	930	1900	3500	5500	16000	880	7200	7900	8700	15000
C1-Chrysenes	NSL	NSL	ug/kg	450 J	830 J	6600 J	740 J	1300 J	3200 J	8700 J	20000 J	530 J	12000 J	14000 J	17000 J	23000 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	1600 J	2200 J	15000 J	1800 J	4300 J	10000 J	23000 J	61000 J	1400 J	34000 J	43000 J	48000 J	75000 J
C1-Fluorenes	NSL	NSL	ug/kg	170 U	280 U	1000 U	250 U	860 U	830 U	2100 J	5000 U	270 U	3300 J	5100 J	5500 J	6500 J
C1-Naphthalenes	NSL	NSL	ug/kg	170 U	280 U	1000 U	250 U	860 U	830 U	2000 U	5000 U	270 U	3100 J	18000 J	18000 J	18000 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	640 J	890 J	9600 J	670 J	2100 J	5800 J	17000 J	39000 J	460 J	29000 J	42000 J	44000 J	62000 J
C2-Chrysenes	NSL	NSL	ug/kg	320 J	700 J	7100 J	320 J	860 U	2400 J	3600 J	8200 J	270 U	6100 J	9600 J	9800 J	15000 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	800 J	1300 J	15000 J	940 J	1800 J	5300 J	11000 J	30000 J	720 J	16000 J	22000 J	26000 J	37000 J
C2-Fluorenes	NSL	NSL	ug/kg	170 U	280 U	2300 J	250 U	860 U	1300 J	2700 J	5000 J	270 U	3800 J	6500 J	7400 J	9000 J
C2-Naphthalenes	NSL	NSL	ug/kg	360 J	370 J	4800 J	330 J	1800 J	4300 J	12000 J	19000 J	270 J	18000 J	42000 J	45000 J	48000 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	430 J	680 J	12000 J	460 J	1700 J	6700 J	13000 J	28000 J	310 J	19000 J	33000 J	36000 J	47000 J
C3-Chrysenes	NSL	NSL	ug/kg	170 U	450 J	5900 J	250 U	860 U	1500 J	2100 J	5300 J	270 U	3500 J	4500 J	5200 J	6600 J
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	350 J	790 J	11000 J	320 J	860 U	3000 J	5300 J	9900 J	270 U	7700 J	13000 J	14000 J	16000 J
C3-Fluorenes	NSL	NSL	ug/kg	170 U	280 U	3100 J	250 U	860 U	1700 J	2800 J	5300 J	270 U	3300 J	7400 J	8500 J	10000 J
C3-Naphthalenes	NSL	NSL	ug/kg	380 J	380 J	7800 J	330 J	3300 J	8500 J	12000 J	22000 J	270 U	18000 J	36000 J	36000 J	39000 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	390 J	750 J	13000 J	340 J	1400 J	7900 J	12000 J	21000 J	270 U	13000 J	31000 J	36000 J	39000 J
C4-Chrysenes	NSL	NSL	ug/kg	170 U	280 U	4600 J	250 U	860 U	830 U	2000 U	5000 U	270 U	2500 U	3000 U	3000 U	6200 U
C4-Naphthalenes	NSL	NSL	ug/kg	180 J	280 U	4500 J	250 U	1400 J	4600 J	5700 J	9600 J	270 U	6900 J	15000 J	18000 J	20000 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	200 J	510 J	8700 J	250 U	860 U	4600 J	6700 J	11000 J	270 U	7200 J	19000 J	21000 J	22000 J
Chrysene**	166	1290	ug/kg	**930**	**1600**	**4900**	**1400**	**2700**	**5000**	**9600**	**26000**	**1200**	**12000**	**15000**	**16000**	**27000**
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	**150 J**	**280**	**690 J**	**280**	**480 J**	**750 J**	**1300 J**	**4300 J**	**230 J**	**2000 J**	**2400 J**	**2300 J**	**4400 J**
Fluoranthene**	423	2230	ug/kg	**1900**	**3100**	**6400**	**2500**	**5400**	**8600**	**16000**	**41000**	**2400**	**21000**	**24000**	**25000**	**41000**
Fluorene**	77.4	536	ug/kg	**190**	**250 J**	**740 J**	**170 J**	**510 J**	**690 J**	**3000**	**5200**	**160 J**	**4500**	**8100**	**7900**	**7700**
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	420	800	1500	790	1300	2100	3200	9400	720	4000	4700	4700	9100
Naphthalene**	176	561	ug/kg	91 J	130 J	**240 J**	110 J	**2000**	**590 J**	**600 J**	**1600 J**	120 J	**660 J**	**8100**	**8800**	**7900**
Perylene	NSL	NSL	ug/kg	210	400	1000 U	330	860 U	1100	2000 U	5000	340	2500 U	3000 U	3000 U	6200 U
Phenanthrene**	204	1170	ug/kg	**1100**	**1900**	**6200**	**1300**	**3700**	**5900**	**18000**	**37000**	**1200**	**25000**	**39000**	**40000**	**49000**
Pyrene**	195	1520	ug/kg	**2100**	**3200**	**9500**	**2400**	**5800**	**12000**	**20000**	**52000**	**2300**	**26000**	**32000**	**35000**	**53000**
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**11082.5**	**18483**	**46765**	**15383**	**35020**	**58265**	**115180**	**288100**	**14110**	**152060**	**217600**	**231900**	**336900**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an
approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported
sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

			Location ID:	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-25	RB15-25	RB15-26	RB15-26	RB15-26	RB15-26
			Sample Name:	RB15-24-SURF	RB15-24-0010	RB15-24-1020	RB15-24-2040	RB15-24-2040FD	RB15-24-4050	RB15-24-5060	RB15-24-6080	RB15-25-SURF	RB15-25-0010	RB15-26-SURF	RB15-26-0010	RB15-26-1030	RB15-26-1030FD
			Sample Date:	11/4/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/4/2015	11/5/2015	11/3/2015	11/4/2015	11/4/2015	11/4/2015
			Depth Interval (ft):	0-0.5	0-1	1-2	2-4	2-4	4-5	5-6	6-8	0-0.5	0-1	0-0.5	0-1	1-3	1-3
Analyte	**TEC**	**PEC**	**Unit**														
1-Methylnaphthalene	NSL	NSL	ug/kg	110 U	590 U	7400	40000	37000	28000	1600	80	4.2 U	4 U	38 U	17 U	4 U	4 U
2-Methylnaphthalene**	NSL	NSL	ug/kg	47 J	320 J	2000 J	29000	29000	35000	1400	87	4.2 U	4 U	32 J	16 J	4 U	4 U
Acenaphthene**	6.71*	NSL	ug/kg	77 J	1000	13000	31000	28000	23000	2100	89	4.2 U	5.5	47	7.9 J	4 U	4 U
Acenaphthylene**	5.87*	NSL	ug/kg	46 J	360 J	1500 J	2600 J	2300 J	2100 J	290 J	10 J	4.2 U	0.96 J	26 J	1.7 J	4 U	4 U
Anthracene**	57.2	845	ug/kg	**190**	**1400**	**13000**	**33000**	**30000**	**31000**	**3100**	**100**	4.2 U	5.2	**110**	7.9 J	4 U	4 U
Benzo(a)anthracene**	108	1050	ug/kg	**650**	**4200**	**15000**	**26000**	**24000**	**26000**	**4400**	**120**	4.2 U	6.7	**230**	11 J	4 U	5.6
Benzo(a)pyrene**	150	1450	ug/kg	**640**	**3800**	**12000**	**19000**	**16000**	**18000**	**3500**	90	4.2 U	4.2	**200**	8.5 J	4 U	4 U
Benzo(b)fluoranthene**	10400*	NSL	ug/kg	580	2500	6900	12000	9500	10000 J	2000	53	4.2 U	4.8	120	8.1 J	4.2	5.2
Benzo(g,h,i)perylene**	170*	NSL	ug/kg	410	2000	6600	8600	7600	8600 J	1600	54	4.2 U	4 U	84	17 U	4.7 U	5.6 U
Benzo(k)fluoranthene**	240*	NSL	ug/kg	590	2900	8600	12000	11000	14000	2600	64	4.2 U	5.1	120	5.8 J	4 U	4 U
Benzo[e]pyrene	150	1450	ug/kg	510	2600	8000	12000	11000	12000	2100	62	4.2 U	4.2	130	17 U	4.6	5.9
C1-Chrysenes	NSL	NSL	ug/kg	330 J	2100 J	9400 J	20000 J	18000 J	17000 J	2600 J	76 J	4.2 U	5.6 J	170 J	17 U	9.2 J	12 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	950 J	7600 J	39000 J	76000 J	64000 J	61000 J	9000 J	270 J	7 J	16 J	530 J	28 J	16 J	21 J
C1-Fluorenes	NSL	NSL	ug/kg	110 U	590 U	4300 J	11000 J	12000 J	11000 U	890 J	41 U	4.2 U	4 U	50 J	17 U	4 U	4 U
C1-Naphthalenes	NSL	NSL	ug/kg	110 U	590 U	5600 J	44000 J	41000 J	40000 J	2000 J	110 J	4.2 U	4.2 J	38 U	17 J	4 U	4.7 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	360 J	3600 J	29000 J	66000 J	65000 J	55000 J	5800 J	210 J	4.2 J	13 J	240 J	17 J	8 J	11 J
C2-Chrysenes	NSL	NSL	ug/kg	200 J	1200 J	6200 J	10000 J	8900 J	11000 U	960 J	41 U	4.2 U	4 U	68 J	17 U	11 J	9 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	480 J	3200 J	16000 J	31000 J	28000 J	23000 J	3600 J	120 J	5.8 J	10 J	220 J	23 J	18 J	22 J
C2-Fluorenes	NSL	NSL	ug/kg	110 U	590 U	4400 J	9800 J	8500 J	11000 U	850 J	41 U	4.2 U	4 U	38 U	17 U	4 U	4 U
C2-Naphthalenes	NSL	NSL	ug/kg	210 J	2000 J	33000 J	110000 J	99000 J	71000 J	4600 J	220 J	4.2 U	16 J	120 J	21 J	6.6 J	12 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	320 J	2700 J	20000 J	39000 J	41000 J	30000 J	3900 J	130 J	6.1 J	12 J	170 J	20 J	14 J	17 J
C3-Chrysenes	NSL	NSL	ug/kg	110 U	590 U	3000 U	7000 J	6100 J	11000 U	780 U	41 U	4.2 U	4 U	38 U	17 U	7.2 J	10 J
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	260 J	1300 J	7300 J	14000 J	12000 J	11000 U	1400 J	56 J	4.8 J	7.7 J	65 J	18 J	17 J	19 J
C3-Fluorenes	NSL	NSL	ug/kg	110 U	590 U	3700 J	8000 J	7600 J	11000 U	780 U	41 U	4.2 U	4 U	38 U	17 U	4.9 J	5.5 J
C3-Naphthalenes	NSL	NSL	ug/kg	280 J	2300 J	25000 J	65000 J	59000 J	43000 J	3300 J	150 J	6.8 J	17 J	130 J	22 J	13 J	19 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	320 J	2500 J	18000 J	35000 J	29000 J	21000 J	2100 J	100 J	9.9 J	15 J	110 J	28 J	25 J	29 J
C4-Chrysenes	NSL	NSL	ug/kg	110 U	590 U	3000 U	6000 U	5800 U	11000 U	780 U	41 U	4.2 U	4 U	38 U	17 U	4.6 J	4.8 J
C4-Naphthalenes	NSL	NSL	ug/kg	180 J	1100 J	9400 J	18000 J	18000 J	12000 J	1100 J	55 J	7 J	11 J	49 J	20 J	19 J	22 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	210 J	1500 J	11000 J	22000 J	18000 J	11000 U	860 J	58 J	7.3 J	10 J	50 J	21 J	22 J	25 J
Chrysene**	166	1290	ug/kg	**710**	**3900**	**14000**	**23000**	**21000**	**23000**	**4000**	110	4.2 U	8.7	**200**	14 J	7.7	10
Dibenzo(a,h)anthracene**	33	NSL	ug/kg	**140**	**610**	**2100 J**	**2900 J**	**2600 J**	**2900 J**	**510 J**	14 J	4.2 U	0.96 J	32 J	2 J	4 U	4 U
Fluoranthene**	423	2230	ug/kg	**1200**	**6600**	**25000**	**44000**	**44000**	**47000**	**7700**	180	5.1 U	16	340	20	4 U	8.4
Fluorene**	77.4	536	ug/kg	**87 J**	**870**	**8200**	**22000**	**20000**	**20000**	**1500**	62	4.2 U	4.1	37 J	8.1 J	4 U	4 U
Indeno(1,2,3-cd)pyrene**	200*	NSL	ug/kg	400	1800	5700	7500	6600	7600 J	1400	39 J	4.2 U	2.5 J	84	4.4 J	4 U	4 U
Naphthalene**	176	561	ug/kg	68 J	**460 J**	**1900 J**	**5900 J**	**5600 J**	**20000**	**1300**	75	11 U	5 U	52	130	5.3 U	12 U
Perylene	NSL	NSL	ug/kg	190	860	3000 U	6000 U	5800 U	11000 U	780 U	41 U	4.2 U	4 U	44	17 U	7.4	8.2
Phenanthrene**	204	1170	ug/kg	**580**	**4800**	**35000**	**83000**	**77000**	**78000**	**6500**	**260**	5.8 U	18	200	28	4 U	12
Pyrene**	195	1520	ug/kg	**1200**	**8900**	**39000**	**70000**	**58000**	**62000**	**8300**	**280**	6.8 U	17	**500**	24	6.5 U	12
Total PAH17 ND=1/2RL	1610	22800	ug/kg	**7581**	**46030**	**207550**	**428550**	**389400**	**423900**	**52200**	**1687**	64.75	106.22	**2414**	305.9	64.15	98

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

** Analytes inlcuded in Total 17 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR PAHS

			Location ID:	RB15-26	RB15-27	RB15-27	RB15-27	RB15-27	RB15-27	RB15-27	RB15-28	RB15-28	RB15-28
			Sample Name:	RB15-26-3050	RB15-27-SURF	RB15-27-0010	RB15-27-1030	RB15-27-3050	RB15-27-5065	RB15-27-6570	RB15-28-SURF	RB15-28-0010	RB15-28-1030
			Sample Date:	11/4/2015	10/26/2015	10/28/2015	10/28/2015	10/28/2015	10/28/2015	10/28/2015	10/26/2015	10/28/2015	10/28/2015
			Depth Interval (ft):	3-5	0-0.5	0-1	1-3	3-5	5-6.5	6.5-7	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**										
1-Methylnaphthalene	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	19000	34000	89000	1200	1900	1400 U	97
2-Methylnaphthalene[**]	NSL	NSL	ug/kg	2.9 J	42000 U	430 J	27000	51000	150000	1800	390 J	320 J	27 J
Acenaphthene[**]	6.71[*]	NSL	ug/kg	1.7 J	66000	7700	30000	56000	42000 J	520 J	4800	1400	64
Acenaphthylene[**]	5.87[*]	NSL	ug/kg	0.34 J	11000 J	910 J	1800 J	2900 J	78000	1200	460 J	1100 J	67
Anthracene[**]	57.2	845	ug/kg	1.4 J	**120000**	**7700**	**23000**	**57000**	**140000**	**1300**	**2300**	**4300**	**150**
Benzo(a)anthracene[**]	108	1050	ug/kg	3.9 U	**130000**	**13000**	**23000**	**43000**	**91000**	**600 J**	**4400**	**4100**	**140**
Benzo(a)pyrene[**]	150	1450	ug/kg	1.4 J	**100000**	**11000**	**18000**	**34000**	**59000**	**370 J**	**4000**	**3300**	110
Benzo(b)fluoranthene[**]	10400[*]	NSL	ug/kg	1.5 J	85000	9800	13000	19000 J	38000 J	300 J	3700	2600	90
Benzo(g,h,i)perylene[**]	170[*]	NSL	ug/kg	2.4 J	41000 J	4800	7300	13000 J	22000 J	180 J	2000	1500	64
Benzo(k)fluoranthene[**]	240[*]	NSL	ug/kg	0.87 J	96000	7800	12000	23000	51000	320 J	2900	2600	68
Benzo[e]pyrene	150	1450	ug/kg	3.9 U	63000	6800	11000	21000 U	51000 U	640 U	2700	2100	77
C1-Chrysenes	NSL	NSL	ug/kg	3.9 U	42000 U	4100 J	14000 J	21000 U	51000 U	640 U	1800 J	1500 J	85 J
C1-Fluoranthenes/pyrene	NSL	NSL	ug/kg	6.8 J	180000 J	20000 J	52000 J	97000 J	200000 J	1400 J	6900 J	7100 J	340 J
C1-Fluorenes	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	7000 J	21000 U	51000 U	640 U	780 U	1400 U	61 J
C1-Naphthalenes	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	33000 J	60000 J	170000 J	2100 J	1600 J	1400 U	85 J
C1-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	3.9 J	76000 J	8400 J	48000 J	77000 J	140000 J	1200 J	3200 J	4400 J	310 J
C2-Chrysenes	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	8100 J	21000 U	51000 U	640 U	880 J	1400 U	64 J
C2-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	6.5 J	45000 J	6300 J	22000 J	30000 J	72000 J	660 J	2500 J	2700 J	180 J
C2-Fluorenes	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	7000 U	21000 U	51000 U	640 U	780 U	1400 U	56 J
C2-Naphthalenes	NSL	NSL	ug/kg	5.4 J	42000 U	3700 J	65000 J	97000 J	200000 J	3200 J	3300 J	5300 J	420 J
C2-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	5.5 J	42000 U	4400 J	29000 J	28000 J	61000 J	640 U	1700 J	2100 J	210 J
C3-Chrysenes	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	7000 U	21000 U	51000 U	640 U	780 U	1400 U	56 J
C3-Fluoranthenes/Pyrene	NSL	NSL	ug/kg	6.4 J	42000 U	2200 U	7900 J	21000 U	51000 U	640 U	820 J	1400 U	96 J
C3-Fluorenes	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	7000 U	21000 U	51000 U	640 U	780 U	1400 U	43 J
C3-Naphthalenes	NSL	NSL	ug/kg	5.8 J	42000 U	3400 J	36000 J	40000 J	99000 J	1700 J	2000 J	3700 J	510 J
C3-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	8.8 J	42000 U	2900 J	20000 J	21000 U	51000 U	640 U	1100 J	1400 J	190 J
C4-Chrysenes	NSL	NSL	ug/kg	3.9 U	42000 U	2200 U	7000 U	21000 U	51000 U	640 U	780 U	1400 U	33 U
C4-Naphthalenes	NSL	NSL	ug/kg	6 J	42000 U	2200 U	12000 J	21000 U	51000 U	640 U	780 U	1400 U	320 J
C4-Phenanthrenes/Anthracenes	NSL	NSL	ug/kg	7.8 J	42000 U	2200 U	9000 J	21000 U	51000 U	640 U	780 U	1400 U	120 J
Chrysene[**]	166	1290	ug/kg	3.2 J	**120000**	**11000**	**20000**	**37000**	**80000**	**550 J**	**4000**	**3800**	130
Dibenzo(a,h)anthracene[**]	33	NSL	ug/kg	0.29 J	**13000 J**	**1800 J**	**2100 J**	**3800 J**	**7800 J**	**54 J**	**660 J**	**440 J**	20 J
Fluoranthene[**]	423	2230	ug/kg	3.9 U	**330000**	**27000**	**48000**	**95000**	**190000**	**1200**	**6700**	**9000**	290
Fluorene[**]	77.4	536	ug/kg	1 J	**72000**	**5100**	**22000**	**44000**	**120000**	**1300**	**1100**	**2500**	**140**
Indeno(1,2,3-cd)pyrene[**]	200[*]	NSL	ug/kg	3.9 U	42000	4700	6600 J	12000 J	22000 J	150 J	1800	1500	47
Naphthalene[**]	176	561	ug/kg	5.4	42000 U	**1900 J**	**55000**	**92000**	**380000**	**6900**	**2100**	**1600**	84
Perylene	NSL	NSL	ug/kg	3.9 U	42000 U	2800	7000 U	21000 U	51000 U	640 U	1000	1400 U	33 U
Phenanthrene[**]	204	1170	ug/kg	4.3	**370000**	**21000**	**83000**	**190000**	**350000**	**3200**	**9700**	**12000**	**530**
Pyrene[**]	195	1520	ug/kg	4.4	**200000**	**19000**	**41000**	**95000**	**140000**	**880**	**5500**	**6500**	**260**
Total PAH17 ND=1/2RL	1610	22800	ug/kg	42.8	**1880000**	**154640**	**432800**	**867700**	**1960800**	**20824**	**56510**	**58560**	**2281**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

FD = Field Duplicate

RB = Riverbend Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

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

RL = Reporting limit

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

J = The analyte was positively identified; the associated numerical value is an
approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported
sample quantitation limit.

[*] TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)

[**] Analytes inlcuded in Total 17 PAH calculations

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

			Location ID:	RB15-01	RB15-01	RB15-01	RB15-01	RB15-02	RB15-02	RB15-02	RB15-02	RB15-02
			Sample Name:	RB15-01-SURF	RB15-01-0010	RB15-01-1030	RB15-01-3050	RB15-02-SURF	RB15-02-SURFFD	RB15-02-0010	RB15-02-1030	RB15-02-3040
			Sample Date:	10/30/2015	11/3/2015	11/3/2015	11/3/2015	10/31/2015	10/31/2015	11/3/2015	11/3/2015	11/3/2015
			Depth Interval (ft):	0-0.5	0-1	1-3	3-5	0-0.5	0-0.5	0-1	1-3	3-4
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	8.6 J	9.3	**9.9**	8.6	4.1 J	2.7 J	3.9	**10**	6.2
Barium	NSL	NSL	mg/kg	86.3 J	105 J	170 J	179 J	143 J	70.6 J	209 J	288 J	50 J
Cadmium	0.99	4.98	mg/kg	0.91 J	**1.7**	**6.6**	**6.4**	**1.3**	0.68	**6.9**	**9.6**	0.17 J
Chromium	43.4	111	mg/kg	38.8 J	**50.4 J**	**107 J**	**145 J**	**46.8 J**	**47.4 J**	**88.9 J**	**77 J**	17.3 J
Copper	31.6	149	mg/kg	**56 J**	**72.7**	**129**	**165**	**85.9 J**	**60.1 J**	**221**	**312**	20.1
Iron	$20000^{(a)}$	$40000^{(a)}$	mg/kg	**22700**	**22900**	**26500**	**22200**	11800	11000	9670	13900	19000
Lead	35.8	128	mg/kg	**62.9**	**104 J**	**265 J**	**387 J**	**169**	**81.8**	**454 J**	**675 J**	20.5 J
Mercury	0.18	1.06	mg/kg	**1.5**	**0.51**	**0.9**	**0.88**	**0.68**	**0.72**	**1.9**	**2.8**	0.062 J
Nickel	22.7	48.6	mg/kg	**35.9 J**	**39.4**	**73.9**	**89.5**	**27.2 J**	16.9 J	**38.7**	**59.8**	22.5
Selenium	NSL	NSL	mg/kg	1.4 J	1.7 J	2 J	1.6 J	0.44 J	3.6 U	0.58 J	1.1 J	3.2 U
Silver	$1.6^{(a)}$	$2.2^{(a)}$	mg/kg	0.34 J	**2.9 J**	**6.2 J**	**5.7 J**	**2.3**	**2.8**	**4.7 J**	**4.3 J**	0.16 J
Zinc	121	459	mg/kg	**207 J**	**329**	**688**	**700**	**210 J**	**170 J**	**443**	**749**	55
Total organic carbon	NSL	NSL	mg/kg	39200	36900 J	53900 J	60800 J	13400	8930	69500 J	61000 J	12200 J
Moisture Content	NSL	NSL	%	131	105	118	95.3	39.2	39.8	32.9	63.6	19.9

NOTES:

Bolded detected values exceed the TEC

Bolded and Shaded detected values exceed the PEC

FD = Field Duplicate

RB = Riverbend Area

mg/kg = milligrams per kilogram

NSL = No Screening Level

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

			Location ID:	RB15-03	RB15-03	RB15-03	RB15-03	RB15-03	RB15-04	RB15-04	RB15-04	RB15-04
			Sample Name:	RB15-03-SURF	RB15-03-0010	RB15-03-1030	RB15-03-3050	RB15-03-5070	RB15-04-SURF	RB15-04-0010	RB15-04-1030	RB15-04-1030FD
			Sample Date:	10/31/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015	10/31/2015	11/3/2015	11/3/2015	11/3/2015
			Depth Interval (ft):	0-0.5	0-1	1-3	3-5	5-7	0-0.5	0-1	1-3	1-3
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	7.5 J	**13 J**	**13.5 J**	**20.6 J**	7.3 J	5.1 J	**10.4**	3.2	4
Barium	NSL	NSL	mg/kg	63.5 J	321 J	495 J	419 J	67.3 J	343 J	254 J	72 J	27.3 J
Cadmium	0.99	4.98	mg/kg	**1.4**	**18 J**	**56.3 J**	**5.8 J**	0.19 J	**3.4**	**3.4**	0.18 J	0.43 J
Chromium	43.4	111	mg/kg	24.8 J	**141 J**	**289 J**	**77.6 J**	17 J	**141 J**	**272 J**	10.6 J	6.4 J
Copper	31.6	149	mg/kg	**40.2 J**	**257**	**435**	**432**	22.6	**491 J**	**677**	**47**	30.1
Iron	20000$^{(a)}$	40000$^{(a)}$	mg/kg	16300	**22600**	**27400**	**22600**	19600	11100	14700	7040	5280
Lead	35.8	128	mg/kg	**46.2**	**451 J**	**599 J**	**967 J**	27 J	**1050**	**899 J**	**231 J**	**130 J**
Mercury	0.18	1.06	mg/kg	0.18 J	**2.5**	**6.7**	**7.1**	**0.23**	**1.1**	**2.6**	**3.3 J**	**0.64 J**
Nickel	22.7	48.6	mg/kg	**27 J**	**65.2 J**	**127 J**	**54.6 J**	**23.6 J**	**32.6 J**	**159**	9.7	17.1
Selenium	NSL	NSL	mg/kg	1 J	2.3 J	2.1 J	1.8 J	0.86 J	0.62 J	1.7 J	0.33 J	0.97 J
Silver	1.6$^{(a)}$	2.2$^{(a)}$	mg/kg	0.35 J	**5**	**11.2**	**6.3**	0.19 J	**15.4**	**23.4 J**	0.15 J	0.97 U
Zinc	121	459	mg/kg	**131 J**	**723 J**	**1250 J**	**1440 J**	71 J	**425 J**	**843**	78.7	65.3
Total organic carbon	NSL	NSL	mg/kg	37600	86500	121000	70800	11900	16900	62400 J	18400 J	30300 J
Moisture Content	NSL	NSL	%	122	85.6	92.2	75.1	22.3	38.6	44.6	31.7	29.8

NOTES:

Bolded detected values exceed the TEC

Bolded and Shaded detected values exceed the PEC

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mg/kg = milligrams per kilogram

NSL = No Screening Level

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

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(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

			Location ID:	RB15-04	RB15-05	RB15-05	RB15-05	RB15-06	RB15-06	RB15-06	RB15-07	RB15-07
			Sample Name:	RB15-04-3040	RB15-05-SURF	RB15-05-0010	RB15-05-1030	RB15-06-SURF	RB15-06-0010	RB15-06-1030	RB15-07-SURF	RB15-07-0010
			Sample Date:	11/3/2015	10/31/2015	11/3/2015	11/3/2015	10/31/2015	11/3/2015	11/3/2015	11/1/2015	11/2/2015
			Depth Interval (ft):	3-4	0-0.5	0-1	1-3	0-0.5	0-1	1-3	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	5.4	3.5 J	6.7	5.8	4.2 J	8.9	**13.1**	4.6 J	5.3 J
Barium	NSL	NSL	mg/kg	37.3 J	65.9 J	62.5 J	53.4 J	47.4 J	74.6 J	71.9 J	50.4 J	47.5 J
Cadmium	0.99	4.98	mg/kg	0.14 J	0.24 J	0.43 J	0.17 J	**3.5**	0.29 J	0.33 J	0.37 J	0.66
Chromium	43.4	111	mg/kg	16.4 J	10.2 J	20.6 J	17.8 J	27.1 J	27.2 J	20.2 J	24.1 J	**44.6 J**
Copper	31.6	149	mg/kg	15	14.7 J	22	15.1	**43.5 J**	28.7	21	20.8 J	**35.9 J**
Iron	20000(a)	40000(a)	mg/kg	18200	7480	17800	17800	12300	**24800**	**23000**	8710	**22700**
Lead	35.8	128	mg/kg	9.9 J	**151**	**111 J**	9.5 J	**128**	18.7 J	10.1 J	**49**	**237**
Mercury	0.18	1.06	mg/kg	0.11 U	0.08 J	0.11 U	0.12 U	**2.8**	0.13 U	0.12 U	0.1 J	0.14
Nickel	22.7	48.6	mg/kg	21.6	9.6 J	**23**	**23.3**	19.4 J	**40.7**	**31.9**	11 J	**27.9 J**
Selenium	NSL	NSL	mg/kg	3 U	4.4 U	0.93 J	0.48 J	0.63 J	0.59 J	0.92 J	4 U	1.1 J
Silver	1.6(a)	2.2(a)	mg/kg	0.85 U	0.22 J	0.21 J	1 U	1.1 J	0.17 J	0.96 U	0.2 J	0.4 J
Zinc	121	459	mg/kg	50	66.8 J	80.9	42.8	110 J	71	60.8	64.9 J	102 J
Total organic carbon	NSL	NSL	mg/kg	17000 J	17000	13100 J	7780 J	17400	26800 J	9950 J	15300	53200
Moisture Content	NSL	NSL	%	19.8	31.5	26	22.4	70.5	40	28.2	30.6	28.7

NOTES:

Bolded detected values exceed the TEC

Bolded and Shaded detected values exceed the PEC

FD = Field Duplicate

RB = Riverbend Area

mg/kg = milligrams per kilogram

NSL = No Screening Level

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

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

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(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

Location ID:				RB15-07	RB15-07	RB15-08	RB15-08	RB15-08	RB15-09	RB15-09	RB15-09
Sample Name:				RB15-07-1020	RB15-07-2030	RB15-08-SURF	RB15-08-SURFFD	RB15-08-0010	RB15-09-SURF	RB15-09-SURFFD	RB15-09-0010
Sample Date:				11/2/2015	11/2/2015	11/1/2015	11/1/2015	11/2/2015	11/1/2015	11/1/2015	11/2/2015
Depth Interval (ft):				1-2	2-3	0-0.5	0-0.5	0-1	0-0.5	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**								
Arsenic	9.79	33	mg/kg	5 J	6 J	**17.8 J**	5.6 J	7.3 J	6.6 J	4.7 J	**11.9 J**
Barium	NSL	NSL	mg/kg	33.2 J	72.8 J	21.9 J	30.9 J	137 J	56.2 J	44.8 J	38.1 J
Cadmium	0.99	4.98	mg/kg	0.36 J	0.041 J	0.11 J	0.29 J	0.079 J	0.73 J	0.73	0.21 J
Chromium	43.4	111	mg/kg	21 J	15.7 J	14.1 J	25.3 J	15.2 J	33.9 J	29.1 J	16.1 J
Copper	31.6	149	mg/kg	29.1 J	19.2	**66.6 J**	**49.6 J**	20.5	**77.9 J**	**42.8 J**	24.8
Iron	20000(a)	40000(a)	mg/kg	17000	19300	**28600**	15600	17900	17900	13900	17100
Lead	35.8	128	mg/kg	**62.5**	9.5 J	**60.7**	**151**	17.8 J	**85.8**	**74.6**	**36.4 J**
Mercury	0.18	1.06	mg/kg	**0.57**	0.11 U	0.1 J	0.11 J	**0.29**	**0.39**	**0.19**	0.1 J
Nickel	22.7	48.6	mg/kg	22.3 J	**28.8 J**	12.7 J	16.5 J	**24.6 J**	**22.9 J**	**24.2 J**	22.1 J
Selenium	NSL	NSL	mg/kg	1.2 J	3.4 U	0.88 J	0.6 J	3.8 U	6.3 U	4.7 U	3.8 U
Silver	1.6(a)	2.2(a)	mg/kg	0.25 J	0.12 J	0.27 J	0.33 J	0.17 J	0.52 J	**4.3**	0.3 J
Zinc	121	459	mg/kg	95.1 J	50 J	75.1 J	87.3 J	61.7 J	**153 J**	**133 J**	65.8 J
Total organic carbon	NSL	NSL	mg/kg	146000	13100	8540	12700	11300	23900	31000	6860
Moisture Content	NSL	NSL	%	29.3	29.5	29.5	27	26.1	69.2	79.5	17.5

NOTES:

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NSL = No Screening Level

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(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

			Location ID:	RB15-10	RB15-10	RB15-11	RB15-11	RB15-11	RB15-11	RB15-12	RB15-12	RB15-13
			Sample Name:	RB15-10-SURF	RB15-10-0010	RB15-11-SURF	RB15-11-0010	RB15-11-1030	RB15-11-1030FD	RB15-12-0010	RB15-12-1030	RB15-13-SURF
			Sample Date:	11/1/2015	11/2/2015	11/3/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015
			Depth Interval (ft):	0-0.5	0-1	0-0.5	0-1	1-3	1-3	0-1	1-3	0-0.5
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	6.1 J	3.2 J	**12.2**	7	5.5	7.4	8.3	**14.3**	4.9 J
Barium	NSL	NSL	mg/kg	38.6 J	26.9 J	51.1	145	134	134	92.3	151	63.7 J
Cadmium	0.99	4.98	mg/kg	0.24 J	0.11 J	0.79 J	0.049 J	0.6 U	0.61 U	0.67	**1.2**	**1.3 J**
Chromium	43.4	111	mg/kg	12.9 J	16.5 J	40	**47.7 J**	30.4 J	30.5 J	**162 J**	28.3 J	29.6 J
Copper	31.6	149	mg/kg	23.2 J	14.8	**101**	**38.5**	21.9	24.7	**42.4**	**186**	**57.7**
Iron	20000$^{(a)}$	40000$^{(a)}$	mg/kg	18400	6140	18900	**34200**	**26500**	**29700**	**32500**	15100	12600
Lead	35.8	128	mg/kg	29.8	**49.4 J**	**221**	17.5	10.2	11.5	**126**	**400**	**91.2 J**
Mercury	0.18	1.06	mg/kg	0.12	**0.56**	0.1 J	0.13 U	0.12 U	0.15 U	**0.38 J+**	**5.3 J+**	**0.19**
Nickel	22.7	48.6	mg/kg	11.8 J	6.7 J	**23.9**	**44.6 J**	**35 J**	**36.8 J**	15.2 J	14.3 J	16.5 J
Selenium	NSL	NSL	mg/kg	4.4 U	0.54 J	1.1 J	1.5 J	1.2 J	0.76 J	1.8 J	3 J	0.62 J
Silver	1.6$^{(a)}$	2.2$^{(a)}$	mg/kg	0.47 J	0.083 J	0.21 J	1.2 UJ	1.2 UJ	1.2 UJ	0.55 J	1.1 J	0.53 J
Zinc	121	459	mg/kg	63.1 J	46.4 J	**211**	75.3	63	69.2	**134**	**492**	**180 J**
Total organic carbon	NSL	NSL	mg/kg	48600	22900	47100	9820	16300	12500	60500	409000	44200
Moisture Content	NSL	NSL	%	50.8	35.8	106	42.6	46	36.3	26.6	53.5	36.5

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TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

Location ID:				RB15-13	RB15-13	RB15-13	RB15-13	RB15-14	RB15-14	RB15-14	RB15-14	RB15-15
Sample Name:				RB15-13-0010	RB15-13-1025	RB15-13-2535	RB15-13-3550	RB15-14-SURF	RB15-14-0010	RB15-14-1030	RB15-14-3050	RB15-15-SURF
Sample Date:				11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015
Depth Interval (ft):				0-1	1-2.5	2.5-3.5	3.5-5	0-0.5	0-1	1-3	3-5	0-0.5
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	7	**9.8**	**9.8**	9	5.8	**14.5**	**10.9**	6.1	3.9
Barium	NSL	NSL	mg/kg	543	348	198	76.2	99.1 J	234	174	61.6	101 J
Cadmium	0.99	4.98	mg/kg	**2.4**	**4.9**	**4.6**	0.16 J	0.83	0.99	**1.7**	0.035 J	0.66
Chromium	43.4	111	mg/kg	**50.7**	**73.4**	**63.7**	21.2 J	**53.5 J**	34.7 J	26.1 J	17.3	36.8 J
Copper	31.6	149	mg/kg	**124**	**126**	**124**	24.5	**77.1**	**214**	**115**	16.1	**49.8**
Iron	20000(a)	40000(a)	mg/kg	16900	17800	19900	**26000**	18400	**50600**	**27900**	19000	15100
Lead	35.8	128	mg/kg	**395**	**675**	**434**	18.6	**179 J**	**736**	**437**	25	**126 J**
Mercury	0.18	1.06	mg/kg	**0.47**	**1.00**	**1.00**	0.12 U	**0.55**	**0.54**	**3**	0.037 J	**0.2**
Nickel	22.7	48.6	mg/kg	**37.2**	**52.4**	**42.9**	**33.4 J**	20.6	**24.7 J**	17.5 J	22.6	18.7
Selenium	NSL	NSL	mg/kg	0.79 J	1 J	1.4 J	1.5 J	0.55 J	1.9 J	2.2 J	1.3 J	0.6 J
Silver	1.6(a)	2.2(a)	mg/kg	1.6	**1.7**	1.4	1.2 UJ	0.39 J	0.69 J	1.1 J	0.88 U	0.35 J
Zinc	121	459	mg/kg	**837**	**859**	**552**	68	**304**	**390**	**549**	53	**206**
Total organic carbon	NSL	NSL	mg/kg	82500	109000	183000	8640	19400 J	58400	87300	32800	41900 J
Moisture Content	NSL	NSL	%	33.1	50.2	56.6	28.5	52.1	31.7	44.6	27.5	48.6

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TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

			Location ID:	RB15-15	RB15-15	RB15-15	RB15-15	RB15-15	RB15-16	RB15-16	RB15-16	RB15-16
			Sample Name:	RB15-15-0010	RB15-15-1020	RB15-15-2040	RB15-15-2040FD	RB15-15-4060	RB15-16-SURF	RB15-16-0010	RB15-16-1030	RB15-16-3040
			Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/2/2015	11/4/2015	11/4/2015	11/4/2015
			Depth Interval (ft):	0-1	1-2	2-4	2-4	4-6	0-0.5	0-1	1-3	3-4
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	**10.3**	7.4	7.9	6	6.4	6 J	6.7	**13.1**	**1**
Barium	NSL	NSL	mg/kg	145	48	71.9	118	69	85.3 J	117	135	94.8
Cadmium	0.99	4.98	mg/kg	**1.7**	0.067 J	0.38 J	0.35 J	0.038 J	0.58 J	0.77	**1.3**	0.69
Chromium	43.4	111	mg/kg	30.4	17.2	14.3	12.6	19.6	**61.6 J**	22.4	27	20.8
Copper	31.6	149	mg/kg	**165**	18.2	**87.2**	**73.7**	19.6	**47.3**	**89.4**	**245**	**115**
Iron	20000$^{(a)}$	40000$^{(a)}$	mg/kg	18000	20000	12300	12700	**21300**	**20500**	**22400**	18300	15000
Lead	35.8	128	mg/kg	**380**	18.8	**218**	**204**	11	**96.6 J**	**259**	**394**	**242**
Mercury	0.18	1.06	mg/kg	**1.7**	0.038 J	**2.7**	**1.00**	0.13 U	0.12 J	**0.48**	**2.1**	**2.3**
Nickel	22.7	48.6	mg/kg	**25.3**	**22.9**	11.6	10.6	**26.2**	21.5 J	20.9	21.4	19.4
Selenium	NSL	NSL	mg/kg	1.1 J	0.79 J	0.79 J	1 J	1.7 J	0.55 J	1.3 J	1.2 J	1.2 J
Silver	1.6$^{(a)}$	2.2$^{(a)}$	mg/kg	**4.4**	1.1 U	0.49 J	0.38 J	1.2 U	0.28 J	0.31 J	0.8 J	0.71 J
Zinc	121	459	mg/kg	**445**	60.1	**302**	**254**	53.6	**229 J**	**259**	**523**	**278**
Total organic carbon	NSL	NSL	mg/kg	59300	19400	42100	47100	17500	45600	61600	69600	77600
Moisture Content	NSL	NSL	%	50.2	20.2	29.9	32.4	25.3	88.4	28.9	42.1	38.4

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TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

Location ID:				RB15-16	RB15-17	RB15-17	RB15-17	RB15-18	RB15-18	RB15-19	RB15-19	RB15-19
Sample Name:				RB15-16-4060	RB15-17-SURF	RB15-17-0010	RB15-17-1030	RB15-18-SURF	RB15-18-0010	RB15-19-SURF	RB15-19-0010	RB15-19-1030
Sample Date:				11/4/2015	11/2/2015	11/3/2015	11/3/2015	11/1/2015	11/2/2015	11/2/2015	11/3/2015	11/3/2015
Depth Interval (ft):				4-6	0-0.5	0-1	1-3	0-0.5	0-1	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	6.5	5.8	8	6.3	5.9 J	6.4 J	4.9	5.5	5.5
Barium	NSL	NSL	mg/kg	103	64.8 J	36.3 J	65.3 J	47.6 J	41.7 J	59.4 J	79.7	73
Cadmium	0.99	4.98	mg/kg	0.074 J	0.21 J	0.34 J	0.16 J	0.11 J	0.35 J	0.9	**1.6**	0.53 U
Chromium	43.4	111	mg/kg	25.5	22.9 J	13.6 J	15.9 J	33 J	15.5 J	34 J	**48.6**	18.5
Copper	31.6	149	mg/kg	21.5	21.2	21.9	20.1	**5250 J**	**67.1**	**154**	**315**	21.1
Iron	20000(a)	40000(a)	mg/kg	**27100**	**21600**	14700	18600	15200	11300	15800	12200	19800
Lead	35.8	128	mg/kg	13.8	12.3 J	17.1 J	9.3 J	**54.5**	**128 J**	**141 J**	**135**	9.2
Mercury	0.18	1.06	mg/kg	0.13 U	0.13 U	0.11 U	0.038 J	0.055 J	0.13	**16.5**	0.18	0.11 U
Nickel	22.7	48.6	mg/kg	**32.4**	**28.1**	20.1	**25.9**	19 J	15.1 J	**32.9**	**40.9**	**23.8**
Selenium	NSL	NSL	mg/kg	1.3 J	4.2 U	0.33 J	3.7 U	0.57 J	0.33 J	0.52 J	0.6 J	1.1 J
Silver	1.6(a)	2.2(a)	mg/kg	1.2 U	0.15 J	0.92 U	1.1 U	1.2	0.21 J	0.57 J	0.43 J	1.1 U
Zinc	121	459	mg/kg	74.3	60.2	70.2	49.5	67.7 J	**138 J**	**303**	**286**	51.8
Total organic carbon	NSL	NSL	mg/kg	19900	14100 J	13800 J	16100 J	12400	32400	12700 J	27900	26200
Moisture Content	NSL	NSL	%	27.7	37.6	14.2	19.7	17.6	20.8	29	21	31.8

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TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

			Location ID:	RB15-20	RB15-20	RB15-20	RB15-20	RB15-21	RB15-21	RB15-21	RB15-22	RB15-22
			Sample Name:	RB15-20-SURF	RB15-20-0010	RB15-20-1020	RB15-20-2040	RB15-21-SURF	RB15-21-0010	RB15-21-1020	RB15-22-SURF	RB15-22-0010
			Sample Date:	11/4/2015	11/5/2015	11/5/2015	11/5/2015	11/4/2015	11/5/2015	11/5/2015	11/3/2015	11/4/2015
			Depth Interval (ft):	0-0.5	0-0.5	1-2	2-4	0-0.5	0-1	1-2	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	**11.9**	**14.7**	**17.6**	**11.2**	4.6	7.6	6.8	5.2	6
Barium	NSL	NSL	mg/kg	135	337	464	117	34.1	136	140	107	155
Cadmium	0.99	4.98	mg/kg	**2.8**	**21.1**	**42.6**	**2.7**	0.54 J	0.89	**5.5**	0.92 J	**1.9**
Chromium	43.4	111	mg/kg	**94.5 J**	**557**	**683**	36.9	20.4 J	**51.5**	**151**	36.8	**134 J**
Copper	31.6	149	mg/kg	**511**	**2340**	**6100**	**314**	**108**	**355**	**1210**	**83.2**	**300**
Iron	20000$^{(a)}$	40000$^{(a)}$	mg/kg	**24300**	**26400**	**25800**	**23900**	8900	13100	16600	16200	**25500**
Lead	35.8	128	mg/kg	**144**	**472**	**858**	**56.3**	**60.6**	**275**	**289**	**55**	**235**
Mercury	0.18	1.06	mg/kg	**0.34 J+**	**2**	**3.9**	**0.24**	0.18 J+	**0.24**	**0.77**	**0.19 J**	**0.2 J+**
Nickel	22.7	48.6	mg/kg	**43.7 J**	**58.2**	**108**	**37.5**	15.2 J	**24.3**	**32.5**	**31.4**	**80.9 J**
Selenium	NSL	NSL	mg/kg	3.4 J	3.8 J	6.6	1.1 J	0.61 J	0.84 J	4.2	1.6 J	1.1 J
Silver	1.6$^{(a)}$	2.2$^{(a)}$	mg/kg	0.94 J	**6**	**9.2**	0.27 J	0.21 J	0.17 J	0.85 J	1.5 J	1 J
Zinc	121	459	mg/kg	**1250**	**3270**	**14500**	**739**	**176**	**524**	**3360**	**187**	**511**
Total organic carbon	NSL	NSL	mg/kg	51800	77200	123000	18200	11000	22900	84500	40000	25100
Moisture Content	NSL	NSL	%	136	109	86.8	33.3	34.5	25.5	29.8	95.1	25.4

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TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

Location ID:				RB15-22	RB15-22	RB15-22	RB15-23	RB15-23	RB15-23	RB15-23	RB15-23	RB15-24
Sample Name:				RB15-22-1020	RB15-22-2030	RB15-22-3050	RB15-23-SURF	RB15-23-0010	RB15-23-1030	RB15-23-1030FD	RB15-23-3050	RB15-24-SURF
Sample Date:				11/4/2015	11/4/2015	11/4/2015	11/3/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/4/2015
Depth Interval (ft):				1-2	2-3	3-5	0-0.5	0-1	1-3	1-3	3-5	0-0.5
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	7.8	8.9	**10**	5.9	**12.4**	**13.2**	**14.3**	**12.7**	8.3
Barium	NSL	NSL	mg/kg	196	289	391	48.3	299	450	424	467	76.1
Cadmium	0.99	4.98	mg/kg	**3.2**	**28**	**8.8**	0.4 J	**13.2**	**49.3**	**46.7**	**41.9**	0.98 J
Chromium	43.4	111	mg/kg	**210 J**	**206 J**	**91.5 J**	21	**127**	**333**	**302**	**278**	32.7 J
Copper	31.6	149	mg/kg	**557**	**1540**	**1030**	**65.5**	**579**	**1190**	**1260**	**1170**	**48.2**
Iron	20000[(a)]	40000[(a)]	mg/kg	12800	16100	15900	17700	**21100**	**28100**	**27300**	**28200**	**23600**
Lead	35.8	128	mg/kg	**327**	**408**	**405**	**36**	**419**	**529**	**535**	**604**	**49.8**
Mercury	0.18	1.06	mg/kg	**0.29 J+**	**1.7 J+**	**4.9 J+**	0.095 J	**2.3**	**4.7**	**4**	**9.2**	0.16 J+
Nickel	22.7	48.6	mg/kg	**122 J**	**97.9 J**	**52.2 J**	17.2	**62.6**	**112**	**116**	**132**	**35.6 J**
Selenium	NSL	NSL	mg/kg	0.96 J	1.9 J	4.9	1.4 J	2.2 J	2.3 J	2.2 J	2.7 J	1.9 J
Silver	1.6[(a)]	2.2[(a)]	mg/kg	1.1 J	**3.2 J**	**5.2 J**	0.17 J	**4.4**	**5.8**	**5.9**	**6.1**	0.28 J
Zinc	121	459	mg/kg	**502**	**3790**	**2370**	**127**	**1510**	**3450**	**3280**	**2600**	**168**
Total organic carbon	NSL	NSL	mg/kg	50200	95200	87600	26000	122000	113000	94200	120000	45300
Moisture Content	NSL	NSL	%	26.7	31.3	57.2	39.9	49.8	77.3	80.5	80.3	142

NOTES:

Bolded detected values exceed the TEC

Bolded and Shaded detected values exceed the PEC

FD = Field Duplicate

RB = Riverbend Area

mg/kg = milligrams per kilogram

NSL = No Screening Level

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

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

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J + = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

			Location ID:	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-24	RB15-25	RB15-25
			Sample Name:	RB15-24-0010	RB15-24-1020	RB15-24-2040	RB15-24-2040FD	RB15-24-4050	RB15-24-5060	RB15-24-6080	RB15-25-SURF	RB15-25-0010
			Sample Date:	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/4/2015	11/5/2015
			Depth Interval (ft):	0-1	1-2	2-4	2-4	4-5	5-6	6-8	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	**191**	**20.6**	**22.2**	**21.5**	**31.1**	7.8	3.1	1.4	1.8
Barium	NSL	NSL	mg/kg	162	311	374	297	222	43.2	26.3	5.9 J	7.5 J
Cadmium	0.99	4.98	mg/kg	0.91	**12.4**	**11.3**	**12.8**	**9**	**1**	0.13 J	0.051 J	0.067 J
Chromium	43.4	111	mg/kg	**153**	**147**	**111**	**116**	**96.5**	18	9.1	3.5 J	4.9
Copper	31.6	149	mg/kg	**222**	**635**	**1000**	**964**	**821**	**147**	11.7	2.9	19.4
Iron	20000[(a)]	40000[(a)]	mg/kg	**26300**	**27500**	**24500**	**25800**	**20200**	8120	10100	3420	4150
Lead	35.8	128	mg/kg	**172**	**463**	**677**	**660**	**536**	**92.6**	6.9	2.3	2.5
Mercury	0.18	1.06	mg/kg	**0.64**	**2.5**	**5.3**	**4.8**	**5.1**	0.094 J	0.11 U	0.13 U	0.1 U
Nickel	22.7	48.6	mg/kg	**43.9**	**75.6**	**57.9**	**54.4**	**43.1**	12	11.9	4.1 J	4.6
Selenium	NSL	NSL	mg/kg	1.5 J	3 J	3.1 J	2.5 J	2.2 J	0.62 J	0.4 J	3.5 U	3.8 U
Silver	1.6[(a)]	2.2[(a)]	mg/kg	1.4 J	**2.7**	**4.9**	**5.7**	**3.4**	0.4 J	0.21 J	1 UJ	1.1 U
Zinc	121	459	mg/kg	**521**	**1010**	**2080**	**2120**	**1300**	**219**	32.5	9.6	11.6
Total organic carbon	NSL	NSL	mg/kg	88500	167000	121000	123000	90600	18700	16300	7210	6290
Moisture Content	NSL	NSL	%	53	75	73.1	79.8	74.4	20.9	22.2	27.2	19.2

NOTES:

Bolded detected values exceed the TEC

Bolded and Shaded detected values exceed the PEC

FD = Field Duplicate

RB = Riverbend Area

mg/kg = milligrams per kilogram

NSL = No Screening Level

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

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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

Location ID:				RB15-26	RB15-26	RB15-26	RB15-26	RB15-26	RB15-27	RB15-27	RB15-27	RB15-27
Sample Name:				RB15-26-SURF	RB15-26-0010	RB15-26-1030	RB15-26-1030FD	RB15-26-3050	RB15-27-SURF	RB15-27-0010	RB15-27-1030	RB15-27-3050
Sample Date:				11/3/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	10/26/2015	10/28/2015	10/28/2015	10/28/2015
Depth Interval (ft):				0-0.5	0-1	1-3	1-3	3-5	0-0.5	0-1	1-3	3-5
Analyte	**TEC**	**PEC**	**Unit**									
Arsenic	9.79	33	mg/kg	2.7	3.7	3.2	3.3	2.1	4.8 J	**13.3 J**	**15.9 J**	**13 J**
Barium	NSL	NSL	mg/kg	35	62.9	29.8	35.6	13.4 J	34.2 J	102 J	299 J	146 J
Cadmium	0.99	4.98	mg/kg	0.2 J	0.13 J	0.12 J	0.13 J	0.079 J	0.25 J	0.93	**21.5**	**1.7**
Chromium	43.4	111	mg/kg	9.2	10 J	7.9 J	8.9 J	4.8	12.7 J	26.5 J	**140 J**	32.9 J
Copper	31.6	149	mg/kg	15	11.8	8.7	9.9	4.5	**33.8 J**	**150 J**	**556 J**	**554 J**
Iron	20000(a)	40000(a)	mg/kg	9290	12100	10300	11300	5550	10300 J	8800 J	**22200 J**	13800 J
Lead	35.8	128	mg/kg	11.8	7.2	5.8	6.1	3	26.4	**60.2**	**459**	**370**
Mercury	0.18	1.06	mg/kg	0.059 J	0.11 U	0.1 U	0.11 U	0.11 U	**0.33**	**0.31**	**4.3**	**2.6**
Nickel	22.7	48.6	mg/kg	10.6	13.6 J	10.6 J	11.5 J	5.9	9.8	15	**68.9**	**24.5**
Selenium	NSL	NSL	mg/kg	2.7 U	3.4 U	4.1 U	0.88 J	3.9 U	0.51 J	0.89 J	1.8 J	0.64 J
Silver	1.6(a)	2.2(a)	mg/kg	0.77 U	0.98 UJ	1.2 UJ	0.93 UJ	1.1 U	0.9 U	0.13 J	**4**	**2.2**
Zinc	121	459	mg/kg	39.3	33.2	26.2	28.6	14.3	62.8 J	**167 J**	**1220 J**	**842 J**
Total organic carbon	NSL	NSL	mg/kg	6530	15300	15500	19300	11600	19500 J	181000 J	121000 J	122000 J
Moisture Content	NSL	NSL	%	9.6	25.9	20.6	20.4	24.4	31.5	34.6	76.7	83.3

NOTES:

Bolded detected values exceed the TEC

Bolded and Shaded detected values exceed the PEC

FD = Field Duplicate

RB = Riverbend Area

mg/kg = milligrams per kilogram

NSL = No Screening Level

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

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

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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-6 SEDIMENT RESULTS FOR METALS AND TOC

Location ID:				RB15-27	RB15-27	RB15-28	RB15-28	RB15-28
Sample Name:				RB15-27-5065	RB15-27-6570	RB15-28-SURF	RB15-28-0010	RB15-28-1030
Sample Date:				10/28/2015	10/28/2015	10/26/2015	10/28/2015	10/28/2015
Depth Interval (ft):				5-6.5	6.5-7	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**					
Arsenic	9.79	33	mg/kg	**19.4 J**	2.1 J	9.7 J	8 J	7.2 J
Barium	NSL	NSL	mg/kg	89.7 J	7.8 J	58.7 J	66.1 J	61.7 J
Cadmium	0.99	4.98	mg/kg	0.91	0.057 J	0.71 J	0.43 J	0.13 J
Chromium	43.4	111	mg/kg	35.2 J	4.8 J	**162 J**	25.6 J	14.8 J
Copper	31.6	149	mg/kg	**302 J**	4.6 J	**58.7 J**	**38 J**	17.9 J
Iron	20000(a)	40000(a)	mg/kg	12200 J	5340 J	**30500 J**	**20800 J**	18800 J
Lead	35.8	128	mg/kg	**242**	3.5	**1970**	32.7	9.1
Mercury	0.18	1.06	mg/kg	**2.8**	0.037 J	**0.26**	**0.38**	0.052 J
Nickel	22.7	48.6	mg/kg	18.9	5.6	**30.5**	**28**	**27.5**
Selenium	NSL	NSL	mg/kg	0.91 J	3.1 U	1.2 J	0.66 J	4.3 U
Silver	1.6(a)	2.2(a)	mg/kg	1.5	0.87 U	2.2 U	1.4 U	1.2 U
Zinc	121	459	mg/kg	**410 J**	13.3 J	**325 J**	112 J	52.3 J
Total organic carbon	NSL	NSL	mg/kg	42700 J	11000 J	31600 J	48000 J	22700 J
Moisture Content	NSL	NSL	%	60.4	19.5	122	64.5	24.6

NOTES:

Bolded detected values exceed the TEC

Bolded and Shaded detected values exceed the PEC

FD = Field Duplicate

RB = Riverbend Area

mg/kg = milligrams per kilogram

NSL = No Screening Level

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

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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

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TABLE 3-7 SEDIMENT RESULTS FOR SEM/AVS

Location ID:		RB15-01	RB15-02	RB15-02	RB15-03	RB15-04	RB15-05
Sample Name:		RB15-01-SURF	RB15-02-SURF	RB15-02-SURFFD	RB15-03-SURF	RB15-04-SURF	RB15-05-SURF
Sample Date:		10/30/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015
Depth Interval (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**						
Cadmium	µmole/g	0.0083 J	0.0065 J	0.0098 J	0.0098 J	0.013 J	0.0047 J
Copper	µmole/g	0.32	0.78 J	0.79 J	0.32 J	2.9 J	0.32 J
Lead	µmole/g	0.22	0.45 J	0.52 J	0.14	2.8 J	0.26 J
Mercury	µmole/g	0.000029 J	0.00031 J	0.0005 J	0.000019 J-	0.00021 J	0.0001 J
Nickel	µmole/g	0.23 J	0.25	0.26	0.16 J	0.28	0.13 J
Zinc	µmole/g	1.8	2 J	2.2 J	1.1	6.3 J	1.1 J
Acid Volatile Sulfides (AVS)	µmole/g	8.3	2.7	1.8	9.1	0.72 U	1.9
SEM/AVS Ratio	none	0.31	**1.3**	**2.2**	0.2	**--**	0.99

NOTES:

AVS = Acid volatile sulfides

Bolded values exceed 1 SEM/AVS ratio

FD = Field duplicate

RB = Riverbend Area

SEM = Simultaneously extracted metals

µmole/g = micromole per gram

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

R = The data are unusable. The compound may or may not be present.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-7 SEDIMENT RESULTS FOR SEM/AVS

	Location ID:	RB15-06	RB15-07	RB15-08	RB15-08	RB15-09	RB15-09
	Sample Name:	RB15-06-SURF	RB15-07-SURF	RB15-08-SURF	RB15-08-SURFFD	RB15-09-SURF	RB15-09-SURFFD
	Sample Date:	10/31/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**						
Cadmium	µmole/g	0.0032 J	0.017 U	0.014 U	0.014 U	0.0044 J	0.0071 J
Copper	µmole/g	0.37 J	0.13 J	0.26	0.38	0.39	0.45
Lead	µmole/g	0.4 J	0.068 J	0.19	0.22	0.34	0.4
Mercury	µmole/g	0.000045 J	0.000039 UJ	0.000025 J	0.000038	0.000029 J	0.000027 J
Nickel	µmole/g	0.15 J	0.066 J	0.094 J	0.065 J	0.16 J	0.13 J
Zinc	µmole/g	1.1 J	0.3 J	0.76	0.79	1.6	1.5
Acid Volatile Sulfides (AVS)	µmole/g	0.69 U	0.78 U	0.68 U	0.66 U	5	0.84 U
SEM/AVS Ratio	none	--	--	--	--	0.5	--

NOTES:

AVS = Acid volatile sulfides

Bolded values exceed 1 SEM/AVS ratio

FD = Field duplicate

RB = Riverbend Area

SEM = Simultaneously extracted metals

µmole/g = micromole per gram

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-7 SEDIMENT RESULTS FOR SEM/AVS

	Location ID:	RB15-10	RB15-11	RB15-13	RB15-14	RB15-15	RB15-16	RB15-17
	Sample Name:	RB15-10-SURF	RB15-11-SURF	RB15-13-SURF	RB15-14-SURF	RB15-15-SURF	RB15-16-SURF	RB15-17-SURF
	Sample Date:	11/1/2015	11/3/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
Cadmium	µmole/g	0.014 U	0.02 UJ	0.0054 J	0.0038 J	0.0029 J	0.018 U	0.014 UJ
Copper	µmole/g	0.14	0.53 J	0.61	0.7	0.25	0.53	0.11 J
Lead	µmole/g	0.18	0.14 J	0.69	0.64 J	0.43 J	0.38	0.023 J
Mercury	µmole/g	0.000018 J	0.000065	0.000037 U	0.000065 J-	0.000055 J-	0.00006	0.000033 R
Nickel	µmole/g	0.051 J	0.13 J	0.2 J	0.17 J	0.095 J	0.14 J	0.13 J
Zinc	µmole/g	0.52	1.8 J	3.5	2.9	1.9	1.8	0.28 J
Acid Volatile Sulfides (AVS)	µmole/g	0.65 U	0.97 U	5.2	8.8	5.7	0.83 U	0.67 U
SEM/AVS Ratio	none	--	--	0.97	0.5	0.47	--	--

NOTES:

AVS = Acid volatile sulfides

Bolded values exceed 1 SEM/AVS ratio

FD = Field duplicate

RB = Riverbend Area

SEM = Simultaneously extracted metals

µmole/g = micromole per gram

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

R = The data are unusable. The compound may or may not be present.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-7 SEDIMENT RESULTS FOR SEM/AVS

	Location ID:	RB15-18	RB15-19	RB15-20	RB15-21	RB15-22	RB15-23	RB15-24	RB15-25
	Sample Name:	RB15-18-SURF	RB15-19-SURF	RB15-20-SURF	RB15-21-SURF	RB15-22-SURF	RB15-23-SURF	RB15-24-SURF	RB15-25-SURF
	Sample Date:	11/1/2015	11/2/2015	11/4/2015	11/4/2015	11/3/2015	11/3/2015	11/4/2015	11/4/2015
	Depth Interval (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
Analyte	**Unit**								
Cadmium	µmole/g	0.012 U	0.0069 J	0.014 J	0.016 U	0.0044 J	0.018 U	0.0088 J	0.013 U
Copper	µmole/g	0.31	3 J	0.94	0.55	0.66	0.33	0.39	0.02 J
Lead	µmole/g	0.19	0.89 J	0.35	0.32	0.26	0.17	0.22	0.015 U
Mercury	µmole/g	0.000029 J	0.00032 J-	0.000033 J	0.000027 J	0.00006 U	0.000042 U	0.000031 J	0.000011 J
Nickel	µmole/g	0.056 J	0.3 J	0.19 J	0.078 J	0.17 J	0.1 J	0.24 J	0.22 U
Zinc	µmole/g	0.59	3.3 J	6.8	1.9	2.1	1.2	1.7	0.055 J
Acid Volatile Sulfides (AVS)	µmole/g	0.59 U	0.71 U	8.6	3.6	7.4	14	5.1	0.63 U
SEM/AVS Ratio	none	--	--	0.97	0.78	0.44	0.13	0.5	--

NOTES:

AVS = Acid volatile sulfides

Bolded values exceed 1 SEM/AVS ratio

FD = Field duplicate

RB = Riverbend Area

SEM = Simultaneously extracted metals

µmole/g = micromole per gram

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

R = The data are unusable. The compound may or may not be present.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-7 SEDIMENT RESULTS FOR SEM/AVS

	Location ID:	RB15-26	RB15-27	RB15-28
	Sample Name:	RB15-26-SURF	RB15-27-SURF	RB15-28-SURF
	Sample Date:	11/3/2015	10/26/2015	10/26/2015
	Depth Interval (ft):	0-0.5	0-0.5	0-0.5
Analyte	**Unit**			
Cadmium	µmole/g	0.012 U	0.0026 J	0.025 U
Copper	µmole/g	0.066 J	0.24	0.16 J
Lead	µmole/g	0.016	0.085	0.14
Mercury	µmole/g	0.000028 U	0.000047 J-	0.00006 R
Nickel	µmole/g	0.036 J	0.072 J	0.21 J
Zinc	µmole/g	0.13	1	1.1
Acid Volatile Sulfides (AVS)	µmole/g	0.57	1.5	23
SEM/AVS Ratio	none	0.44	0.93	0.069

NOTES:

AVS = Acid volatile sulfides

Bolded values exceed 1 SEM/AVS ratio

FD = Field duplicate

RB = Riverbend Area

SEM = Simultaneously extracted metals

µmole/g = micromole per gram

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

J - = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.

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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

"--" SEM/AVS not calculated because AVS was not detected.

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TABLE 3-8 SEDIMENT RESULTS FOR TPHs

Location ID:		RB15-01	RB15-02	RB15-02	RB15-03	RB15-04	RB15-05	RB15-06
Sample Name:		RB15-01-SURF	RB15-02-SURF	RB15-02-SURFFD	RB15-03-SURF	RB15-04-SURF	RB15-05-SURF	RB15-06-SURF
Sample Date:		10/30/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015
Depth Interval (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
foc	fraction	0.0392	0.0134	0.00893	0.0376	0.0169	0.017	0.0174
Diesel Range Organics (C10-C20)	mg/kg	210	**300**	95 U	160 U	200 U	29	92 U
DRO Sample-Specific Risk Screening Level	mg/kg	217.3	74.3	49.5	208.4	93.7	94.2	96.4
Oil Range Organics (C20-C36)	mg/kg	**1400**	**1800**	**640**	**900**	**1100**	130	**330**
ORO Sample-Specific Risk Screening Level	mg/kg	387.4	132.4	88.3	371.6	167.0	168.0	172.0
Σ TPH	mg/kg	1610	2100	735	1060	1300	159	422

NOTES:

- **Sediment benchmark for DRO** used in calculation of sample-specific risk screening level is **5543 mg/kg**
- **Sediment benchmark for ORO** used in calculation of sample-specific risk screening level is **9883 mg/kg**

Bolded detected values exceed the Sample-Specific Risk Screening Level

FD = Field duplicate
RB = Riverbend Area
mg/kg = milligram per kilogram
TPH = Total petroleum hydrocarbon
U = Indicates the analyte was analyzed but not detected
Σ TPH = Total Petroleum Hydrocarbons
Σ TPH = DRO (C10-C20) + ORO (C20-C36)

TABLE 3-8 SEDIMENT RESULTS FOR TPHs

Location ID:		RB15-07	RB15-08	RB15-08	RB15-09	RB15-09	RB15-10	RB15-11
Sample Name:		RB15-07-SURF	RB15-08-SURF	RB15-08-SURFFD	RB15-09-SURF	RB15-09-SURFFD	RB15-10-SURF	RB15-11-SURF
Sample Date:		11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/3/2015
Depth Interval (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
foc	fraction	0.0153	0.00854	0.0127	0.0239	0.031	0.0486	0.0471
Diesel Range Organics (C10-C20)	mg/kg	58	**60**	30	90	41	73	**910**
DRO Sample-Specific Risk Screening Level	mg/kg	84.8	47.3	70.4	132.5	171.8	269.4	261.1
Oil Range Organics (C20-C36)	mg/kg	**340**	**320**	**170**	**540**	190	410	**1700**
ORO Sample-Specific Risk Screening Level	mg/kg	151.2	84.4	125.5	236.2	306.4	480.3	465.5
Σ TPH	mg/kg	398	380	200	630	231	483	2610

NOTES:

- **Sediment benchmark for DRO** used in calculation of sample-specific risk screening level is **5543 mg/kg**
- **Sediment benchmark for ORO** used in calculation of sample-specific risk screening level is **9883 mg/kg**

Bolded detected values exceed the Sample-Specific Risk Screening Level

FD = Field duplicate

RB = Riverbend Area

mg/kg = milligram per kilogram

TPH = Total petroleum hydrocarbon

U = Indicates the analyte was analyzed but not detected

Σ TPH = Total Petroleum Hydrocarbons

Σ TPH = DRO (C10-C20) + ORO (C20-C36)

TABLE 3-8 SEDIMENT RESULTS FOR TPHs

Location ID:		RB15-13	RB15-14	RB15-15	RB15-16	RB15-17	RB15-18	RB15-19
Sample Name:		RB15-13-SURF	RB15-14-SURF	RB15-15-SURF	RB15-16-SURF	RB15-17-SURF	RB15-18-SURF	RB15-19-SURF
Sample Date:		11/2/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015	11/1/2015	11/2/2015
Depth Interval (ft):		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
foc	fraction	0.0442	0.0194	0.0419	0.0456	0.0141	0.0124	0.0127
Diesel Range Organics (C10-C20)	mg/kg	110 U	97 U	180 J	130	62	**69**	**74**
DRO Sample-Specific Risk Screening Level	mg/kg	245.0	107.5	232.3	252.8	78.2	68.7	70.4
Oil Range Organics (C20-C36)	mg/kg	**560**	**420**	**860**	420	130	**160**	**340**
ORO Sample-Specific Risk Screening Level	mg/kg	436.8	191.7	414.1	450.7	139.4	122.5	125.5
Σ TPH	mg/kg	670	517	1040	550	192	229	414

NOTES:

- **Sediment benchmark for DRO** used in calculation of sample-specific risk screening level is **5543 mg/kg**
- **Sediment benchmark for ORO** used in calculation of sample-specific risk screening level is **9883 mg/kg**

Bolded detected values exceed the Sample-Specific Risk Screening Level

FD = Field duplicate
RB = Riverbend Area
mg/kg = milligram per kilogram
TPH = Total petroleum hydrocarbon
U = Indicates the analyte was analyzed but not detected
Σ TPH = Total Petroleum Hydrocarbons
Σ TPH = DRO (C10-C20) + ORO (C20-C36)

TABLE 3-8 SEDIMENT RESULTS FOR TPHs

	Location ID:	RB15-20	RB15-21	RB15-22	RB15-23	RB15-24	RB15-25	RB15-26	RB15-27	RB15-28
	Sample Name:	RB15-20-SURF	RB15-21-SURF	RB15-22-SURF	RB15-23-SURF	RB15-24-SURF	RB15-25-SURF	RB15-26-SURF	RB15-27-SURF	RB15-28-SURF
	Sample Date:	11/4/2015	11/4/2015	11/3/2015	11/3/2015	11/4/2015	11/4/2015	11/3/2015	10/26/2015	10/26/2015
	Depth Interval (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
Analyte	**Unit**									
foc	fraction	0.0518	0.011	0.04	0.026	0.0453	0.00721	0.00653	0.0195	0.0316
Diesel Range Organics (C10-C20)	mg/kg	**1200**	**74**	76 U	110 U	190	8.6 U	20	87	170
DRO Sample-Specific Risk Screening Level	mg/kg	287.1	61.0	221.7	144.1	251.1	40.0	36.2	108.1	175.2
Oil Range Organics (C20-C36)	mg/kg	**6700**	**470**	370	**680**	**1000**	15	**78**	**310**	**750**
ORO Sample-Specific Risk Screening Level	mg/kg	511.9	108.7	395.3	257.0	447.7	71.3	64.5	192.7	312.3
Σ TPH	mg/kg	7900	544	446	790	1190	23.6	98	397	920

NOTES:

- **Sediment benchmark for DRO** used in calculation of sample-specific risk screening level is **5543 mg/kg**
- **Sediment benchmark for ORO** used in calculation of sample-specific risk screening level is **9883 mg/kg**

Bolded detected values exceed the Sample-Specific Risk Screening Level

FD = Field duplicate

RB = Riverbend Area

mg/kg = milligram per kilogram

TPH = Total petroleum hydrocarbon

U = Indicates the analyte was analyzed but not detected

Σ TPH = Total Petroleum Hydrocarbons

Σ TPH = DRO (C10-C20) + ORO (C20-C36)

Tables for
Section 4: Equilibrium Partitioning Sediment Benchmarks

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TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-01**				**RB15-01**			
Sample Name:			**RB15-01-SURF**				**RB15-01-0010**			
Sample Date:			**10/30/2015**				**11/3/2015**			
Depth Interval (ft):			**0-0.5**				**0-1**			
	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**
Total Organic Carbon (%)	--	--	3.92	0.0392	--	--	3.69	0.0369	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.13	0.00	0.00	0.00	0.07	1.95	1.95	0.004
Acenaphthene	491	33,400	0.09	2.32	2.32	0.005	0.19	5.15	5.15	0.01
Acenaphthylene	452	24,000	0.03	0.69	0.69	0.002	0.07	1.92	1.92	0.004
Anthracene	594	1,300	0.21	5.36	5.36	0.01	0.52	14.09	14.09	0.02
Benzo[a]anthracene	841	4,153	1.10	28.06	28.06	0.03	2.50	67.75	67.75	0.08
Benzo[a]pyrene	965	3,840	1.20	30.61	30.61	0.03	2.30	62.33	62.33	0.06
Benzo[b]fluoranthene	979	2,169	1.40	35.71	35.71	0.04	2.50	67.75	67.75	0.07
Benzo[e]pyrene	967	4,300	1.00	25.51	25.51	0.03	1.90	51.49	51.49	0.05
Benzo[g,h,i]perylene	1,095	648	0.77	19.64	19.64	0.02	1.60	43.36	43.36	0.04
Benzo[k]fluoranthene	981	1,220	0.95	24.23	24.23	0.02	2.20	59.62	59.62	0.06
C1-Chrysenes	929	--	0.38	9.69	9.69	0.01	1.00	27.10	27.10	0.03
C1-Fluoranthenes/pyrene	770	--	1.30	33.16	33.16	0.04	2.90	78.59	78.59	0.10
C1-Fluorenes	611	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.39	9.95	9.95	0.01	0.97	26.29	26.29	0.04
C2-Chrysenes	1,008	--	0.13	0.00	0.00	0.00	0.49	13.28	13.28	0.01
C2-Fluoranthenes/Pyrene	--	--	0.58	14.80	14.80	--	1.40	37.94	37.94	--
C2-Fluorenes	686	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.13	0.00	0.00	0.00	0.69	18.70	18.70	0.03
C3-Chrysenes	1,112	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.13	0.00	0.00	0.00	0.69	18.70	18.70	0.02
C3-Fluorenes	769	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.13	0.00	0.00	0.00	0.62	16.80	16.80	0.03
C3-Phenanthrenes/Anthracenes	829	--	0.13	0.00	0.00	0.00	0.56	15.18	15.18	0.02
C4-Chrysenes	1,214	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.13	0.00	0.00	0.00	0.24	0.00	0.00	0.00
Chrysene	844	826	1.30	33.16	33.16	0.04	2.70	73.17	73.17	0.09
Dibenzo(a,h)anthracene	1,123	2,389	0.25	6.38	6.38	0.01	0.54	14.63	14.63	0.01
Fluoranthene	707	23,870	2.50	63.78	63.78	0.09	5.20	141	141	0.20
Fluorene	538	26,000	0.08	2.14	2.14	0.004	0.22	5.96	5.96	0.01
Indeno(1,2,3-cd)pyrene	1,115	--	0.80	20.41	20.41	0.02	1.60	43.36	43.36	0.04
Naphthalene	385	61,700	0.05	1.17	1.17	0.003	0.24	0.00	0.00	0.00
Perylene	967	431	0.33	8.42	8.42	0.01	0.66	17.89	17.89	0.02
Phenanthrene	596	34,300	1.10	28.06	28.06	0.05	2.20	59.62	59.62	0.10
Pyrene	697	9,090	2.10	53.57	53.57	0.08	4.80	130	130	0.19
	---	**ESBTU FCVi**	---	---	---	0.55	--	--	--	1.34

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-01**				**RB15-01**			
Sample Name:			**RB15-01-1030**				**RB15-01-3050**			
Sample Date:			**11/3/2015**				**11/3/2015**			
Depth Interval (ft):			**1-3**				**3-5**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**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**
Total Organic Carbon (%)	--	--	5.39	0.0539	--	--	6.08	0.0608	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.23	0.00	0.00	0.00	0.32	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.35	6.49	6.49	0.01	0.57	9.38	9.38	0.02
Acenaphthene	491	33,400	0.30	5.57	5.57	0.01	0.46	7.57	7.57	0.02
Acenaphthylene	452	24,000	0.10	1.76	1.76	0.004	0.19	3.13	3.13	0.01
Anthracene	594	1,300	0.74	13.73	13.73	0.02	1.00	16.45	16.45	0.03
Benzo[a]anthracene	841	4,153	2.20	40.82	40.82	0.05	3.30	54.28	54.28	0.06
Benzo[a]pyrene	965	3,840	2.00	37.11	37.11	0.04	3.00	49.34	49.34	0.05
Benzo[b]fluoranthene	979	2,169	2.10	38.96	38.96	0.04	3.00	49.34	49.34	0.05
Benzo[e]pyrene	967	4,300	1.60	29.68	29.68	0.03	2.40	39.47	39.47	0.04
Benzo[g,h,i]perylene	1,095	648	1.40	25.97	25.97	0.02	2.00	32.89	32.89	0.03
Benzo[k]fluoranthene	981	1,220	1.80	33.40	33.40	0.03	2.50	41.12	41.12	0.04
C1-Chrysenes	929	--	1.00	18.55	18.55	0.02	1.90	31.25	31.25	0.03
C1-Fluoranthenes/pyrene	770	--	3.30	61.22	61.22	0.08	5.10	83.88	83.88	0.11
C1-Fluorenes	611	--	0.23	0.00	0.00	0.00	0.64	10.53	10.53	0.02
C1-Naphthalenes	444	--	0.23	0.00	0.00	0.00	0.67	11.02	11.02	0.02
C1-Phenanthrenes/Anthracenes	670	--	2.00	37.11	37.11	0.06	3.20	52.63	52.63	0.08
C2-Chrysenes	1,008	--	0.63	11.69	11.69	0.01	1.30	21.38	21.38	0.02
C2-Fluoranthenes/Pyrene	--	--	1.80	33.40	33.40	--	3.30	54.28	54.28	--
C2-Fluorenes	686	--	0.90	16.70	16.70	0.02	1.40	23.03	23.03	0.03
C2-Naphthalenes	510	--	2.50	46.38	46.38	0.09	4.40	72.37	72.37	0.14
C2-Phenanthrenes/Anthracenes	746	--	2.10	38.96	38.96	0.05	3.60	59.21	59.21	0.08
C3-Chrysenes	1,112	--	0.23	0.00	0.00	0.00	0.75	12.34	12.34	0.01
C3-Fluoranthenes/Pyrene	949	--	1.10	20.41	20.41	0.02	1.80	29.61	29.61	0.03
C3-Fluorenes	769	--	1.20	22.26	22.26	0.03	1.70	27.96	27.96	0.04
C3-Naphthalenes	581	--	4.10	76.07	76.07	0.13	6.90	113	113	0.20
C3-Phenanthrenes/Anthracenes	829	--	2.20	40.82	40.82	0.05	3.80	62.50	62.50	0.08
C4-Chrysenes	1,214	--	0.23	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C4-Naphthalenes	657	--	2.70	50.09	50.09	0.08	4.60	75.66	75.66	0.12
C4-Phenanthrenes/Anthracenes	913	--	1.10	20.41	20.41	0.02	2.40	39.47	39.47	0.04
Chrysene	844	826	2.40	44.53	44.53	0.05	3.60	59.21	59.21	0.07
Dibenzo(a,h)anthracene	1,123	2,389	0.45	8.35	8.35	0.01	0.68	11.18	11.18	0.01
Fluoranthene	707	23,870	5.10	94.62	94.62	0.13	6.80	112	112	0.16
Fluorene	538	26,000	0.37	6.86	6.86	0.01	0.54	8.88	8.88	0.02
Indeno(1,2,3-cd)pyrene	1,115	--	1.30	24.12	24.12	0.02	1.90	31.25	31.25	0.03
Naphthalene	385	61,700	0.12	2.23	2.23	0.01	0.25	4.11	4.11	0.01
Perylene	967	431	0.54	10.02	10.02	0.01	0.80	13.16	13.16	0.01
Phenanthrene	596	34,300	2.90	53.80	53.80	0.09	4.20	69.08	69.08	0.12
Pyrene	697	9,090	4.70	87.20	87.20	0.13	6.70	110	110	0.16
	---	**ESBTU FCVi**	--	--	--	1.32	--	--	--	1.89

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-02**				**RB15-02**				**RB15-02**			
		Sample Name:	**RB15-02-SURF**				**RB15-02-SURFFD**				**RB15-02-0010**			
		Sample Date:	**10/31/2015**				**10/31/2015**				**11/3/2015**			
		Depth Interval (ft):	**0-0.5**				**0-0.5**				**0-1**			
	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 (%)	--	--	1.34	0.0134	--	--	0.893	0.00893	--	--	6.95	0.0695	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.24	17.91	17.91	0.04	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
Acenaphthene	491	33,400	0.53	39.55	39.55	0.08	0.35	39.19	39.19	0.08	13.00	187	187	0.38
Acenaphthylene	452	24,000	0.16	11.94	11.94	0.03	0.12	13.44	13.44	0.03	3.50	50.36	50.36	0.11
Anthracene	594	1,300	1.10	82.09	82.09	0.14	0.84	94.06	94.06	0.16	36.00	518	518	0.87
Benzo[a]anthracene	841	4,153	4.30	321	321	0.38	3.20	358	358	0.43	68.00	978	978	1.16
Benzo[a]pyrene	965	3,840	4.80	358	358	0.37	3.60	403	403	0.42	59.00	849	849	0.88
Benzo[b]fluoranthene	979	2,169	4.00	299	299	0.30	2.80	314	314	0.32	36.00	518	518	0.53
Benzo[e]pyrene	967	4,300	3.30	246	246	0.25	2.60	291	291	0.30	38.00	547	547	0.57
Benzo[g,h,i]perylene	1,095	648	2.50	187	187	0.17	2.00	224	224	0.20	30.00	432	432	0.39
Benzo[k]fluoranthene	981	1,220	3.40	254	254	0.26	2.70	302	302	0.31	35.00	504	504	0.51
C1-Chrysenes	929	--	1.50	112	112	0.12	1.30	146	146	0.16	29.00	417	417	0.45
C1-Fluoranthenes/pyrene	770	--	5.90	440	440	0.57	4.70	526	526	0.68	130	1871	1871	2.43
C1-Fluorenes	611	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.90	142	142	0.21	1.50	168	168	0.25	62.00	892	892	1.33
C2-Chrysenes	1,008	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	2.30	172	172	--	1.70	190	190	--	35.00	504	504	--
C2-Fluorenes	686	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	24.00	345	345	0.68
C2-Phenanthrenes/Anthracenes	746	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	25.00	360	360	0.48
C3-Chrysenes	1,112	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C3-Fluorenes	769	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	23.00	331	331	0.57
C3-Phenanthrenes/Anthracenes	829	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	13.00	187	187	0.23
C4-Chrysenes	1,214	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.49	0.00	0.00	0.00	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
Chrysene	844	826	4.30	321	321	0.38	3.40	381	381	0.45	63.00	906	826	0.98
Dibenzo(a,h)anthracene	1,123	2,389	0.69	51.49	51.49	0.05	0.54	60.47	60.47	0.05	8.10	117	117	0.10
Fluoranthene	707	23,870	7.90	590	590	0.83	5.90	661	661	0.93	92.00	1324	1324	1.87
Fluorene	538	26,000	0.40	29.85	29.85	0.06	0.28	31.35	31.35	0.06	12.00	173	173	0.32
Indeno(1,2,3-cd)pyrene	1,115	--	2.60	194	194	0.17	2.00	224	224	0.20	24.00	345	345	0.31
Naphthalene	385	61,700	0.48	35.82	35.82	0.09	0.47	0.00	0.00	0.00	5.50	0.00	0.00	0.00
Perylene	967	431	1.20	89.55	89.55	0.09	0.47	0.00	0.00	0.00	11.00	158	158	0.16
Phenanthrene	596	34,300	4.60	343	343	0.58	3.30	370	370	0.62	92.00	1324	1324	2.22
Pyrene	697	9,090	7.90	590	590	0.85	6.20	694	694	1.00	150	2158	2158	3.10
	---	**ESBTU FCVi**	--	--	--	5.99	--	--	--	6.65	--	--	--	20.64

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	RB15-02				RB15-02				RB15-03			
		Sample Name:	RB15-02-1030				RB15-02-3040				RB15-03-SURF			
		Sample Date:	11/3/2015				11/3/2015				10/31/2015			
		Depth Interval (ft):	1-3				3-4				0-0.5			
	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 (%)	--	--	6.1	0.061	--	--	1.22	0.0122	--	--	3.76	0.0376	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	19.00	311	311	0.70	0.53	43.44	43.44	0.10	0.08	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	14.00	230	230	0.51	0.43	35.25	35.25	0.08	0.03	0.66	0.66	0.001
Acenaphthene	491	33,400	25.00	410	410	0.83	0.46	37.70	37.70	0.08	0.07	1.89	1.89	0.004
Acenaphthylene	452	24,000	3.50	57.38	57.38	0.13	0.04	3.03	3.03	0.01	0.04	0.96	0.96	0.002
Anthracene	594	1,300	42.00	689	689	1.16	0.42	34.43	34.43	0.06	0.17	4.52	4.52	0.01
Benzo[a]anthracene	841	4,153	48.00	787	787	0.94	0.41	33.61	33.61	0.04	0.85	22.61	22.61	0.03
Benzo[a]pyrene	965	3,840	36.00	590	590	0.61	0.31	25.41	25.41	0.03	0.95	25.27	25.27	0.03
Benzo[b]fluoranthene	979	2,169	19.00	311	311	0.32	0.21	17.21	17.21	0.02	1.00	26.60	26.60	0.03
Benzo[e]pyrene	967	4,300	22.00	361	361	0.37	0.20	16.39	16.39	0.02	0.73	19.41	19.41	0.02
Benzo[g,h,i]perylene	1,095	648	17.00	279	279	0.25	0.17	13.93	13.93	0.01	0.54	14.36	14.36	0.01
Benzo[k]fluoranthene	981	1,220	24.00	393	393	0.40	0.21	17.21	17.21	0.02	0.65	17.29	17.29	0.02
C1-Chrysenes	929	--	31.00	508	508	0.55	0.24	19.67	19.67	0.02	0.34	9.04	9.04	0.01
C1-Fluoranthenes/pyrene	770	--	110	1803	1803	2.34	0.89	72.95	72.95	0.09	1.30	34.57	34.57	0.04
C1-Fluorenes	611	--	13.00	213	213	0.35	0.15	12.30	12.30	0.02	0.08	0.00	0.00	0.00
C1-Naphthalenes	444	--	22.00	361	361	0.81	0.62	50.82	50.82	0.11	0.08	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	88.00	1443	1443	2.15	0.71	58.20	58.20	0.09	0.39	10.37	10.37	0.02
C2-Chrysenes	1,008	--	14.00	230	230	0.23	0.07	0.00	0.00	0.00	0.17	4.52	4.52	0.004
C2-Fluoranthenes/Pyrene	--	--	41.00	672	672	--	0.36	29.51	29.51	--	0.52	13.83	13.83	--
C2-Fluorenes	686	--	5.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.08	0.00	0.00	0.00
C2-Naphthalenes	510	--	84.00	1377	1377	2.70	1.20	98.36	98.36	0.19	0.08	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	43.00	705	705	0.94	0.38	31.15	31.15	0.04	0.27	7.18	7.18	0.01
C3-Chrysenes	1,112	--	5.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.08	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	14.00	230	230	0.24	0.13	10.66	10.66	0.01	0.18	4.79	4.79	0.01
C3-Fluorenes	769	--	5.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.08	0.00	0.00	0.00
C3-Naphthalenes	581	--	58.00	951	951	1.64	0.60	49.18	49.18	0.08	0.16	4.26	4.26	0.01
C3-Phenanthrenes/Anthracenes	829	--	21.00	344	344	0.42	0.20	16.39	16.39	0.02	0.25	6.65	6.65	0.01
C4-Chrysenes	1,214	--	5.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.08	0.00	0.00	0.00
C4-Naphthalenes	657	--	15.00	246	246	0.37	0.24	19.67	19.67	0.03	0.08	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	5.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.08	0.00	0.00	0.00
Chrysene	844	826	42.00	689	689	0.82	0.37	30.33	30.33	0.04	0.89	23.67	23.67	0.03
Dibenzo(a,h)anthracene	1,123	2,389	5.20	85.25	85.25	0.08	0.05	3.69	3.69	0.003	0.15	3.99	3.99	0.004
Fluoranthene	707	23,870	73.00	1197	1197	1.69	0.67	54.92	54.92	0.08	1.60	42.55	42.55	0.06
Fluorene	538	26,000	21.00	344	344	0.64	0.31	25.41	25.41	0.05	0.08	1.99	1.99	0.004
Indeno(1,2,3-cd)pyrene	1,115	--	15.00	246	246	0.22	0.14	11.48	11.48	0.01	0.54	14.36	14.36	0.01
Naphthalene	385	61,700	5.00	81.97	81.97	0.21	0.26	21.31	21.31	0.06	0.04	1.01	1.01	0.003
Perylene	967	431	5.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.25	6.65	6.65	0.01
Phenanthrene	596	34,300	110	1803	1803	3.03	1.30	107	107	0.18	0.84	22.34	22.34	0.04
Pyrene	697	9,090	100	1639	1639	2.35	0.92	75.41	75.41	0.11	1.50	39.89	39.89	0.06
	---	**ESBTU FCVi**	--	--	--	26.79	--	--	--	1.51	--	--	--	0.46

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-03**				**RB15-03**				**RB15-03**			
Sample Name:			**RB15-03-0010**				**RB15-03-1030**				**RB15-03-3050**			
Sample Date:			**11/2/2015**				**11/2/2015**				**11/2/2015**			
Depth Interval (ft):			**0-1**				**1-3**				**3-5**			
	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 (%)	--	--	8.65	0.0865	--	--	12.1	0.121	--	--	7.08	0.0708	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.30	0.00	0.00	0.00	3.20	26.45	26.45	0.06	7.80	110	110	0.25
2-Methylnaphthalene	447	154,800	0.19	2.20	2.20	0.005	3.50	28.93	28.93	0.06	10.00	141	141	0.32
Acenaphthene	491	33,400	0.53	6.13	6.13	0.01	2.60	21.49	21.49	0.04	8.50	120	120	0.24
Acenaphthylene	452	24,000	0.19	2.20	2.20	0.005	0.43	3.55	3.55	0.01	1.20	16.95	16.95	0.04
Anthracene	594	1,300	0.91	10.52	10.52	0.02	3.50	28.93	28.93	0.05	17.00	240	240	0.40
Benzo[a]anthracene	841	4,153	3.40	39.31	39.31	0.05	6.50	53.72	53.72	0.06	20.00	282	282	0.34
Benzo[a]pyrene	965	3,840	2.90	33.53	33.53	0.03	4.90	40.50	40.50	0.04	16.00	226	226	0.23
Benzo[b]fluoranthene	979	2,169	2.60	30.06	30.06	0.03	3.60	29.75	29.75	0.03	9.50	134	134	0.14
Benzo[e]pyrene	967	4,300	2.20	25.43	25.43	0.03	3.70	30.58	30.58	0.03	9.50	134	134	0.14
Benzo[g,h,i]perylene	1,095	648	1.40	16.18	16.18	0.01	2.40	19.83	19.83	0.02	6.30	88.98	88.98	0.08
Benzo[k]fluoranthene	981	1,220	2.30	26.59	26.59	0.03	3.80	31.40	31.40	0.03	12.00	169	169	0.17
C1-Chrysenes	929	--	2.30	26.59	26.59	0.03	5.70	47.11	47.11	0.05	11.00	155	155	0.17
C1-Fluoranthenes/pyrene	770	--	8.00	92.49	92.49	0.12	18.00	149	149	0.19	52.00	734	734	0.95
C1-Fluorenes	611	--	0.30	0.00	0.00	0.00	1.80	14.88	14.88	0.02	2.95	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.30	0.00	0.00	0.00	4.60	38.02	38.02	0.09	13.00	184	184	0.41
C1-Phenanthrenes/Anthracenes	670	--	5.60	64.74	64.74	0.10	16.00	132	132	0.20	37.00	523	523	0.78
C2-Chrysenes	1,008	--	1.80	20.81	20.81	0.02	4.60	38.02	38.02	0.04	7.70	109	109	0.11
C2-Fluoranthenes/Pyrene	--	--	5.20	60.12	60.12	--	12.00	99.17	99.17	--	20.00	282	282	--
C2-Fluorenes	686	--	1.10	12.72	12.72	0.02	3.00	24.79	24.79	0.04	2.95	0.00	0.00	0.00
C2-Naphthalenes	510	--	2.70	31.21	31.21	0.06	19.00	157	157	0.31	38.00	537	537	1.05
C2-Phenanthrenes/Anthracenes	746	--	9.30	108	108	0.14	17.00	140	140	0.19	20.00	282	282	0.38
C3-Chrysenes	1,112	--	0.85	9.83	9.83	0.01	2.40	19.83	19.83	0.02	2.95	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	2.70	31.21	31.21	0.03	7.70	63.64	63.64	0.07	6.80	96.05	96.05	0.10
C3-Fluorenes	769	--	2.10	24.28	24.28	0.03	4.10	33.88	33.88	0.04	2.95	0.00	0.00	0.00
C3-Naphthalenes	581	--	4.70	54.34	54.34	0.09	18.00	149	149	0.26	26.00	367	367	0.63
C3-Phenanthrenes/Anthracenes	829	--	11.00	127	127	0.15	22.00	182	182	0.22	19.00	268	268	0.32
C4-Chrysenes	1,214	--	0.30	0.00	0.00	0.00	0.80	0.00	0.00	0.00	2.95	0.00	0.00	0.00
C4-Naphthalenes	657	--	3.90	45.09	45.09	0.07	8.60	71.07	71.07	0.11	9.80	138	138	0.21
C4-Phenanthrenes/Anthracenes	913	--	6.40	73.99	73.99	0.08	13.00	107	107	0.12	10.00	141	141	0.15
Chrysene	844	826	3.50	40.46	40.46	0.05	7.00	57.85	57.85	0.07	19.00	268	268	0.32
Dibenzo(a,h)anthracene	1,123	2,389	0.41	4.74	4.74	0.004	0.86	7.11	7.11	0.01	2.00	28.25	28.25	0.03
Fluoranthene	707	23,870	6.20	71.68	71.68	0.10	9.80	80.99	80.99	0.11	31.00	438	438	0.62
Fluorene	538	26,000	0.44	5.09	5.09	0.01	2.10	17.36	17.36	0.03	7.70	109	109	0.20
Indeno(1,2,3-cd)pyrene	1,115	--	1.20	13.87	13.87	0.01	2.00	16.53	16.53	0.01	5.40	76.27	76.27	0.07
Naphthalene	385	61,700	0.14	1.62	1.62	0.004	1.10	9.09	9.09	0.02	3.90	55.08	55.08	0.14
Perylene	967	431	0.71	8.21	8.21	0.01	0.80	0.00	0.00	0.00	2.95	0.00	0.00	0.00
Phenanthrene	596	34,300	4.00	46.24	46.24	0.08	14.00	116	116	0.19	50.00	706	706	1.18
Pyrene	697	9,090	5.70	65.90	65.90	0.09	12.00	99.17	99.17	0.14	43.00	607	607	0.87
	---	**ESBTU FCVi**	--	--	--	1.49	--	--	--	2.79	--	--	--	10.49

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-03**				**RB15-04**				**RB15-04**			
		Sample Name:	**RB15-03-5070**				**RB15-04-SURF**				**RB15-04-0010**			
		Sample Date:	**11/2/2015**				**10/31/2015**				**11/3/2015**			
		Depth Interval (ft):	**5-7**				**0-0.5**				**0-1**			
	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**
Total Organic Carbon (%)	--	--	1.19	0.0119	--	--	1.69	0.0169	--	--	6.24	0.0624	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.19	15.97	15.97	0.04	1.25	0.00	0.00	0.00	2.50	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.19	15.97	15.97	0.04	0.75	44.38	44.38	0.10	0.80	12.82	12.82	0.03
Acenaphthene	491	33,400	0.21	17.65	17.65	0.04	2.00	118	118	0.24	6.00	96.15	96.15	0.20
Acenaphthylene	452	24,000	0.03	2.35	2.35	0.01	1.25	0.00	0.00	0.00	1.30	20.83	20.83	0.05
Anthracene	594	1,300	0.31	26.05	26.05	0.04	5.70	337	337	0.57	19.00	304	304	0.51
Benzo[a]anthracene	841	4,153	0.48	40.34	40.34	0.05	9.60	568	568	0.68	29.00	465	465	0.55
Benzo[a]pyrene	965	3,840	0.37	31.09	31.09	0.03	8.50	503	503	0.52	21.00	337	337	0.35
Benzo[b]fluoranthene	979	2,169	0.31	26.05	26.05	0.03	7.00	414	414	0.42	15.00	240	240	0.25
Benzo[e]pyrene	967	4,300	0.25	21.01	21.01	0.02	5.50	325	325	0.34	14.00	224	224	0.23
Benzo[g,h,i]perylene	1,095	648	0.19	15.97	15.97	0.01	4.20	249	249	0.23	10.00	160	160	0.15
Benzo[k]fluoranthene	981	1,220	0.24	20.17	20.17	0.02	7.10	420	420	0.43	15.00	240	240	0.25
C1-Chrysenes	929	--	0.29	24.37	24.37	0.03	3.10	183	183	0.20	15.00	240	240	0.26
C1-Fluoranthenes/pyrene	770	--	1.10	92.44	92.44	0.12	11.00	651	651	0.85	53.00	849	849	1.10
C1-Fluorenes	611	--	0.11	9.24	9.24	0.02	1.25	0.00	0.00	0.00	2.50	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.25	21.01	21.01	0.05	1.25	0.00	0.00	0.00	2.50	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.79	66.39	66.39	0.10	4.60	272	272	0.41	39.00	625	625	0.93
C2-Chrysenes	1,008	--	0.19	15.97	15.97	0.02	1.25	0.00	0.00	0.00	7.00	112	112	0.11
C2-Fluoranthenes/Pyrene	--	--	0.48	40.34	40.34	--	4.60	272	272	--	22.00	353	353	--
C2-Fluorenes	686	--	0.09	7.82	7.82	0.01	1.25	0.00	0.00	0.00	5.60	89.74	89.74	0.13
C2-Naphthalenes	510	--	0.85	71.43	71.43	0.14	1.25	0.00	0.00	0.00	16.00	256	256	0.50
C2-Phenanthrenes/Anthracenes	746	--	0.51	42.86	42.86	0.06	2.50	148	148	0.20	22.00	353	353	0.47
C3-Chrysenes	1,112	--	0.10	8.40	8.40	0.01	1.25	0.00	0.00	0.00	2.50	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.21	17.65	17.65	0.02	1.25	0.00	0.00	0.00	8.50	136	136	0.14
C3-Fluorenes	769	--	0.10	8.40	8.40	0.01	1.25	0.00	0.00	0.00	2.50	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.74	62.18	62.18	0.11	1.25	0.00	0.00	0.00	22.00	353	353	0.61
C3-Phenanthrenes/Anthracenes	829	--	0.47	39.50	39.50	0.05	1.25	0.00	0.00	0.00	15.00	240	240	0.29
C4-Chrysenes	1,214	--	0.04	0.00	0.00	0.00	1.25	0.00	0.00	0.00	2.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.30	25.21	25.21	0.04	1.25	0.00	0.00	0.00	9.30	149	149	0.23
C4-Phenanthrenes/Anthracenes	913	--	0.26	21.85	21.85	0.02	1.25	0.00	0.00	0.00	7.90	127	127	0.14
Chrysene	844	826	0.43	36.13	36.13	0.04	9.40	556	556	0.66	26.00	417	417	0.49
Dibenzo(a,h)anthracene	1,123	2,389	0.04	3.70	3.70	0.003	1.30	76.92	76.92	0.07	3.20	51.28	51.28	0.05
Fluoranthene	707	23,870	0.85	71.43	71.43	0.10	23.00	1361	1361	1.92	49.00	785	785	1.11
Fluorene	538	26,000	0.18	15.13	15.13	0.03	2.80	166	166	0.31	7.10	114	114	0.21
Indeno(1,2,3-cd)pyrene	1,115	--	0.15	12.61	12.61	0.01	4.60	272	272	0.24	9.70	155	155	0.14
Naphthalene	385	61,700	0.09	7.31	7.31	0.02	2.10	124	124	0.32	0.99	15.87	15.87	0.04
Perylene	967	431	0.09	7.31	7.31	0.01	1.25	0.00	0.00	0.00	2.50	0.00	0.00	0.00
Phenanthrene	596	34,300	1.10	92.44	92.44	0.16	23.00	1361	1361	2.28	51.00	817	817	1.37
Pyrene	697	9,090	0.92	77.31	77.31	0.11	19.00	1124	1124	1.61	61.00	978	978	1.40
	---	**ESBTU FCVi**	--	--	--	1.49	--	--	--	12.49	--	--	--	12.13

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	RB15-04				RB15-04				RB15-04			
		Sample Name:	RB15-04-1030				RB15-04-1030FD				RB15-04-3040			
		Sample Date:	11/3/2015				11/3/2015				11/3/2015			
		Depth Interval (ft):	1-3				1-3				3-4			
	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 (%)	--	--	1.84	0.0184	--	--	3.03	0.0303	--	--	1.7	0.017	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.01	0.49	0.49	0.001
2-Methylnaphthalene	447	154,800	0.30	16.30	16.30	0.04	0.59	19.47	19.47	0.04	0.01	0.42	0.42	0.001
Acenaphthene	491	33,400	1.00	54.35	54.35	0.11	1.70	56.11	56.11	0.11	0.004	0.26	0.26	0.001
Acenaphthylene	452	24,000	0.23	12.50	12.50	0.03	0.25	8.25	8.25	0.02	0.002	0.10	0.10	0.0002
Anthracene	594	1,300	3.30	179	179	0.30	4.60	152	152	0.26	0.01	0.59	0.59	0.001
Benzo[a]anthracene	841	4,153	6.70	364	364	0.43	7.40	244	244	0.29	0.02	1.00	1.00	0.001
Benzo[a]pyrene	965	3,840	5.30	288	288	0.30	5.70	188	188	0.19	0.01	0.82	0.82	0.001
Benzo[b]fluoranthene	979	2,169	3.90	212	212	0.22	4.60	152	152	0.16	0.01	0.65	0.65	0.001
Benzo[e]pyrene	967	4,300	3.30	179	179	0.19	3.70	122	122	0.13	0.01	0.76	0.76	0.001
Benzo[g,h,i]perylene	1,095	648	2.70	147	147	0.13	3.20	106	106	0.10	0.02	1.00	1.00	0.001
Benzo[k]fluoranthene	981	1,220	3.60	196	196	0.20	4.30	142	142	0.14	0.01	0.54	0.54	0.001
C1-Chrysenes	929	--	2.80	152	152	0.16	2.90	95.71	95.71	0.10	0.02	1.12	1.12	0.001
C1-Fluoranthenes/pyrene	770	--	9.50	516	516	0.67	10.00	330	330	0.43	0.05	2.76	2.76	0.004
C1-Fluorenes	611	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.01	0.49	0.49	0.001
C1-Naphthalenes	444	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.01	0.65	0.65	0.001
C1-Phenanthrenes/Anthracenes	670	--	4.80	261	261	0.39	5.60	185	185	0.28	0.05	2.94	2.94	0.004
C2-Chrysenes	1,008	--	1.10	59.78	59.78	0.06	0.80	0.00	0.00	0.00	0.02	1.18	1.18	0.001
C2-Fluoranthenes/Pyrene	--	--	3.80	207	207	--	3.80	125	125	--	0.04	2.41	2.41	--
C2-Fluorenes	686	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.01	0.71	0.71	0.001
C2-Naphthalenes	510	--	1.80	97.83	97.83	0.19	2.30	75.91	75.91	0.15	0.04	2.53	2.53	0.005
C2-Phenanthrenes/Anthracenes	746	--	2.60	141	141	0.19	3.00	99.01	99.01	0.13	0.05	2.94	2.94	0.004
C3-Chrysenes	1,112	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.02	0.88	0.88	0.001
C3-Fluoranthenes/Pyrene	949	--	1.60	86.96	86.96	0.09	1.60	52.81	52.81	0.06	0.04	2.12	2.12	0.002
C3-Fluorenes	769	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.02	1.06	1.06	0.001
C3-Naphthalenes	581	--	1.70	92.39	92.39	0.16	2.20	72.61	72.61	0.12	0.10	5.65	5.65	0.01
C3-Phenanthrenes/Anthracenes	829	--	1.60	86.96	86.96	0.10	1.70	56.11	56.11	0.07	0.06	3.59	3.59	0.004
C4-Chrysenes	1,214	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.01	0.42	0.42	0.0003
C4-Naphthalenes	657	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.09	5.53	5.53	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.43	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.05	2.71	2.71	0.003
Chrysene	844	826	5.70	310	310	0.37	6.30	208	208	0.25	0.02	1.24	1.24	0.001
Dibenzo(a,h)anthracene	1,123	2,389	0.85	46.20	46.20	0.04	1.10	36.30	36.30	0.03	0.003	0.16	0.16	0.0001
Fluoranthene	707	23,870	11.00	598	598	0.85	13.00	429	429	0.61	0.03	1.59	1.59	0.002
Fluorene	538	26,000	0.86	46.74	46.74	0.09	2.00	66.01	66.01	0.12	0.01	0.32	0.32	0.001
Indeno(1,2,3-cd)pyrene	1,115	--	2.50	136	136	0.12	3.00	99.01	99.01	0.09	0.01	0.41	0.41	0.0004
Naphthalene	385	61,700	0.29	15.76	15.76	0.04	0.85	28.05	28.05	0.07	0.004	0.23	0.23	0.001
Perylene	967	431	1.30	70.65	70.65	0.07	0.80	0.00	0.00	0.00	0.01	0.54	0.54	0.001
Phenanthrene	596	34,300	7.30	397	397	0.67	12.00	396	396	0.66	0.03	2.00	2.00	0.003
Pyrene	697	9,090	13.00	707	707	1.01	14.00	462	462	0.66	0.04	2.24	2.24	0.003
	---	**ESBTU FCVi**	--	--	--	7.18	--	--	--	5.23	--	--	--	0.07

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	RB15-05				RB15-05				RB15-05			
		Sample Name:	RB15-05-SURF				RB15-05-0010				RB15-05-1030			
		Sample Date:	10/31/2015				11/3/2015				11/3/2015			
		Depth Interval (ft):	0-0.5				0-1				1-3			
	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 (%)	--	--	1.7	0.017	--	--	1.31	0.0131	--	--	0.778	0.00778	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.01	1.27	1.27	0.00
2-Methylnaphthalene	447	154,800	0.06	3.24	3.24	0.01	1.35	0.00	0.00	0.00	0.01	1.12	1.12	0.00
Acenaphthene	491	33,400	0.13	7.65	7.65	0.02	0.31	23.66	23.66	0.05	0.002	0.30	0.30	0.001
Acenaphthylene	452	24,000	0.09	5.47	5.47	0.01	1.10	83.97	83.97	0.19	0.002	0.23	0.23	0.001
Anthracene	594	1,300	0.37	21.76	21.76	0.04	3.20	244	244	0.41	0.01	0.69	0.69	0.00
Benzo[a]anthracene	841	4,153	1.30	76.47	76.47	0.09	15.00	1145	1145	1.36	0.02	2.44	2.44	0.00
Benzo[a]pyrene	965	3,840	1.40	82.35	82.35	0.09	15.00	1145	1145	1.19	0.02	2.31	2.31	0.00
Benzo[b]fluoranthene	979	2,169	0.89	52.35	52.35	0.05	7.10	542	542	0.55	0.02	2.44	2.44	0.00
Benzo[e]pyrene	967	4,300	0.93	54.71	54.71	0.06	10.00	763	763	0.79	0.02	2.44	2.44	0.00
Benzo[g,h,i]perylene	1,095	648	0.67	39.41	39.41	0.04	8.80	672	648	0.59	0.02	3.08	3.08	0.00
Benzo[k]fluoranthene	981	1,220	0.78	45.88	45.88	0.05	8.90	679	679	0.69	0.01	1.67	1.67	0.00
C1-Chrysenes	929	--	0.68	40.00	40.00	0.04	5.40	412	412	0.44	0.02	2.96	2.96	0.00
C1-Fluoranthenes/pyrene	770	--	2.80	165	165	0.21	26.00	1985	1985	2.58	0.05	5.78	5.78	0.01
C1-Fluorenes	611	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.01	1.13	1.13	0.00
C1-Naphthalenes	444	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.01	1.54	1.54	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.20	70.59	70.59	0.11	9.40	718	718	1.07	0.05	6.04	6.04	0.01
C2-Chrysenes	1,008	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.02	2.83	2.83	0.00
C2-Fluoranthenes/Pyrene	--	--	0.90	52.94	52.94	--	7.00	534	534	--	0.06	7.33	7.33	--
C2-Fluorenes	686	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.02	2.06	2.06	0.00
C2-Naphthalenes	510	--	0.30	17.65	17.65	0.03	1.35	0.00	0.00	0.00	0.05	6.56	6.56	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.58	34.12	34.12	0.05	4.20	321	321	0.43	0.06	7.97	7.97	0.01
C3-Chrysenes	1,112	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.02	3.08	3.08	0.003
C3-Fluoranthenes/Pyrene	949	--	0.27	15.88	15.88	0.02	1.35	0.00	0.00	0.00	0.04	5.66	5.66	0.01
C3-Fluorenes	769	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.02	2.83	2.83	0.004
C3-Naphthalenes	581	--	0.28	16.47	16.47	0.03	1.35	0.00	0.00	0.00	0.12	15.42	15.42	0.03
C3-Phenanthrenes/Anthracenes	829	--	0.32	18.82	18.82	0.02	1.35	0.00	0.00	0.00	0.07	9.13	9.13	0.01
C4-Chrysenes	1,214	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.01	0.93	0.93	0.001
C4-Naphthalenes	657	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.11	14.14	14.14	0.02
C4-Phenanthrenes/Anthracenes	913	--	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.06	7.20	7.20	0.01
Chrysene	844	826	1.20	70.59	70.59	0.08	12.00	916	826	0.98	0.03	3.47	3.47	0.004
Dibenzo(a,h)anthracene	1,123	2,389	0.21	12.35	12.35	0.01	1.80	137	137	0.12	0.004	0.48	0.48	0.0004
Fluoranthene	707	23,870	1.80	106	106	0.15	20.00	1527	1527	2.16	0.03	4.24	4.24	0.01
Fluorene	538	26,000	0.11	6.47	6.47	0.01	0.34	25.95	25.95	0.05	0.004	0.49	0.49	0.001
Indeno(1,2,3-cd)pyrene	1,115	--	0.58	34.12	34.12	0.03	6.50	496	496	0.45	0.01	1.29	1.29	0.001
Naphthalene	385	61,700	0.08	4.76	4.76	0.01	1.35	0.00	0.00	0.00	0.004	0.51	0.51	0.001
Perylene	967	431	0.14	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.01	1.67	1.67	0.002
Phenanthrene	596	34,300	1.30	76.47	76.47	0.13	7.90	603	603	1.01	0.02	2.83	2.83	0.005
Pyrene	697	9,090	2.60	153	153	0.22	38.00	2901	2901	4.16	0.04	4.63	4.63	0.01
	---	**ESBTU FCVi**	--	--	--	1.59	--	--	--	19.27	--	--	--	0.17

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			RB15-06				RB15-06				RB15-06			
Sample Name:			RB15-06-SURF				RB15-06-0010				RB15-06-1030			
Sample Date:			10/31/2015				11/3/2015				11/3/2015			
Depth Interval (ft):			0-0.5				0-1				1-3			
	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
Total Organic Carbon (%)	--	--	1.74	0.0174	--	--	2.68	0.0268	--	--	0.995	0.00995	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.54	0.54	0.00
2-Methylnaphthalene	447	154,800	0.23	0.00	0.00	0.00	0.01	0.37	0.37	0.00	0.004	0.43	0.43	0.001
Acenaphthene	491	33,400	0.25	14.37	14.37	0.03	0.01	0.41	0.41	0.00	0.002	0.19	0.19	0.0004
Acenaphthylene	452	24,000	0.12	6.90	6.90	0.02	0.01	0.28	0.28	0.00	0.001	0.09	0.09	0.0002
Anthracene	594	1,300	0.63	36.21	36.21	0.06	0.03	1.27	1.27	0.00	0.004	0.38	0.38	0.001
Benzo[a]anthracene	841	4,153	2.40	138	138	0.16	0.15	5.60	5.60	0.01	0.01	0.57	0.57	0.00
Benzo[a]pyrene	965	3,840	2.40	138	138	0.14	0.13	4.85	4.85	0.01	0.005	0.47	0.47	0.0005
Benzo[b]fluoranthene	979	2,169	1.50	86.21	86.21	0.09	0.10	3.73	3.73	0.00	0.01	0.67	0.67	0.00
Benzo[e]pyrene	967	4,300	1.60	91.95	91.95	0.10	0.10	3.73	3.73	0.00	0.01	0.76	0.76	0.00
Benzo[g,h,i]perylene	1,095	648	1.20	68.97	68.97	0.06	0.08	3.02	3.02	0.00	0.01	0.97	0.97	0.00
Benzo[k]fluoranthene	981	1,220	1.80	103	103	0.11	0.08	3.13	3.13	0.00	0.003	0.34	0.34	0.0003
C1-Chrysenes	929	--	1.00	57.47	57.47	0.06	0.09	3.25	3.25	0.00	0.02	1.61	1.61	0.00
C1-Fluoranthenes/pyrene	770	--	4.30	247	247	0.32	0.22	8.21	8.21	0.01	0.03	2.91	2.91	0.00
C1-Fluorenes	611	--	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.75	0.75	0.00
C1-Naphthalenes	444	--	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.64	0.64	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.20	68.97	68.97	0.10	0.16	5.97	5.97	0.01	0.05	5.03	5.03	0.01
C2-Chrysenes	1,008	--	0.23	0.00	0.00	0.00	0.05	1.72	1.72	0.00	0.02	1.61	1.61	0.00
C2-Fluoranthenes/Pyrene	--	--	1.40	80.46	80.46	--	0.14	5.22	5.22	--	0.04	3.92	3.92	--
C2-Fluorenes	686	--	0.23	0.00	0.00	0.00	0.04	1.38	1.38	0.00	0.02	1.51	1.51	0.00
C2-Naphthalenes	510	--	0.23	0.00	0.00	0.00	0.11	4.10	4.10	0.01	0.04	4.32	4.32	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.75	43.10	43.10	0.06	0.17	6.34	6.34	0.01	0.06	6.13	6.13	0.01
C3-Chrysenes	1,112	--	0.23	0.00	0.00	0.00	0.05	1.75	1.75	0.002	0.02	1.81	1.81	0.002
C3-Fluoranthenes/Pyrene	949	--	0.23	0.00	0.00	0.00	0.09	3.32	3.32	0.003	0.04	3.92	3.92	0.004
C3-Fluorenes	769	--	0.23	0.00	0.00	0.00	0.06	2.05	2.05	0.003	0.02	2.01	2.01	0.003
C3-Naphthalenes	581	--	0.23	0.00	0.00	0.00	0.43	16.04	16.04	0.03	0.15	15.08	15.08	0.03
C3-Phenanthrenes/Anthracenes	829	--	0.60	34.48	34.48	0.04	0.18	6.72	6.72	0.01	0.07	7.14	7.14	0.01
C4-Chrysenes	1,214	--	0.23	0.00	0.00	0.00	0.03	1.04	1.04	0.001	0.01	0.74	0.74	0.001
C4-Naphthalenes	657	--	0.23	0.00	0.00	0.00	0.37	13.81	13.81	0.02	0.14	14.07	14.07	0.02
C4-Phenanthrenes/Anthracenes	913	--	0.23	0.00	0.00	0.00	0.13	4.85	4.85	0.01	0.06	5.63	5.63	0.01
Chrysene	844	826	2.30	132	132	0.16	0.15	5.60	5.60	0.01	0.01	1.21	1.21	0.001
Dibenzo(a,h)anthracene	1,123	2,389	0.30	17.24	17.24	0.02	0.03	0.97	0.97	0.001	0.002	0.16	0.16	0.0001
Fluoranthene	707	23,870	3.60	207	207	0.29	0.21	7.84	7.84	0.01	0.01	0.79	0.79	0.001
Fluorene	538	26,000	0.25	14.37	14.37	0.03	0.02	0.60	0.60	0.001	0.003	0.27	0.27	0.001
Indeno(1,2,3-cd)pyrene	1,115	--	1.20	68.97	68.97	0.06	0.07	2.61	2.61	0.002	0.003	0.26	0.26	0.0002
Naphthalene	385	61,700	0.13	7.47	7.47	0.02	0.01	0.29	0.29	0.001	0.002	0.24	0.24	0.001
Perylene	967	431	0.56	32.18	32.18	0.03	0.04	1.42	1.42	0.001	0.01	0.78	0.78	0.001
Phenanthrene	596	34,300	2.40	138	138	0.23	0.16	5.97	5.97	0.01	0.02	2.01	2.01	0.003
Pyrene	697	9,090	4.90	282	282	0.40	0.25	9.33	9.33	0.01	0.01	1.31	1.31	0.002
	---	**ESBTU FCVi**	--	--	--	2.59	--	--	--	0.19	--	--	--	0.12

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	RB15-07				RB15-07			
		Sample Name:	**RB15-07-SURF**				**RB15-07-0010**			
		Sample Date:	**11/1/2015**				**11/2/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**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**
Total Organic Carbon (%)	--	--	1.53	0.0153	--	--	5.32	0.0532	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.50	0.00	0.00	0.00	0.04	0.75	0.75	0.00
Acenaphthene	491	33,400	0.28	18.30	18.30	0.04	0.12	2.26	2.26	0.00
Acenaphthylene	452	24,000	0.19	12.42	12.42	0.03	0.04	0.70	0.70	0.00
Anthracene	594	1,300	1.00	65.36	65.36	0.11	0.32	6.02	6.02	0.01
Benzo[a]anthracene	841	4,153	3.50	229	229	0.27	0.96	18.05	18.05	0.02
Benzo[a]pyrene	965	3,840	3.90	255	255	0.26	0.91	17.11	17.11	0.02
Benzo[b]fluoranthene	979	2,169	2.10	137	137	0.14	0.66	12.41	12.41	0.01
Benzo[e]pyrene	967	4,300	2.40	157	157	0.16	0.60	11.28	11.28	0.01
Benzo[g,h,i]perylene	1,095	648	1.80	118	118	0.11	0.44	8.27	8.27	0.01
Benzo[k]fluoranthene	981	1,220	2.40	157	157	0.16	0.75	14.10	14.10	0.01
C1-Chrysenes	929	--	1.30	84.97	84.97	0.09	0.34	6.39	6.39	0.01
C1-Fluoranthenes/pyrene	770	--	6.50	425	425	0.55	1.30	24.44	24.44	0.03
C1-Fluorenes	611	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	2.50	163	163	0.24	0.50	9.40	9.40	0.01
C2-Chrysenes	1,008	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	1.90	124	124	--	0.53	9.96	9.96	--
C2-Fluorenes	686	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	1.20	78.43	78.43	0.11	0.27	5.08	5.08	0.01
C3-Chrysenes	1,112	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluorenes	769	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.50	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Chrysene	844	826	3.10	203	203	0.24	0.89	16.73	16.73	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.52	33.99	33.99	0.03	0.16	3.01	3.01	0.003
Fluoranthene	707	23,870	5.30	346	346	0.49	1.80	33.83	33.83	0.05
Fluorene	538	26,000	0.23	15.03	15.03	0.03	0.11	2.07	2.07	0.004
Indeno(1,2,3-cd)pyrene	1,115	--	1.60	105	105	0.09	0.46	8.65	8.65	0.01
Naphthalene	385	61,700	0.50	0.00	0.00	0.00	0.07	1.26	1.26	0.003
Perylene	967	431	0.50	0.00	0.00	0.00	0.23	4.32	4.32	0.004
Phenanthrene	596	34,300	3.30	216	216	0.36	1.10	20.68	20.68	0.03
Pyrene	697	9,090	7.40	484	484	0.69	1.60	30.08	30.08	0.04
	---	**ESBTU FCVi**	--	--	--	4.21	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-07**				**RB15-07**			
Sample Name:			**RB15-07-1020**				**RB15-07-2030**			
Sample Date:			**11/2/2015**				**11/2/2015**			
Depth Interval (ft):			**1-2**				**2-3**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**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**
Total Organic Carbon (%)	--	--	14.6	0.146	--	--	1.31	0.0131	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.10	0.68	0.68	0.002	0.03	2.21	2.21	0.005
Acenaphthene	491	33,400	0.23	1.58	1.58	0.003	0.03	2.44	2.44	0.005
Acenaphthylene	452	24,000	0.25	1.71	1.71	0.004	0.04	0.00	0.00	0.00
Anthracene	594	1,300	0.61	4.18	4.18	0.01	0.02	1.83	1.83	0.003
Benzo[a]anthracene	841	4,153	1.20	8.22	8.22	0.01	0.06	4.81	4.81	0.01
Benzo[a]pyrene	965	3,840	1.20	8.22	8.22	0.01	0.07	5.11	5.11	0.01
Benzo[b]fluoranthene	979	2,169	0.58	3.97	3.97	0.004	0.03	2.52	2.52	0.003
Benzo[e]pyrene	967	4,300	0.78	5.34	5.34	0.01	0.04	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	0.51	3.49	3.49	0.003	0.02	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.85	5.82	5.82	0.01	0.04	2.90	2.90	0.003
C1-Chrysenes	929	--	0.47	3.22	3.22	0.003	0.04	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	2.40	16.44	16.44	0.02	0.16	12.21	12.21	0.02
C1-Fluorenes	611	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.95	6.51	6.51	0.01	0.16	12.21	12.21	0.02
C2-Chrysenes	1,008	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.73	5.00	5.00	--	0.04	0.00	0.00	--
C2-Fluorenes	686	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.36	2.47	2.47	0.005	0.12	9.16	9.16	0.02
C2-Phenanthrenes/Anthracenes	746	--	0.44	3.01	3.01	0.004	0.14	10.69	10.69	0.01
C3-Chrysenes	1,112	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C3-Fluorenes	769	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.30	2.05	2.05	0.004	0.29	22.14	22.14	0.04
C3-Phenanthrenes/Anthracenes	829	--	0.31	2.12	2.12	0.003	0.15	11.45	11.45	0.01
C4-Chrysenes	1,214	--	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.15	0.00	0.00	0.00	0.27	20.61	20.61	0.03
C4-Phenanthrenes/Anthracenes	913	--	0.15	0.00	0.00	0.00	0.09	7.10	7.10	0.01
Chrysene	844	826	1.10	7.53	7.53	0.01	0.07	5.34	5.34	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.13	0.89	0.89	0.001	0.01	0.61	0.61	0.001
Fluoranthene	707	23,870	2.20	15.07	15.07	0.02	0.08	5.95	5.95	0.01
Fluorene	538	26,000	0.31	2.12	2.12	0.004	0.02	1.60	1.60	0.003
Indeno(1,2,3-cd)pyrene	1,115	--	0.46	3.15	3.15	0.003	0.03	1.91	1.91	0.002
Naphthalene	385	61,700	0.34	2.33	2.33	0.01	0.25	19.08	19.08	0.05
Perylene	967	431	0.15	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Phenanthrene	596	34,300	2.90	19.86	19.86	0.03	0.12	9.16	9.16	0.02
Pyrene	697	9,090	3.20	21.92	21.92	0.03	0.13	9.92	9.92	0.01
	---	**ESBTU FCVi**	--	--	--	0.21	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-08**				**RB15-08**			
Sample Name:			**RB15-08-SURF**				**RB15-08-SURFFD**			
Sample Date:			**11/1/2015**				**11/1/2015**			
Depth Interval (ft):			**0-0.5**				**0-0.5**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**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**
Total Organic Carbon (%)	--	--	0.854	0.00854	--	--	1.27	0.0127	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Acenaphthene	491	33,400	0.14	16.39	16.39	0.033	0.06	4.41	4.41	0.01
Acenaphthylene	452	24,000	0.06	6.67	6.67	0.015	0.03	2.44	2.44	0.005
Anthracene	594	1,300	0.37	43.33	43.33	0.07	0.12	9.45	9.45	0.02
Benzo[a]anthracene	841	4,153	1.30	152	152	0.18	0.53	41.73	41.73	0.05
Benzo[a]pyrene	965	3,840	1.10	129	129	0.13	0.49	38.58	38.58	0.04
Benzo[b]fluoranthene	979	2,169	1.20	141	141	0.14	0.49	38.58	38.58	0.04
Benzo[e]pyrene	967	4,300	0.84	98.36	98.36	0.10	0.36	28.35	28.35	0.03
Benzo[g,h,i]perylene	1,095	648	0.57	66.74	66.74	0.06	0.26	20.47	20.47	0.02
Benzo[k]fluoranthene	981	1,220	0.92	108	108	0.11	0.37	29.13	29.13	0.03
C1-Chrysenes	929	--	0.42	49.18	49.18	0.05	0.19	14.96	14.96	0.02
C1-Fluoranthenes/pyrene	770	--	1.40	164	164	0.21	0.71	55.91	55.91	0.07
C1-Fluorenes	611	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.50	58.55	58.55	0.09	0.26	20.47	20.47	0.03
C2-Chrysenes	1,008	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.63	73.77	73.77	--	0.29	22.83	22.83	--
C2-Fluorenes	686	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.15	0.00	0.00	0.00	0.13	10.24	10.24	0.01
C3-Chrysenes	1,112	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C3-Fluorenes	769	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Chrysene	844	826	1.20	141	141	0.17	0.48	37.80	37.80	0.04
Dibenzo(a,h)anthracene	1,123	2,389	0.21	24.59	24.59	0.02	0.09	7.17	7.17	0.01
Fluoranthene	707	23,870	2.40	281	281	0.40	1.00	78.74	78.74	0.11
Fluorene	538	26,000	0.16	18.74	18.74	0.035	0.06	4.96	4.96	0.01
Indeno(1,2,3-cd)pyrene	1,115	--	0.61	71.43	71.43	0.06	0.29	22.83	22.83	0.02
Naphthalene	385	61,700	0.09	10.42	10.42	0.027	0.02	1.65	1.65	0.004
Perylene	967	431	0.15	0.00	0.00	0.00	0.13	10.24	10.24	0.01
Phenanthrene	596	34,300	1.40	164	164	0.28	0.54	42.52	42.52	0.07
Pyrene	697	9,090	1.80	211	211	0.30	0.94	74.02	74.02	0.11
	---	**ESBTU FCVi**	---	---	---	2.49	--	--	--	0.75

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	RB15-08				RB15-09			
		Sample Name:	**RB15-08-0010**				**RB15-09-SURF**			
		Sample Date:	**11/2/2015**				**11/1/2015**			
		Depth Interval (ft):	**0-1**				**0-0.5**			
	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**
Total Organic Carbon (%)	--	--	1.13	0.0113	--	--	2.39	0.0239	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.03	2.92	2.92	0.01	0.37	0.00	0.00	0.00
Acenaphthene	491	33,400	0.07	6.28	6.28	0.01	0.28	11.72	11.72	0.02
Acenaphthylene	452	24,000	0.26	23.01	23.01	0.051	0.13	5.44	5.44	0.01
Anthracene	594	1,300	0.22	19.47	19.47	0.03	0.76	31.80	31.80	0.05
Benzo[a]anthracene	841	4,153	0.91	80.53	80.53	0.10	2.10	87.87	87.87	0.10
Benzo[a]pyrene	965	3,840	1.80	159	159	0.17	2.00	83.68	83.68	0.09
Benzo[b]fluoranthene	979	2,169	1.20	106	106	0.11	1.70	71.13	71.13	0.07
Benzo[e]pyrene	967	4,300	1.20	106	106	0.11	1.40	58.58	58.58	0.06
Benzo[g,h,i]perylene	1,095	648	1.00	88.50	88.50	0.08	1.00	41.84	41.84	0.04
Benzo[k]fluoranthene	981	1,220	0.92	81.42	81.42	0.08	1.60	66.95	66.95	0.07
C1-Chrysenes	929	--	0.65	57.52	57.52	0.06	0.74	30.96	30.96	0.03
C1-Fluoranthenes/pyrene	770	--	1.70	150	150	0.20	3.00	126	126	0.16
C1-Fluorenes	611	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.80	70.80	70.80	0.11	1.40	58.58	58.58	0.09
C2-Chrysenes	1,008	--	0.41	36.28	36.28	0.04	0.37	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.96	84.96	84.96	--	1.20	50.21	50.21	--
C2-Fluorenes	686	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.46	40.71	40.71	0.05	0.37	0.00	0.00	0.00
C3-Chrysenes	1,112	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.33	29.20	29.20	0.03	0.37	0.00	0.00	0.00
C3-Fluorenes	769	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.28	24.78	24.78	0.03	0.37	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
Chrysene	844	826	0.89	78.76	78.76	0.09	2.00	83.68	83.68	0.10
Dibenzo(a,h)anthracene	1,123	2,389	0.32	28.32	28.32	0.03	0.41	17.15	17.15	0.02
Fluoranthene	707	23,870	1.80	159	159	0.23	4.50	188	188	0.27
Fluorene	538	26,000	0.09	8.14	8.14	0.02	0.31	12.97	12.97	0.02
Indeno(1,2,3-cd)pyrene	1,115	--	0.88	77.88	77.88	0.07	1.10	46.03	46.03	0.04
Naphthalene	385	61,700	0.12	0.00	0.00	0.00	0.37	0.00	0.00	0.00
Perylene	967	431	0.36	31.86	31.86	0.03	0.37	0.00	0.00	0.00
Phenanthrene	596	34,300	0.87	76.99	76.99	0.13	3.60	151	151	0.25
Pyrene	697	9,090	1.70	150	150	0.22	4.40	184	184	0.26
	---	**ESBTU FCVi**	--	--	--	2.06	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-09**				**RB15-09**				**RB15-10**			
		Sample Name:	**RB15-09-SURFFD**				**RB15-09-0010**				**RB15-10-SURF**			
		Sample Date:	**11/1/2015**				**11/2/2015**				**11/1/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**				**0-0.5**			
	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**
Total Organic Carbon (%)	--	--	3.1	0.031	--	--	0.686	0.00686	--	--	4.86	0.0486	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.08	2.65	2.65	0.01	1.20	175	175	0.39	0.11	0.00	0.00	0.00
Acenaphthene	491	33,400	0.30	9.68	9.68	0.02	2.00	292	292	0.59	0.09	1.91	1.91	0.004
Acenaphthylene	452	24,000	0.08	2.52	2.52	0.01	0.37	53.94	53.94	0.12	0.11	0.00	0.00	0.00
Anthracene	594	1,300	0.72	23.23	23.23	0.04	4.70	685	685	1.15	0.59	12.14	12.14	0.02
Benzo[a]anthracene	841	4,153	1.80	58.06	58.06	0.07	6.90	1006	1006	1.20	0.74	15.23	15.23	0.02
Benzo[a]pyrene	965	3,840	1.80	58.06	58.06	0.06	4.80	700	700	0.73	0.43	8.85	8.85	0.01
Benzo[b]fluoranthene	979	2,169	1.70	54.84	54.84	0.06	3.60	525	525	0.54	0.46	9.47	9.47	0.01
Benzo[e]pyrene	967	4,300	1.30	41.94	41.94	0.04	3.00	437	437	0.45	0.33	6.79	6.79	0.01
Benzo[g,h,i]perylene	1,095	648	0.81	26.13	26.13	0.02	2.00	292	292	0.27	0.20	4.12	4.12	0.004
Benzo[k]fluoranthene	981	1,220	1.30	41.94	41.94	0.04	4.40	641	641	0.65	0.43	8.85	8.85	0.01
C1-Chrysenes	929	--	0.70	22.58	22.58	0.02	2.30	335	335	0.36	0.11	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	2.50	80.65	80.65	0.10	8.70	1268	1268	1.65	1.00	20.58	20.58	0.03
C1-Fluorenes	611	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.10	35.48	35.48	0.05	6.20	904	904	1.35	0.40	8.23	8.23	0.01
C2-Chrysenes	1,008	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	1.10	35.48	35.48	--	3.90	569	569	--	0.33	6.79	6.79	--
C2-Fluorenes	686	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.27	0.00	0.00	0.00	2.80	408	408	0.80	0.11	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.54	17.42	17.42	0.02	2.50	364	364	0.49	0.11	0.00	0.00	0.00
C3-Chrysenes	1,112	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluorenes	769	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Chrysene	844	826	1.80	58.06	58.06	0.07	6.20	904	826	0.98	0.74	15.23	15.23	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.25	8.06	8.06	0.01	0.68	99.13	99.13	0.09	0.06	1.30	1.30	0.001
Fluoranthene	707	23,870	3.70	119	119	0.17	17.00	2478	2478	3.51	2.30	47.33	47.33	0.07
Fluorene	538	26,000	0.31	10.00	10.00	0.02	2.50	364	364	0.68	0.24	4.94	4.94	0.01
Indeno(1,2,3-cd)pyrene	1,115	--	0.85	27.42	27.42	0.02	2.20	321	321	0.29	0.21	4.32	4.32	0.004
Naphthalene	385	61,700	0.13	4.19	4.19	0.01	2.70	394	394	1.02	0.11	0.00	0.00	0.00
Perylene	967	431	0.27	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Phenanthrene	596	34,300	2.70	87.10	87.10	0.15	19.00	2770	2770	4.65	1.80	37.04	37.04	0.06
Pyrene	697	9,090	3.00	96.77	96.77	0.14	12.00	1749	1749	2.51	1.40	28.81	28.81	0.04
	---	**ESBTU FCVi**	--	--	--	1.15	--	--	--	24.06	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-10**				**RB15-11**				**RB15-11**			
		Sample Name:	**RB15-10-0010**				**RB15-11-SURF**				**RB15-11-0010**			
		Sample Date:	**11/2/2015**				**11/3/2015**				**11/4/2015**			
		Depth Interval (ft):	**0-1**				**0-0.5**				**0-1**			
	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**
Total Organic Carbon (%)	--	--	2.29	0.0229	--	--	4.71	0.0471	--	--	0.982	0.00982	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.08	0.00	0.00	0.00	34.00	722	722	1.62	4.40	448	448	1.00
2-Methylnaphthalene	447	154,800	0.08	0.00	0.00	0.00	33.00	701	701	1.57	4.50	458	458	1.025
Acenaphthene	491	33,400	0.07	2.93	2.93	0.01	22.00	467	467	0.95	3.40	346	346	0.705
Acenaphthylene	452	24,000	0.03	1.35	1.35	0.003	7.80	166	166	0.37	0.73	74.34	74.34	0.164
Anthracene	594	1,300	0.23	10.04	10.04	0.02	50.00	1062	1062	1.79	4.90	499	499	0.84
Benzo[a]anthracene	841	4,153	0.90	39.30	39.30	0.05	56.00	1189	1189	1.41	5.00	509	509	0.61
Benzo[a]pyrene	965	3,840	0.86	37.55	37.55	0.04	44.00	934	934	0.97	3.80	387	387	0.40
Benzo[b]fluoranthene	979	2,169	0.72	31.44	31.44	0.03	31.00	658	658	0.67	2.70	275	275	0.28
Benzo[e]pyrene	967	4,300	0.53	23.14	23.14	0.02	26.00	552	552	0.57	2.30	234	234	0.24
Benzo[g,h,i]perylene	1,095	648	0.54	23.58	23.58	0.02	20.00	425	425	0.39	2.00	204	204	0.19
Benzo[k]fluoranthene	981	1,220	0.61	26.64	26.64	0.03	29.00	616	616	0.63	2.70	275	275	0.28
C1-Chrysenes	929	--	0.32	13.97	13.97	0.02	34.00	722	722	0.78	1.90	193	193	0.21
C1-Fluoranthenes/pyrene	770	--	1.40	61.14	61.14	0.08	86.00	1826	1826	2.37	8.20	835	835	1.08
C1-Fluorenes	611	--	0.08	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.08	0.00	0.00	0.00	42.00	892	892	2.01	5.60	570	570	1.28
C1-Phenanthrenes/Anthracenes	670	--	0.53	23.14	23.14	0.03	66.00	1401	1401	2.09	6.40	652	652	0.97
C2-Chrysenes	1,008	--	0.18	7.86	7.86	0.01	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.58	25.33	25.33	--	27.00	573	573	--	2.80	285	285	--
C2-Fluorenes	686	--	0.08	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.08	0.00	0.00	0.00	68.00	1444	1444	2.83	8.10	825	825	1.62
C2-Phenanthrenes/Anthracenes	746	--	0.35	15.28	15.28	0.02	28.00	594	594	0.80	2.80	285	285	0.38
C3-Chrysenes	1,112	--	0.08	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.18	7.86	7.86	0.01	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C3-Fluorenes	769	--	0.08	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.08	0.00	0.00	0.00	36.00	764	764	1.32	4.10	418	418	0.72
C3-Phenanthrenes/Anthracenes	829	--	0.28	12.23	12.23	0.01	14.00	297	297	0.36	0.80	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.08	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.08	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.23	10.04	10.04	0.01	5.50	0.00	0.00	0.00	0.80	0.00	0.00	0.00
Chrysene	844	826	0.76	33.19	33.19	0.04	40.00	849	826	0.98	3.70	377	377	0.45
Dibenzo(a,h)anthracene	1,123	2,389	0.15	6.55	6.55	0.01	7.30	155	155	0.138	0.62	63.14	63.14	0.056
Fluoranthene	707	23,870	1.30	56.77	56.77	0.08	120.00	2548	2548	3.60	11.00	1120	1120	1.58
Fluorene	538	26,000	0.06	2.79	2.79	0.01	41.00	870	870	1.62	4.50	458	458	0.852
Indeno(1,2,3-cd)pyrene	1,115	--	0.49	21.40	21.40	0.02	22.00	467	467	0.42	1.90	193	193	0.17
Naphthalene	385	61,700	0.08	0.00	0.00	0.00	41.00	870	870	2.26	9.00	916	916	2.381
Perylene	967	431	0.21	9.17	9.17	0.01	11.00	234	234	0.24	0.80	0.00	0.00	0.00
Phenanthrene	596	34,300	0.71	31.00	31.00	0.05	170.00	3609	3609	6.06	18.00	1833	1833	3.08
Pyrene	697	9,090	1.40	61.14	61.14	0.09	140.00	2972	2972	4.26	12.00	1222	1222	1.75
	---	**ESBTU FCVi**	--	--	--	0.71	--	--	--	39.88	--	--	--	20.29

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			RB15-11				RB15-11				RB15-12			
Sample Name:			**RB15-11-1030**				**RB15-11-1030FD**				**RB15-12-0010**			
Sample Date:			**11/4/2015**				**11/4/2015**				**11/4/2015**			
Depth Interval (ft):			**1-3**				**1-3**				**0-1**			
	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 (%)	--	--	1.63	0.0163	--	--	1.25	0.0125	--	--	6.05	0.0605	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.09	5.52	5.52	0.01	0.04	3.12	3.12	0.01	100	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.09	5.71	5.71	0.013	0.04	3.04	3.04	0.01	250	4132	4132	9.24
Acenaphthene	491	33,400	0.07	3.99	3.99	0.01	0.02	1.68	1.68	0.003	220	3636	3636	7.41
Acenaphthylene	452	24,000	0.02	0.92	0.92	0.002	0.003	0.25	0.25	0.001	20	331	331	0.73
Anthracene	594	1,300	0.08	4.72	4.72	0.01	0.02	1.52	1.52	0.003	360	5950	1300	2.19
Benzo[a]anthracene	841	4,153	0.06	3.93	3.93	0.005	0.01	0.78	0.78	0.001	200	3306	3306	3.93
Benzo[a]pyrene	965	3,840	0.05	3.25	3.25	0.003	0.01	0.62	0.62	0.001	150	2479	2479	2.57
Benzo[b]fluoranthene	979	2,169	0.04	2.45	2.45	0.003	0.01	0.96	0.96	0.001	130	2149	2149	2.19
Benzo[e]pyrene	967	4,300	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	100	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	42	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.04	2.21	2.21	0.002	0.01	0.44	0.44	0.0004	130	2149	1220	1.24
C1-Chrysenes	929	--	0.06	3.44	3.44	0.004	0.04	2.80	2.80	0.003	100	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.14	8.59	8.59	0.01	0.05	4.32	4.32	0.01	260	4298	4298	5.58
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	100	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.11	6.75	6.75	0.02	0.05	4.00	4.00	0.01	310	5124	5124	11.54
C1-Phenanthrenes/Anthracenes	670	--	0.15	9.20	9.20	0.01	0.10	8.00	8.00	0.01	100	0.00	0.00	0.00
C2-Chrysenes	1,008	--	0.05	3.13	3.13	0.003	0.03	2.72	2.72	0.003	100	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.09	5.52	5.52	--	0.07	5.68	5.68	--	100	0.00	0.00	--
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.04	2.80	2.80	0.004	100	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.19	11.66	11.66	0.02	0.09	7.36	7.36	0.01	100	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.13	7.98	7.98	0.01	0.13	10.40	10.40	0.01	100	0.00	0.00	0.00
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.04	3.12	3.12	0.003	100	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.07	4.48	4.48	0.005	0.07	5.92	5.92	0.01	100	0.00	0.00	0.00
C3-Fluorenes	769	--	0.02	0.00	0.00	0.00	0.05	3.92	3.92	0.01	100	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.22	13.50	13.50	0.02	0.24	19.20	19.20	0.03	100	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.15	9.20	9.20	0.01	0.14	11.20	11.20	0.01	100	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	100	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.19	11.66	11.66	0.02	0.25	20.00	20.00	0.03	100	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.10	6.13	6.13	0.01	0.11	8.80	8.80	0.01	100	0.00	0.00	0.00
Chrysene	844	826	0.07	4.23	4.23	0.01	0.03	2.48	2.48	0.003	170	2810	826	0.98
Dibenzo(a,h)anthracene	1,123	2,389	0.01	0.58	0.58	0.001	0.003	0.20	0.20	0.0002	28	463	463	0.41
Fluoranthene	707	23,870	0.16	9.82	9.82	0.01	0.03	2.56	2.56	0.004	540	8926	8926	12.62
Fluorene	538	26,000	0.08	4.72	4.72	0.01	0.02	1.76	1.76	0.003	230	3802	3802	7.07
Indeno(1,2,3-cd)pyrene	1,115	--	0.02	1.47	1.47	0.001	0.004	0.32	0.32	0.0003	82	1355	1355	1.22
Naphthalene	385	61,700	0.59	36.20	36.20	0.094	0.34	27.20	27.20	0.07	2600	42975	42975	112
Perylene	967	431	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	100	0.00	0.00	0.00
Phenanthrene	596	34,300	0.29	17.79	17.79	0.03	0.08	6.00	6.00	0.01	760	12562	12562	21.08
Pyrene	697	9,090	0.18	11.04	11.04	0.02	0.04	2.96	2.96	0.004	440	7273	7273	10.43
	---	**ESBTU FCVi**	--	--	--	0.34	--	--	--	0.26	--	--	--	202.82

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-12**				**RB15-13**				**RB15-13**			
		Sample Name:	**RB15-12-1030**				**RB15-13-SURF**				**RB15-13-0010**			
		Sample Date:	**11/4/2015**				**11/2/2015**				**11/4/2015**			
		Depth Interval (ft):	**1-3**				**0-0.5**				**0-1**			
	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 (%)	--	--	40.9	0.409	--	--	4.42	0.0442	--	--	8.25	0.0825	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	5500.00	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	5000.00	12225	12225	27.35	0.87	19.68	19.68	0.04	0.69	8.36	8.36	0.02
Acenaphthene	491	33,400	3200.00	7824	7824	15.93	3.20	72.40	72.40	0.15	3.70	44.85	44.85	0.09
Acenaphthylene	452	24,000	5500.00	0.00	0.00	0.00	2.65	0.00	0.00	0.00	0.67	8.12	8.12	0.02
Anthracene	594	1,300	3700.00	9046	1300	2.19	10.00	226	226	0.38	5.90	71.52	71.52	0.12
Benzo[a]anthracene	841	4,153	1600.00	3912	3912	4.65	23.00	520	520	0.62	10.00	121	121	0.14
Benzo[a]pyrene	965	3,840	1000.00	2445	2445	2.53	18.00	407	407	0.42	8.50	103	103	0.11
Benzo[b]fluoranthene	979	2,169	5500.00	0.00	0.00	0.00	16.00	362	362	0.37	6.00	72.73	72.73	0.07
Benzo[e]pyrene	967	4,300	5500.00	0.00	0.00	0.00	13.00	294	294	0.30	5.50	66.67	66.67	0.07
Benzo[g,h,i]perylene	1,095	648	5500	0.00	0.00	0.00	9.80	222	222	0.20	4.00	48.48	48.48	0.04
Benzo[k]fluoranthene	981	1,220	5500	0.00	0.00	0.00	14.00	317	317	0.32	7.00	84.85	84.85	0.09
C1-Chrysenes	929	--	5500	0.00	0.00	0.00	8.10	183	183	0.20	4.60	55.76	55.76	0.06
C1-Fluoranthenes/pyrene	770	--	5500	0.00	0.00	0.00	26.00	588	588	0.76	16.00	194	194	0.25
C1-Fluorenes	611	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
C1-Naphthalenes	444	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	5500	0.00	0.00	0.00	12.00	271	271	0.41	11.00	133	133	0.20
C2-Chrysenes	1,008	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	2.80	33.94	33.94	0.03
C2-Fluoranthenes/Pyrene	--	--	5500	0.00	0.00	--	11.00	249	249	--	5.60	67.88	67.88	--
C2-Fluorenes	686	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
C2-Naphthalenes	510	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	8.10	98.18	98.18	0.19
C2-Phenanthrenes/Anthracenes	746	--	5500	0.00	0.00	0.00	5.70	129	129	0.17	5.50	66.67	66.67	0.09
C3-Chrysenes	1,112	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
C3-Fluorenes	769	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
C3-Naphthalenes	581	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	7.10	86.06	86.06	0.15
C3-Phenanthrenes/Anthracenes	829	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	3.10	37.58	37.58	0.05
C4-Chrysenes	1,214	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
C4-Naphthalenes	657	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	2.20	26.67	26.67	0.04
C4-Phenanthrenes/Anthracenes	913	--	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	1.05	0.00	0.00	0.00
Chrysene	844	826	1500	3667	826	0.98	20.00	452	452	0.54	9.20	112	112	0.13
Dibenzo(a,h)anthracene	1,123	2,389	5500	0.00	0.00	0.00	3.70	83.71	83.71	0.07	1.40	16.97	16.97	0.02
Fluoranthene	707	23,870	2400	0.00	0.00	0.00	45.00	1018	1018	1.44	17.00	206	206	0.29
Fluorene	538	26,000	3300	8068	8068	15.00	4.40	99.55	99.55	0.19	2.70	32.73	32.73	0.06
Indeno(1,2,3-cd)pyrene	1,115	--	430	1051	1051	0.94	9.90	224	224	0.20	4.20	50.91	50.91	0.05
Naphthalene	385	61,700	99000	242054	61700	160	1.80	40.72	40.72	0.11	1.20	14.55	14.55	0.04
Perylene	967	431	5500	0.00	0.00	0.00	2.65	0.00	0.00	0.00	2.10	25.45	25.45	0.03
Phenanthrene	596	34,300	3950	0.00	0.00	0.00	35.00	792	792	1.33	15.00	182	182	0.31
Pyrene	697	9,090	2150	0.00	0.00	0.00	43.00	973	973	1.40	20.00	242	242	0.35
	---	**ESBTU FCVi**	--	--	--	202.49	--	--	--	9.57	--	--	--	3.08

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			RB15-13				RB15-13				RB15-13			
Sample Name:			RB15-13-1025				RB15-13-2535				RB15-13-3550			
Sample Date:			11/4/2015				11/4/2015				11/4/2015			
Depth Interval (ft):			1-2.5				2.5-3.5				3.5-5			
	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
Total Organic Carbon (%)	--	--	10.9	0.109	--	--	18.3	0.183	--	--	0.864	0.00864	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	16.00	147	147	0.33	90.00	492	492	1.10	1.80	208	208	0.467
2-Methylnaphthalene	447	154,800	4.10	37.61	37.61	0.08	93.00	508	508	1.14	0.66	76.39	76.39	0.171
Acenaphthene	491	33,400	17.00	156	156	0.32	86.00	470	470	0.96	1.500	174	174	0.354
Acenaphthylene	452	24,000	1.70	15.60	15.60	0.03	5.90	32.24	32.24	0.07	0.045	5.21	5.21	0.0115
Anthracene	594	1,300	18.00	165	165	0.28	83.00	454	454	0.76	1.60	185	185	0.312
Benzo[a]anthracene	841	4,153	21.00	193	193	0.23	76.00	415	415	0.49	1.90	220	220	0.261
Benzo[a]pyrene	965	3,840	17.00	156	156	0.16	65.00	355	355	0.37	1.30	150	150	0.156
Benzo[b]fluoranthene	979	2,169	9.90	90.83	90.83	0.09	35.00	191	191	0.20	0.99	115	115	0.117
Benzo[e]pyrene	967	4,300	11.00	101	101	0.10	40.00	219	219	0.23	0.84	97.22	97.22	0.101
Benzo[g,h,i]perylene	1,095	648	7.80	71.56	71.56	0.07	25.00	137	137	0.12	0.73	84.49	84.49	0.077
Benzo[k]fluoranthene	981	1,220	14.00	128	128	0.13	44.00	240	240	0.25	1.20	139	139	0.142
C1-Chrysenes	929	--	9.00	82.57	82.57	0.09	33.00	180	180	0.19	0.62	71.76	71.76	0.077
C1-Fluoranthenes/pyrene	770	--	39.00	358	358	0.46	140	765	765	0.99	2.60	301	301	0.391
C1-Fluorenes	611	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C1-Naphthalenes	444	--	12.00	110	110	0.25	120	656	656	1.48	1.50	174	174	0.391
C1-Phenanthrenes/Anthracenes	670	--	27.00	248	248	0.37	120	656	656	0.98	1.90	220	220	0.328
C2-Chrysenes	1,008	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	13.00	119	119	--	44.00	240	240	--	0.86	99.54	99.54	--
C2-Fluorenes	686	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C2-Naphthalenes	510	--	39.00	358	358	0.70	180	984	984	1.93	3.00	347	347	0.681
C2-Phenanthrenes/Anthracenes	746	--	14.00	128	128	0.17	52.00	284	284	0.38	0.84	97.22	97.22	0.130
C3-Chrysenes	1,112	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C3-Fluorenes	769	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C3-Naphthalenes	581	--	21.00	193	193	0.33	81.00	443	443	0.76	1.20	139	139	0.24
C3-Phenanthrenes/Anthracenes	829	--	8.50	77.98	77.98	0.09	23.00	126	126	0.15	0.22	0.00	0.00	0.00
C4-Chrysenes	1,214	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C4-Naphthalenes	657	--	6.40	58.72	58.72	0.09	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
Chrysene	844	826	19.00	174	174	0.21	67.00	366	366	0.43	1.60	185	185	0.219
Dibenzo(a,h)anthracene	1,123	2,389	2.70	24.77	24.77	0.02	8.60	46.99	46.99	0.04	0.270	31.25	31.25	0.0278
Fluoranthene	707	23,870	39.00	358	358	0.51	140	765	765	1.08	3.80	440	440	0.622
Fluorene	538	26,000	9.80	89.91	89.91	0.17	56.00	306	306	0.57	0.90	104	104	0.194
Indeno(1,2,3-cd)pyrene	1,115	--	7.90	72.48	72.48	0.07	27.00	148	148	0.13	0.75	86.81	86.81	0.0779
Naphthalene	385	61,700	4.50	41.28	41.28	0.11	42.00	230	230	0.60	1.800	208	208	0.541
Perylene	967	431	2.45	0.00	0.00	0.00	10.50	0.00	0.00	0.00	0.22	0.00	0.00	0.00
Phenanthrene	596	34,300	47.00	431	431	0.72	220	1202	1202	2.02	3.90	451	451	0.757
Pyrene	697	9,090	46.00	422	422	0.61	170	929	929	1.33	3.20	370	370	0.531
	---	**ESBTU FCVi**	--	--	--	6.38	--	--	--	16.52	--	--	--	6.74

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-14**				**RB15-14**				**RB15-14**			
		Sample Name:	**RB15-14-SURF**				**RB15-14-0010**				**RB15-14-1030**			
		Sample Date:	**11/2/2015**				**11/4/2015**				**11/4/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**				**1-3**			
	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 (%)	--	--	1.94	0.0194	--	--	5.84	0.0584	--	--	8.73	0.0873	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.50	0.00	0.00	0.00	33.00	565	565	1.27	120	1375	1375	3.08
2-Methylnaphthalene	447	154,800	0.41	21.13	21.13	0.05	35.00	599	599	1.34	150	1718	1718	3.84
Acenaphthene	491	33,400	0.70	36.08	36.08	0.07	32.00	548	548	1.12	90	1031	1031	2.10
Acenaphthylene	452	24,000	0.41	21.13	21.13	0.05	2.70	46.23	46.23	0.10	4.2	48.1	48.1	0.106
Anthracene	594	1,300	1.60	82.47	82.47	0.14	40.00	685	685	1.15	80.00	916	916	1.54
Benzo[a]anthracene	841	4,153	5.90	304	304	0.36	35.00	599	599	0.71	53.00	607	607	0.72
Benzo[a]pyrene	965	3,840	5.20	268	268	0.28	28.00	479	479	0.50	42.00	481	481	0.50
Benzo[b]fluoranthene	979	2,169	3.90	201	201	0.21	20.00	342	342	0.35	23.00	263	263	0.27
Benzo[e]pyrene	967	4,300	3.60	186	186	0.19	18.00	308	308	0.32	26.00	298	298	0.31
Benzo[g,h,i]perylene	1,095	648	3.30	170	170	0.16	15.00	257	257	0.23	9.50	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	4.10	211	211	0.22	22.00	377	377	0.38	31.00	355	355	0.36
C1-Chrysenes	929	--	2.80	144	144	0.16	15.00	257	257	0.28	24.00	275	275	0.30
C1-Fluoranthenes/pyrene	770	--	7.80	402	402	0.52	54.00	925	925	1.20	110	1260	1260	1.64
C1-Fluorenes	611	--	0.50	0.00	0.00	0.00	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.50	0.00	0.00	0.00	43.00	736	736	1.66	180	2062	2062	4.64
C1-Phenanthrenes/Anthracenes	670	--	3.20	165	165	0.25	43.00	736	736	1.10	100	1145	1145	1.71
C2-Chrysenes	1,008	--	1.10	56.70	56.70	0.06	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	3.30	170	170	--	16.00	274	274	--	32.00	367	367	--
C2-Fluorenes	686	--	0.50	0.00	0.00	0.00	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C2-Naphthalenes	510	--	1.20	61.86	61.86	0.12	63.00	1079	1079	2.12	190	2176	2176	4.27
C2-Phenanthrenes/Anthracenes	746	--	2.10	108	108	0.15	18.00	308	308	0.41	40.00	458	458	0.61
C3-Chrysenes	1,112	--	0.50	0.00	0.00	0.00	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	1.20	61.86	61.86	0.07	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.50	0.00	0.00	0.00	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	1.30	67.01	67.01	0.12	29.00	497	497	0.85	74.00	848	848	1.46
C3-Phenanthrenes/Anthracenes	829	--	1.20	61.86	61.86	0.07	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.50	0.00	0.00	0.00	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.50	0.00	0.00	0.00	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.50	0.00	0.00	0.00	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
Chrysene	844	826	5.40	278	278	0.33	32.00	548	548	0.65	48.00	550	550	0.651
Dibenzo(a,h)anthracene	1,123	2,389	1.00	51.55	51.55	0.05	4.90	83.90	83.90	0.07	5.9	67.6	67.6	0.0602
Fluoranthene	707	23,870	10.00	515	515	0.73	63.00	1079	1079	1.53	110	1260	1260	1.78
Fluorene	538	26,000	0.70	36.08	36.08	0.07	22.00	377	377	0.70	57.000	653	653	1.214
Indeno(1,2,3-cd)pyrene	1,115	--	3.00	155	155	0.14	14.00	240	240	0.22	17.00	195	195	0.175
Naphthalene	385	61,700	1.00	51.55	51.55	0.13	38.00	651	651	1.69	250	2864	2864	7.44
Perylene	967	431	1.30	67.01	67.01	0.07	4.35	0.00	0.00	0.00	10.00	0.00	0.00	0.00
Phenanthrene	596	34,300	5.60	289	289	0.48	80.00	1370	1370	2.30	210	2405	2405	4.04
Pyrene	697	9,090	11.00	567	567	0.81	71.00	1216	1216	1.74	140	1604	1604	2.30
	---	**ESBTU FCVi**	--	--	--	5.98	--	--	--	21.38	--	--	--	38.19

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			RB15-14				RB15-15				RB15-15			
Sample Name:			RB15-14-3050				RB15-15-SURF				RB15-15-0010			
Sample Date:			11/4/2015				11/2/2015				11/4/2015			
Depth Interval (ft):			3-5				0-0.5				0-1			
	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 (%)	--	--	3.28	0.0328	--	--	4.19	0.0419	--	--	5.93	0.0593	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.88	26.83	26.83	0.06	0.13	0.00	0.00	0.00	110	1855	1855	4.16
2-Methylnaphthalene	447	154,800	1.00	30.49	30.49	0.07	0.12	2.86	2.86	0.01	160	2698	2698	6.036
Acenaphthene	491	33,400	0.81	24.70	24.70	0.05	0.24	5.73	5.73	0.01	100	1686	1686	3.4345
Acenaphthylene	452	24,000	0.05	1.49	1.49	0.003	0.16	3.82	3.82	0.01	3.10	52.28	52.28	0.1157
Anthracene	594	1,300	0.95	28.96	28.96	0.05	0.50	11.93	11.93	0.02	67.00	1130	1130	1.902
Benzo[a]anthracene	841	4,153	0.94	28.66	28.66	0.03	2.30	54.89	54.89	0.07	36.00	607	607	0.72
Benzo[a]pyrene	965	3,840	0.65	19.82	19.82	0.02	2.40	57.28	57.28	0.06	26.00	438	438	0.4544
Benzo[b]fluoranthene	979	2,169	0.35	10.67	10.67	0.01	2.20	52.51	52.51	0.05	15.00	253	253	0.26
Benzo[e]pyrene	967	4,300	0.38	11.59	11.59	0.01	1.60	38.19	38.19	0.04	12.00	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	0.27	8.23	8.23	0.01	1.50	35.80	35.80	0.03	11.00	185	185	0.17
Benzo[k]fluoranthene	981	1,220	0.54	16.46	16.46	0.02	1.50	35.80	35.80	0.04	18.00	304	304	0.3094
C1-Chrysenes	929	--	0.39	11.89	11.89	0.01	0.96	22.91	22.91	0.02	12.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	1.50	45.73	45.73	0.06	3.20	76.37	76.37	0.10	84.00	1417	1417	1.84
C1-Fluorenes	611	--	0.24	7.32	7.32	0.01	0.13	0.00	0.00	0.00	12.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	1.20	36.59	36.59	0.08	0.13	0.00	0.00	0.00	170	2867	2867	6.46
C1-Phenanthrenes/Anthracenes	670	--	1.10	33.54	33.54	0.05	0.99	23.63	23.63	0.04	77.00	1298	1298	1.94
C2-Chrysenes	1,008	--	0.11	0.00	0.00	0.00	0.48	11.46	11.46	0.01	12.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.51	15.55	15.55	--	1.30	31.03	31.03	--	24.00	405	405	--
C2-Fluorenes	686	--	0.11	0.00	0.00	0.00	0.13	0.00	0.00	0.00	12.00	0.00	0.00	0.00
C2-Naphthalenes	510	--	1.40	42.68	42.68	0.08	0.42	10.02	10.02	0.02	150	2530	2530	4.96
C2-Phenanthrenes/Anthracenes	746	--	0.51	15.55	15.55	0.02	0.67	15.99	15.99	0.02	27.00	455	455	0.61
C3-Chrysenes	1,112	--	0.11	0.00	0.00	0.00	0.13	0.00	0.00	0.00	12.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.11	0.00	0.00	0.00	0.43	10.26	10.26	0.011	12.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.11	0.00	0.00	0.00	0.13	0.00	0.00	0.00	12.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.70	21.34	21.34	0.04	0.35	8.35	8.35	0.01	57.00	961	961	1.65
C3-Phenanthrenes/Anthracenes	829	--	0.30	9.15	9.15	0.01	0.46	10.98	10.98	0.01	12.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.11	0.00	0.00	0.00	0.13	0.00	0.00	0.00	12.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.24	7.32	7.32	0.01	0.13	0.00	0.00	0.00	12.00	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.11	0.00	0.00	0.00	0.13	0.00	0.00	0.00	12.00	0.00	0.00	0.00
Chrysene	844	826	0.76	23.17	23.17	0.03	2.00	47.73	47.73	0.06	31.00	523	523	0.619
Dibenzo(a,h)anthracene	1,123	2,389	0.08	2.44	2.44	0.002	0.45	10.74	10.74	0.010	3.10	52.28	52.28	0.0466
Fluoranthene	707	23,870	1.80	54.88	54.88	0.08	3.60	85.92	85.92	0.12	72.00	1214	1214	1.717
Fluorene	538	26,000	0.52	15.85	15.85	0.03	0.19	4.53	4.53	0.008	53.00	894	894	1.661
Indeno(1,2,3-cd)pyrene	1,115	--	0.26	7.93	7.93	0.01	1.30	31.03	31.03	0.028	11.00	185	185	0.1664
Naphthalene	385	61,700	1.50	45.73	45.73	0.12	0.24	5.73	5.73	0.015	270	4553	4553	11.826
Perylene	967	431	0.11	0.00	0.00	0.00	0.55	13.13	13.13	0.014	12.00	0.00	0.00	0.00
Phenanthrene	596	34,300	2.30	70.12	70.12	0.12	1.60	38.19	38.19	0.06	170	2867	2867	4.810
Pyrene	697	9,090	1.90	57.93	57.93	0.08	3.40	81.15	81.15	0.12	100	1686	1686	2.419
	---	**ESBTU FCVi**	--	--	--	1.05	--	--	--	1.01	--	--	--	48.09

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-15**				**RB15-15**			
		Sample Name:	**RB15-15-1020**				**RB15-15-2040**			
		Sample Date:	**11/4/2015**				**11/4/2015**			
		Depth Interval (ft):	**1-2**				**2-4**			
	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**
Total Organic Carbon (%)	--	--	1.94	0.0194	--	--	4.21	0.0421	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	11.00	567	567	1.27	110	2613	2613	5.86
2-Methylnaphthalene	447	154,800	15.00	773	773	1.73	150	3563	3563	7.97
Acenaphthene	491	33,400	8.20	423	423	0.86	88.00	2090	2090	4.26
Acenaphthylene	452	24,000	0.24	12.37	12.37	0.03	3.30	78.38	78.38	0.17
Anthracene	594	1,300	5.80	299	299	0.50	55.00	1306	1300	2.19
Benzo[a]anthracene	841	4,153	2.40	124	124	0.15	32.00	760	760	0.90
Benzo[a]pyrene	965	3,840	1.70	87.63	87.63	0.09	23.00	546	546	0.57
Benzo[b]fluoranthene	979	2,169	0.99	51.03	51.03	0.05	11.00	261	261	0.27
Benzo[e]pyrene	967	4,300	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	0.77	39.69	39.69	0.04	9.20	219	219	0.20
Benzo[k]fluoranthene	981	1,220	1.10	56.70	56.70	0.06	14.00	333	333	0.34
C1-Chrysenes	929	--	1.00	0.00	0.00	0.00	21.00	499	499	0.54
C1-Fluoranthenes/pyrene	770	--	5.00	258	258	0.33	93.00	2209	2209	2.87
C1-Fluorenes	611	--	1.00	0.00	0.00	0.00	22.00	523	523	0.86
C1-Naphthalenes	444	--	16.00	825	825	1.86	170	4038	4038	9.09
C1-Phenanthrenes/Anthracenes	670	--	4.90	253	253	0.38	93.00	2209	2209	3.30
C2-Chrysenes	1,008	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	1.00	0.00	0.00	--	34.00	808	808	--
C2-Fluorenes	686	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
C2-Naphthalenes	510	--	11.00	567	567	1.11	180	4276	4276	8.38
C2-Phenanthrenes/Anthracenes	746	--	1.00	0.00	0.00	0.00	40.00	950	950	1.27
C3-Chrysenes	1,112	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
C3-Fluorenes	769	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	3.60	186	186	0.32	74.00	1758	1758	3.03
C3-Phenanthrenes/Anthracenes	829	--	1.00	0.00	0.00	0.00	21.00	499	499	0.60
C4-Chrysenes	1,214	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
Chrysene	844	826	2.10	108	108	0.13	27.00	641	641	0.76
Dibenzo(a,h)anthracene	1,123	2,389	0.24	12.37	12.37	0.01	3.30	78.38	78.38	0.070
Fluoranthene	707	23,870	4.90	253	253	0.36	52.00	1235	1235	1.75
Fluorene	538	26,000	4.10	211	211	0.39	41.00	974	974	1.810
Indeno(1,2,3-cd)pyrene	1,115	--	0.71	36.60	36.60	0.03	8.20	195	195	0.17
Naphthalene	385	61,700	20.00	1031	1031	2.68	210	4988	4988	12.956
Perylene	967	431	1.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
Phenanthrene	596	34,300	13.00	670	670	1.12	150	3563	3563	5.98
Pyrene	697	9,090	6.80	351	351	0.50	99.00	2352	2352	3.37
	---	**ESBTU FCVi**	--	--	--	11.00	--	--	--	65.70

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-15**				**RB15-15**			
		Sample Name:	**RB15-15-2040FD**				**RB15-15-4060**			
		Sample Date:	**11/4/2015**				**11/4/2015**			
		Depth Interval (ft):	**2-4**				**4-6**			
	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**
Total Organic Carbon (%)	--	--	4.71	0.0471	--	--	1.75	0.0175	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	79.00	1677	1677	3.76	0.90	51.43	51.43	0.12
2-Methylnaphthalene	447	154,800	100	2123	2123	4.750	1.20	68.57	68.57	0.153
Acenaphthene	491	33,400	63.00	1338	1338	2.724	0.93	53.14	53.14	0.108
Acenaphthylene	452	24,000	2.40	50.96	50.96	0.113	0.04	2.06	2.06	0.005
Anthracene	594	1,300	37.00	786	786	1.32	0.67	38.29	38.29	0.064
Benzo[a]anthracene	841	4,153	22.00	467	467	0.56	0.42	24.00	24.00	0.03
Benzo[a]pyrene	965	3,840	15.00	318	318	0.33	0.36	20.57	20.57	0.02
Benzo[b]fluoranthene	979	2,169	6.70	142	142	0.145	0.20	11.43	11.43	0.012
Benzo[e]pyrene	967	4,300	8.00	0.00	0.00	0.00	0.23	13.14	13.14	0.01
Benzo[g,h,i]perylene	1,095	648	5.70	121	121	0.111	0.19	10.86	10.86	0.01
Benzo[k]fluoranthene	981	1,220	8.70	185	185	0.19	0.20	11.43	11.43	0.012
C1-Chrysenes	929	--	8.00	0.00	0.00	0.00	0.25	14.29	14.29	0.02
C1-Fluoranthenes/pyrene	770	--	67.00	1423	1423	1.85	0.99	56.57	56.57	0.07
C1-Fluorenes	611	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Naphthalenes	444	--	120	2548	2548	5.74	1.30	74.29	74.29	0.17
C1-Phenanthrenes/Anthracenes	670	--	71.00	1507	1507	2.25	0.85	48.57	48.57	0.07
C2-Chrysenes	1,008	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	25.00	531	531	--	0.39	22.29	22.29	--
C2-Fluorenes	686	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Naphthalenes	510	--	130	2760	2760	5.412	1.60	91.43	91.43	0.18
C2-Phenanthrenes/Anthracenes	746	--	28.00	594	594	0.797	0.42	24.00	24.00	0.03
C3-Chrysenes	1,112	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluorenes	769	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Naphthalenes	581	--	54.00	1146	1146	1.973	0.83	47.43	47.43	0.08
C3-Phenanthrenes/Anthracenes	829	--	8.00	0.00	0.00	0.00	0.24	13.71	13.71	0.02
C4-Chrysenes	1,214	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Naphthalenes	657	--	8.00	0.00	0.00	0.00	0.26	14.86	14.86	0.02
C4-Phenanthrenes/Anthracenes	913	--	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Chrysene	844	826	18.00	382	382	0.45	0.37	21.14	21.14	0.03
Dibenzo(a,h)anthracene	1,123	2,389	1.90	40.34	40.34	0.036	0.05	2.63	2.63	0.002
Fluoranthene	707	23,870	34.00	722	722	1.02	0.84	48.00	48.00	0.07
Fluorene	538	26,000	29.00	616	616	1.144	0.47	26.86	26.86	0.050
Indeno(1,2,3-cd)pyrene	1,115	--	4.90	104	104	0.093	0.13	7.43	7.43	0.007
Naphthalene	385	61,700	150	3185	3185	8.27	2.10	120	120	0.31
Perylene	967	431	8.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Phenanthrene	596	34,300	110	2335	2335	3.92	1.90	109	109	0.18
Pyrene	697	9,090	69.00	1465	1465	2.10	1.40	80.00	80.00	0.11
	---	**ESBTU FCVi**	--	--	--	40.55	--	--	--	1.70

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-16**				**RB15-16**			
		Sample Name:	**RB15-16-SURF**				**RB15-16-0010**			
		Sample Date:	**11/2/2015**				**11/4/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**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**
Total Organic Carbon (%)	--	--	4.56	0.0456	--	--	6.16	0.0616	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.28	0.00	0.00	0.00	17.00	276	276	0.62
2-Methylnaphthalene	447	154,800	0.11	2.41	2.41	0.01	10.00	162	162	0.36
Acenaphthene	491	33,400	0.37	8.11	8.11	0.017	20.00	325	325	0.66
Acenaphthylene	452	24,000	0.26	5.70	5.70	0.013	1.30	21.10	21.10	0.05
Anthracene	594	1,300	0.74	16.23	16.23	0.03	19.00	308	308	0.52
Benzo[a]anthracene	841	4,153	3.60	78.95	78.95	0.09	15.00	244	244	0.29
Benzo[a]pyrene	965	3,840	3.30	72.37	72.37	0.07	11.00	179	179	0.19
Benzo[b]fluoranthene	979	2,169	2.10	46.05	46.05	0.05	6.50	106	106	0.11
Benzo[e]pyrene	967	4,300	2.30	50.44	50.44	0.05	7.00	114	114	0.12
Benzo[g,h,i]perylene	1,095	648	1.90	41.67	41.67	0.04	5.10	82.79	82.79	0.08
Benzo[k]fluoranthene	981	1,220	2.00	43.86	43.86	0.04	7.80	127	127	0.13
C1-Chrysenes	929	--	1.60	35.09	35.09	0.04	6.90	112	112	0.12
C1-Fluoranthenes/pyrene	770	--	6.10	134	134	0.17	30.00	487	487	0.63
C1-Fluorenes	611	--	0.28	0.00	0.00	0.00	4.50	73.05	73.05	0.12
C1-Naphthalenes	444	--	0.28	0.00	0.00	0.00	17.00	276	276	0.62
C1-Phenanthrenes/Anthracenes	670	--	2.10	46.05	46.05	0.07	23.00	373	373	0.56
C2-Chrysenes	1,008	--	0.62	13.60	13.60	0.01	2.10	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	2.00	43.86	43.86	--	8.20	133	133	--
C2-Fluorenes	686	--	0.28	0.00	0.00	0.00	2.10	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.28	0.00	0.00	0.00	31.00	503	503	0.99
C2-Phenanthrenes/Anthracenes	746	--	1.20	26.32	26.32	0.04	9.50	154	154	0.21
C3-Chrysenes	1,112	--	0.28	0.00	0.00	0.00	2.10	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.28	0.00	0.00	0.00	2.10	0.00	0.00	0.00
C3-Fluorenes	769	--	0.28	0.00	0.00	0.00	2.10	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.55	12.06	12.06	0.02	16.00	260	260	0.45
C3-Phenanthrenes/Anthracenes	829	--	0.65	14.25	14.25	0.02	4.60	74.68	74.68	0.09
C4-Chrysenes	1,214	--	0.28	0.00	0.00	0.00	2.10	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.28	0.00	0.00	0.00	2.10	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.28	0.00	0.00	0.00	2.10	0.00	0.00	0.00
Chrysene	844	826	3.00	65.79	65.79	0.08	13.00	211	211	0.25
Dibenzo(a,h)anthracene	1,123	2,389	0.55	12.06	12.06	0.01	1.70	27.60	27.60	0.02
Fluoranthene	707	23,870	4.40	96.49	96.49	0.14	26.00	422	422	0.60
Fluorene	538	26,000	0.26	5.70	5.70	0.011	12.00	195	195	0.36
Indeno(1,2,3-cd)pyrene	1,115	--	1.60	35.09	35.09	0.03	4.90	79.55	79.55	0.07
Naphthalene	385	61,700	0.23	5.04	5.04	0.013	17.00	276	276	0.72
Perylene	967	431	0.67	14.69	14.69	0.02	2.10	0.00	0.00	0.00
Phenanthrene	596	34,300	2.00	43.86	43.86	0.07	45.00	731	731	1.23
Pyrene	697	9,090	7.60	167	167	0.24	38.00	617	617	0.89
	---	**ESBTU FCVi**	---	---	---	1.38	--	--	--	10.05

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-16**				**RB15-16**			
		Sample Name:	**RB15-16-1030**				**RB15-16-3040**			
		Sample Date:	**11/4/2015**				**11/4/2015**			
		Depth Interval (ft):	**1-3**				**3-4**			
	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**
Total Organic Carbon (%)	--	--	6.96	0.0696	--	--	7.76	0.0776	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	300	4310	4310	9.66	360.00	4639.18	4639.18	10.40
2-Methylnaphthalene	447	154,800	410	5891	5891	13.18	410.00	5283.51	5283.51	11.82
Acenaphthene	491	33,400	270	3879	3879	7.90	280.00	3608.25	3608.25	7.35
Acenaphthylene	452	24,000	9.50	136	136	0.302	10.00	128.87	128.87	0.29
Anthracene	594	1,300	190	2730	1300	2.19	210.00	2706.19	1300.00	2.19
Benzo[a]anthracene	841	4,153	100	1437	1437	1.71	87.00	1121.13	1121.13	1.33
Benzo[a]pyrene	965	3,840	77.00	1106	1106	1.15	64.00	824.74	824.74	0.85
Benzo[b]fluoranthene	979	2,169	40.00	575	575	0.59	23.00	296.39	296.39	0.30
Benzo[e]pyrene	967	4,300	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	31.00	445	445	0.41	24.00	309.28	309.28	0.28
Benzo[k]fluoranthene	981	1,220	49.00	704	704	0.72	44.00	567.01	567.01	0.58
C1-Chrysenes	929	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	240	3448	3448	4.48	270.00	3479.38	3479.38	4.52
C1-Fluorenes	611	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	450	6466	6466	14.56	560.00	7216.49	7216.49	16.25
C1-Phenanthrenes/Anthracenes	670	--	230	3305	3305	4.93	270.00	3479.38	3479.38	5.19
C2-Chrysenes	1,008	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	48.50	0.00	0.00	--	49.00	0.00	0.00	--
C2-Fluorenes	686	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C2-Naphthalenes	510	--	450	6466	6466	12.68	560.00	7216.49	7216.49	14.15
C2-Phenanthrenes/Anthracenes	746	--	48.50	0.00	0.00	0.00	120.00	1546.39	1546.39	2.07
C3-Chrysenes	1,112	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C3-Fluorenes	769	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	170	2443	2443	4.20	220.00	2835.05	2835.05	4.88
C3-Phenanthrenes/Anthracenes	829	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
Chrysene	844	826	86.00	1236	826	0.98	80.00	1030.93	826.00	0.98
Dibenzo(a,h)anthracene	1,123	2,389	9.00	129	129	0.12	49.00	0.00	0.00	0.00
Fluoranthene	707	23,870	200	2874	2874	4.06	150.00	1932.99	1932.99	2.73
Fluorene	538	26,000	150	2155	2155	4.01	140.00	1804.12	1804.12	3.35
Indeno(1,2,3-cd)pyrene	1,115	--	29.00	417	417	0.37	18.00	231.96	231.96	0.21
Naphthalene	385	61,700	700	10057	10057	26.12	700.00	9020.62	9020.62	23.43
Perylene	967	431	48.50	0.00	0.00	0.00	49.00	0.00	0.00	0.00
Phenanthrene	596	34,300	510	7328	7328	12.29	450.00	5798.97	5798.97	9.73
Pyrene	697	9,090	300	4310	4310	6.18	280.00	3608.25	3608.25	5.18
	---	**ESBTU FCVi**	--	--	--	109.95	--	--	--	105.85

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			RB15-16				RB15-17				RB15-17			
Sample Name:			RB15-16-4060				RB15-17-SURF				RB15-17-0010			
Sample Date:			11/4/2015				11/2/2015				11/3/2015			
Depth Interval (ft):			4-6				0-0.5				0-1			
	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
Total Organic Carbon (%)	--	--	1.99	0.0199	--	--	1.41	0.0141	--	--	1.38	0.0138	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (μg/kg)		--												
1-Methylnaphthalene	446	165,700	3.40	171	171	0.38	0.02	1.42	1.42	0.003	0.13	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	3.60	181	181	0.40	0.01	0.66	0.66	0.001	0.05	3.62	3.62	0.01
Acenaphthene	491	33,400	2.60	131	131	0.27	0.12	8.51	8.51	0.02	0.61	44.20	44.20	0.09
Acenaphthylene	452	24,000	0.55	0.00	0.00	0.00	0.01	0.45	0.45	0.001	0.10	7.03	7.03	0.02
Anthracene	594	1,300	1.20	60.30	60.30	0.10	0.04	2.84	2.84	0.005	1.50	109	109	0.18
Benzo[a]anthracene	841	4,153	0.62	31.16	31.16	0.04	0.08	5.96	5.96	0.01	1.80	130	130	0.16
Benzo[a]pyrene	965	3,840	0.49	24.62	24.62	0.03	0.08	5.39	5.39	0.01	1.10	79.71	79.71	0.08
Benzo[b]fluoranthene	979	2,169	0.20	10.05	10.05	0.01	0.06	4.18	4.18	0.004	0.85	61.59	61.59	0.06
Benzo[e]pyrene	967	4,300	0.55	0.00	0.00	0.00	0.06	4.33	4.33	0.004	0.75	54.35	54.35	0.06
Benzo[g,h,i]perylene	1,095	648	0.25	12.56	12.56	0.01	0.07	4.89	4.89	0.004	0.58	42.03	42.03	0.04
Benzo[k]fluoranthene	981	1,220	0.37	18.59	18.59	0.02	0.06	4.26	4.26	0.004	0.82	59.42	59.42	0.06
C1-Chrysenes	929	--	0.55	0.00	0.00	0.00	0.02	1.70	1.70	0.002	0.83	60.14	60.14	0.06
C1-Fluoranthenes/pyrene	770	--	1.40	70.35	70.35	0.09	0.04	2.98	2.98	0.004	3.70	268	268	0.35
C1-Fluorenes	611	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.43	31.16	31.16	0.05
C1-Naphthalenes	444	--	5.00	251	251	0.57	0.01	0.00	0.00	0.00	0.13	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.40	70.35	70.35	0.11	0.04	2.91	2.91	0.004	2.80	203	203	0.30
C2-Chrysenes	1,008	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.36	26.09	26.09	0.03
C2-Fluoranthenes/Pyrene	--	--	0.55	0.00	0.00	--	0.01	0.00	0.00	--	1.50	109	109	--
C2-Fluorenes	686	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.44	31.88	31.88	0.05
C2-Naphthalenes	510	--	3.20	161	161	0.32	0.02	1.42	1.42	0.003	1.10	79.71	79.71	0.16
C2-Phenanthrenes/Anthracenes	746	--	0.55	0.00	0.00	0.00	0.04	2.77	2.77	0.004	1.50	109	109	0.15
C3-Chrysenes	1,112	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.13	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.41	29.71	29.71	0.03
C3-Fluorenes	769	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.13	0.00	0.00	0.00
C3-Naphthalenes	581	--	1.20	60.30	60.30	0.10	0.03	2.34	2.34	0.004	1.60	116	116	0.20
C3-Phenanthrenes/Anthracenes	829	--	0.55	0.00	0.00	0.00	0.03	1.91	1.91	0.002	0.66	47.83	47.83	0.06
C4-Chrysenes	1,214	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.13	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.55	0.00	0.00	0.00	0.02	1.06	1.06	0.002	0.57	41.30	41.30	0.06
C4-Phenanthrenes/Anthracenes	913	--	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.29	21.01	21.01	0.02
Chrysene	844	826	0.60	30.15	30.15	0.04	0.09	6.67	6.67	0.01	1.50	109	109	0.13
Dibenzo(a,h)anthracene	1,123	2,389	0.55	0.00	0.00	0.00	0.02	1.06	1.06	0.001	0.20	14.49	14.49	0.01
Fluoranthene	707	23,870	1.20	60.30	60.30	0.09	0.18	12.77	12.77	0.02	3.30	239	239	0.34
Fluorene	538	26,000	1.10	55.28	55.28	0.10	0.03	2.06	2.06	0.004	0.48	34.78	34.78	0.06
Indeno(1,2,3-cd)pyrene	1,115	--	0.18	9.05	9.05	0.01	0.05	3.19	3.19	0.003	0.57	41.30	41.30	0.04
Naphthalene	385	61,700	15.00	754	754	1.96	0.01	0.70	0.70	0.002	0.09	6.30	6.30	0.02
Perylene	967	431	0.55	0.00	0.00	0.00	0.03	2.06	2.06	0.002	0.28	20.29	20.29	0.02
Phenanthrene	596	34,300	3.00	151	151	0.25	0.13	9.22	9.22	0.02	2.70	196	196	0.33
Pyrene	697	9,090	1.70	85.43	85.43	0.12	0.20	14.18	14.18	0.02	3.80	275	275	0.40
	---	**ESBTU FCVi**	--	--	--	4.22	--	--	--	0.15	--	--	--	3.56

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
μg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	RB15-17				RB15-18				RB15-18			
		Sample Name:	RB15-17-1030				RB15-18-SURF				RB15-18-0010			
		Sample Date:	11/3/2015				11/1/2015				11/2/2015			
		Depth Interval (ft):	1-3				0-0.5				0-1			
	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 (%)	--	--	1.61	0.0161	--	--	1.24	0.0124	--	--	3.24	0.0324	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.004	0.27	0.27	0.001	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.005	0.29	0.29	0.001	0.21	16.94	16.94	0.04	0.13	4.01	4.01	0.009
Acenaphthene	491	33,400	0.01	0.53	0.53	0.00	0.72	58.06	58.06	0.12	0.55	16.98	16.98	0.035
Acenaphthylene	452	24,000	0.003	0.17	0.17	0.0004	0.09	7.34	7.34	0.02	0.26	8.02	8.02	0.018
Anthracene	594	1,300	0.01	0.81	0.81	0.00	0.82	66.13	66.13	0.11	2.20	67.90	67.90	0.11
Benzo[a]anthracene	841	4,153	0.02	1.12	1.12	0.00	1.70	137	137	0.16	4.50	139	139	0.17
Benzo[a]pyrene	965	3,840	0.01	0.81	0.81	0.00	1.60	129	129	0.13	4.10	127	127	0.13
Benzo[b]fluoranthene	979	2,169	0.02	0.93	0.93	0.00	1.30	105	105	0.11	2.80	86.42	86.42	0.09
Benzo[e]pyrene	967	4,300	0.02	0.99	0.99	0.00	1.00	80.65	80.65	0.08	2.60	80.25	80.25	0.08
Benzo[g,h,i]perylene	1,095	648	0.01	0.62	0.62	0.00	0.76	61.29	61.29	0.06	2.20	67.90	67.90	0.06
Benzo[k]fluoranthene	981	1,220	0.01	0.57	0.57	0.00	1.00	80.65	80.65	0.08	2.60	80.25	80.25	0.08
C1-Chrysenes	929	--	0.04	2.24	2.24	0.00	0.74	59.68	59.68	0.06	1.70	52.47	52.47	0.06
C1-Fluoranthenes/pyrene	770	--	0.06	3.73	3.73	0.00	3.00	242	242	0.31	7.00	216	216	0.28
C1-Fluorenes	611	--	0.02	1.37	1.37	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.01	0.45	0.45	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.11	6.83	6.83	0.01	1.60	129	129	0.19	3.10	95.68	95.68	0.14
C2-Chrysenes	1,008	--	0.05	2.86	2.86	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.06	3.91	3.91	--	1.20	96.77	96.77	--	2.50	77.16	77.16	--
C2-Fluorenes	686	--	0.04	2.36	2.36	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.05	3.17	3.17	0.01	1.10	88.71	88.71	0.17	0.48	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.13	8.07	8.07	0.01	0.85	68.55	68.55	0.09	1.90	58.64	58.64	0.08
C3-Chrysenes	1,112	--	0.03	2.05	2.05	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.07	4.10	4.10	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C3-Fluorenes	769	--	0.06	3.42	3.42	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.20	12.42	12.42	0.02	1.10	88.71	88.71	0.15	1.20	37.04	37.04	0.06
C3-Phenanthrenes/Anthracenes	829	--	0.14	8.70	8.70	0.01	0.52	41.94	41.94	0.05	1.00	30.86	30.86	0.04
C4-Chrysenes	1,214	--	0.02	1.06	1.06	0.00	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.26	16.15	16.15	0.02	0.47	37.90	37.90	0.06	0.48	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.10	5.90	5.90	0.01	0.20	0.00	0.00	0.00	0.48	0.00	0.00	0.00
Chrysene	844	826	0.03	2.05	2.05	0.00	1.50	121	121	0.14	3.80	117	117	0.14
Dibenzo(a,h)anthracene	1,123	2,389	0.003	0.20	0.20	0.0002	0.23	18.55	18.55	0.017	0.62	19.14	19.14	0.017
Fluoranthene	707	23,870	0.03	1.68	1.68	0.00	3.30	266	266	0.38	8.50	262	262	0.37
Fluorene	538	26,000	0.01	0.43	0.43	0.00	0.39	31.45	31.45	0.06	0.38	11.73	11.73	0.022
Indeno(1,2,3-cd)pyrene	1,115	--	0.01	0.34	0.34	0.00	0.76	61.29	61.29	0.05	2.00	61.73	61.73	0.06
Naphthalene	385	61,700	0.003	0.21	0.21	0.001	0.48	38.71	38.71	0.10	0.19	5.86	5.86	0.015
Perylene	967	431	0.01	0.60	0.60	0.00	0.20	0.00	0.00	0.00	1.00	30.86	30.86	0.03
Phenanthrene	596	34,300	0.04	2.61	2.61	0.00	2.40	194	194	0.32	2.90	89.51	89.51	0.15
Pyrene	697	9,090	0.04	2.42	2.42	0.00	3.40	274	274	0.39	11.00	340	340	0.49
	---	**ESBTU FCVi**	--	--	--	0.13	--	--	--	3.44	--	--	--	2.73

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-19**				**RB15-19**				**RB15-19**			
		Sample Name:	**RB15-19-SURF**				**RB15-19-0010**				**RB15-19-1030**			
		Sample Date:	**11/2/2015**				**11/3/2015**				**11/3/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**				**1-3**			
	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 (%)	--	--	1.27	0.0127	--	--	2.79	0.0279	--	--	2.62	0.0262	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.01	0.22	0.22	0.00
2-Methylnaphthalene	447	154,800	0.12	9.45	9.45	0.02	0.56	20.07	20.07	0.04	0.01	0.24	0.24	0.00
Acenaphthene	491	33,400	0.39	30.71	30.71	0.06	2.00	71.68	71.68	0.15	0.01	0.35	0.35	0.00
Acenaphthylene	452	24,000	0.21	16.54	16.54	0.04	0.41	14.70	14.70	0.03	0.00	0.10	0.10	0.00
Anthracene	594	1,300	0.67	52.76	52.76	0.09	3.40	122	122	0.21	0.01	0.50	0.50	0.00
Benzo[a]anthracene	841	4,153	3.40	268	268	0.32	9.10	326	326	0.39	0.03	0.99	0.99	0.00
Benzo[a]pyrene	965	3,840	3.00	236	236	0.24	6.70	240	240	0.25	0.02	0.80	0.80	0.00
Benzo[b]fluoranthene	979	2,169	1.90	150	150	0.15	5.70	204	204	0.21	0.02	0.84	0.84	0.00
Benzo[e]pyrene	967	4,300	2.00	157	157	0.16	4.50	161	161	0.17	0.02	0.73	0.73	0.00
Benzo[g,h,i]perylene	1,095	648	1.60	126	126	0.12	3.40	122	122	0.11	0.02	0.76	0.76	0.00
Benzo[k]fluoranthene	981	1,220	1.90	150	150	0.15	5.20	186	186	0.19	0.02	0.57	0.57	0.00
C1-Chrysenes	929	--	1.60	126	126	0.14	4.30	154	154	0.17	0.03	1.11	1.11	0.00
C1-Fluoranthenes/pyrene	770	--	6.30	496	496	0.64	13.00	466	466	0.61	0.05	2.06	2.06	0.00
C1-Fluorenes	611	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.01	0.38	0.38	0.00
C1-Naphthalenes	444	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.01	0.29	0.29	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.70	134	134	0.20	5.20	186	186	0.28	0.06	2.10	2.10	0.00
C2-Chrysenes	1,008	--	0.72	56.69	56.69	0.06	1.05	0.00	0.00	0.00	0.02	0.84	0.84	0.00
C2-Fluoranthenes/Pyrene	--	--	2.30	181	181	--	6.00	215	215	--	0.05	2.06	2.06	--
C2-Fluorenes	686	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.02	0.65	0.65	0.00
C2-Naphthalenes	510	--	0.61	48.03	48.03	0.09	2.30	82.44	82.44	0.16	0.03	1.11	1.11	0.00
C2-Phenanthrenes/Anthracenes	746	--	1.30	102	102	0.14	2.80	100	100	0.13	0.07	2.79	2.79	0.00
C3-Chrysenes	1,112	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.02	0.80	0.80	0.00
C3-Fluoranthenes/Pyrene	949	--	0.64	50.39	50.39	0.05	1.05	0.00	0.00	0.00	0.04	1.41	1.41	0.00
C3-Fluorenes	769	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.03	1.03	1.03	0.00
C3-Naphthalenes	581	--	0.59	46.46	46.46	0.08	2.40	86.02	86.02	0.15	0.08	3.21	3.21	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.76	59.84	59.84	0.07	1.05	0.00	0.00	0.00	0.08	3.17	3.17	0.00
C4-Chrysenes	1,214	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.02	0.73	0.73	0.00
C4-Naphthalenes	657	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.10	3.82	3.82	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.06	2.40	2.40	0.00
Chrysene	844	826	2.90	228	228	0.27	7.60	272	272	0.32	0.03	1.26	1.26	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.41	32.28	32.28	0.03	1.30	46.59	46.59	0.04	0.00	0.15	0.15	0.00
Fluoranthene	707	23,870	4.30	339	339	0.48	17.00	609	609	0.86	0.04	1.60	1.60	0.00
Fluorene	538	26,000	0.33	25.98	25.98	0.05	2.20	78.85	78.85	0.15	0.01	0.38	0.38	0.00
Indeno(1,2,3-cd)pyrene	1,115	--	1.40	110	110	0.10	3.70	133	133	0.12	0.01	0.37	0.37	0.00
Naphthalene	385	61,700	0.16	12.60	12.60	0.03	1.20	43.01	43.01	0.11	0.01	0.35	0.35	0.00
Perylene	967	431	0.60	47.24	47.24	0.05	1.05	0.00	0.00	0.00	0.01	0.46	0.46	0.00
Phenanthrene	596	34,300	1.70	134	134	0.22	11.00	394	394	0.66	0.03	1.07	1.07	0.00
Pyrene	697	9,090	6.20	488	488	0.70	18.00	645	645	0.93	0.04	1.60	1.60	0.00
	---	**ESBTU FCVi**	--	--	--	4.74	--	--	--	6.38	--	--	--	0.05

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-20**				**RB15-20**				**RB15-20**			
		Sample Name:	**RB15-20-SURF**				**RB15-20-0010**				**RB15-20-1020**			
		Sample Date:	**11/4/2015**				**11/5/2015**				**11/5/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**				**1-2**			
	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 (%)	--	--	5.18	0.0518	--	--	7.72	0.0772	--	--	12.3	0.123	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.50	9.65	9.65	0.02	3.50	45.34	45.34	0.10	7.10	57.72	57.72	0.13
2-Methylnaphthalene	447	154,800	0.35	6.76	6.76	0.02	2.80	36.27	36.27	0.08	5.50	44.72	44.72	0.10
Acenaphthene	491	33,400	0.41	7.92	7.92	0.02	1.30	16.84	16.84	0.03	2.30	18.70	18.70	0.04
Acenaphthylene	452	24,000	0.27	5.21	5.21	0.01	0.50	6.48	6.48	0.01	1.10	8.94	8.94	0.02
Anthracene	594	1,300	1.00	19.31	19.31	0.03	2.10	27.20	27.20	0.05	3.50	28.46	28.46	0.05
Benzo[a]anthracene	841	4,153	2.60	50.19	50.19	0.06	4.70	60.88	60.88	0.07	6.50	52.85	52.85	0.06
Benzo[a]pyrene	965	3,840	2.50	48.26	48.26	0.05	3.20	41.45	41.45	0.04	4.70	38.21	38.21	0.04
Benzo[b]fluoranthene	979	2,169	2.00	38.61	38.61	0.04	3.30	42.75	42.75	0.04	4.30	34.96	34.96	0.04
Benzo[e]pyrene	967	4,300	1.80	34.75	34.75	0.04	3.00	38.86	38.86	0.04	4.20	34.15	34.15	0.04
Benzo[g,h,i]perylene	1,095	648	1.30	25.10	25.10	0.02	1.70	22.02	22.02	0.02	2.40	19.51	19.51	0.02
Benzo[k]fluoranthene	981	1,220	1.90	36.68	36.68	0.04	2.70	34.97	34.97	0.04	3.60	29.27	29.27	0.03
C1-Chrysenes	929	--	2.20	42.47	42.47	0.05	6.40	82.90	82.90	0.09	9.10	73.98	73.98	0.08
C1-Fluoranthenes/pyrene	770	--	5.50	106	106	0.14	11.00	142	142	0.19	19.00	154	154	0.20
C1-Fluorenes	611	--	0.21	0.00	0.00	0.00	1.70	22.02	22.02	0.04	2.80	22.76	22.76	0.04
C1-Naphthalenes	444	--	0.57	11.00	11.00	0.02	3.90	50.52	50.52	0.11	7.90	64.23	64.23	0.14
C1-Phenanthrenes/Anthracenes	670	--	3.10	59.85	59.85	0.09	12.00	155	155	0.23	21.00	171	171	0.25
C2-Chrysenes	1,008	--	1.90	36.68	36.68	0.04	8.10	105	105	0.10	7.80	63.41	63.41	0.06
C2-Fluoranthenes/Pyrene	--	--	4.10	79.15	79.15	--	11.00	142	142	--	17.00	138	138	--
C2-Fluorenes	686	--	0.68	13.13	13.13	0.02	3.50	45.34	45.34	0.07	5.40	43.90	43.90	0.06
C2-Naphthalenes	510	--	2.80	54.05	54.05	0.11	19.00	246	246	0.48	36.00	293	293	0.57
C2-Phenanthrenes/Anthracenes	746	--	3.60	69.50	69.50	0.09	18.00	233	233	0.31	27.00	220	220	0.29
C3-Chrysenes	1,112	--	1.20	23.17	23.17	0.02	5.30	68.65	68.65	0.06	6.60	53.66	53.66	0.05
C3-Fluoranthenes/Pyrene	949	--	2.30	44.40	44.40	0.05	10.00	130	130	0.14	15.00	122	122	0.13
C3-Fluorenes	769	--	1.10	21.24	21.24	0.03	5.20	67.36	67.36	0.09	7.60	61.79	61.79	0.08
C3-Naphthalenes	581	--	3.10	59.85	59.85	0.10	21.00	272	272	0.47	35.00	285	285	0.49
C3-Phenanthrenes/Anthracenes	829	--	4.90	94.59	94.59	0.11	22.00	285	285	0.34	35.00	285	285	0.34
C4-Chrysenes	1,214	--	0.43	8.30	8.30	0.01	2.40	31.09	31.09	0.03	3.40	27.64	27.64	0.02
C4-Naphthalenes	657	--	2.00	38.61	38.61	0.06	10.00	130	130	0.20	16.00	130	130	0.20
C4-Phenanthrenes/Anthracenes	913	--	3.40	65.64	65.64	0.07	17.00	220	220	0.24	26.00	211	211	0.23
Chrysene	844	826	2.80	54.05	54.05	0.06	6.00	77.72	77.72	0.09	7.90	64.23	64.23	0.08
Dibenzo(a,h)anthracene	1,123	2,389	0.49	9.46	9.46	0.01	0.69	8.94	8.94	0.01	0.87	7.07	7.07	0.01
Fluoranthene	707	23,870	4.20	81.08	81.08	0.11	7.60	98.45	98.45	0.14	11.00	89.43	89.43	0.13
Fluorene	538	26,000	0.41	7.92	7.92	0.01	1.50	19.43	19.43	0.04	2.30	18.70	18.70	0.03
Indeno(1,2,3-cd)pyrene	1,115	--	1.30	25.10	25.10	0.02	1.70	22.02	22.02	0.02	2.30	18.70	18.70	0.02
Naphthalene	385	61,700	0.11	0.00	0.00	0.00	0.83	10.75	10.75	0.03	1.80	14.63	14.63	0.04
Perylene	967	431	0.59	11.39	11.39	0.01	0.80	10.36	10.36	0.01	0.60	0.00	0.00	0.00
Phenanthrene	596	34,300	2.50	48.26	48.26	0.08	8.20	106	106	0.18	13.00	106	106	0.18
Pyrene	697	9,090	4.70	90.73	90.73	0.13	8.60	111	111	0.16	14.00	114	114	0.16
	---	**ESBTU FCVi**	--	--	--	1.71	--	--	--	4.05	--	--	--	4.08

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-20**				**RB15-21**				**RB15-21**			
		Sample Name:	**RB15-20-2040**				**RB15-21-SURF**				**RB15-21-0010**			
		Sample Date:	**11/5/2015**				**11/4/2015**				**11/5/2015**			
		Depth Interval (ft):	**2-4**				**0-0.5**				**0-1**			
	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**
Total Organic Carbon (%)	--	--	1.82	0.0182	--	--	1.1	0.011	--	--	2.29	0.0229	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.60	32.97	32.97	0.07	0.09	0.00	0.00	0.00	0.14	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.42	23.08	23.08	0.05	0.07	6.73	6.73	0.02	0.04	0.00	0.00	0.00
Acenaphthene	491	33,400	0.34	18.68	18.68	0.04	0.18	16.36	16.36	0.03	0.200	8.73	8.73	0.02
Acenaphthylene	452	24,000	0.10	5.27	5.27	0.01	0.05	4.82	4.82	0.01	0.077	3.36	3.36	0.01
Anthracene	594	1,300	0.31	17.03	17.03	0.03	0.38	34.55	34.55	0.06	0.53	23.14	23.14	0.04
Benzo[a]anthracene	841	4,153	0.49	26.92	26.92	0.03	1.00	90.91	90.91	0.11	1.70	74.24	74.24	0.09
Benzo[a]pyrene	965	3,840	0.36	19.78	19.78	0.02	0.77	70.00	70.00	0.07	1.40	61.14	61.14	0.06
Benzo[b]fluoranthene	979	2,169	0.29	15.93	15.93	0.02	0.72	65.45	65.45	0.07	1.20	52.40	52.40	0.05
Benzo[e]pyrene	967	4,300	0.28	15.38	15.38	0.02	0.57	51.82	51.82	0.05	1.10	48.03	48.03	0.05
Benzo[g,h,i]perylene	1,095	648	0.20	10.99	10.99	0.01	0.41	37.27	37.27	0.03	0.84	36.68	36.68	0.03
Benzo[k]fluoranthene	981	1,220	0.27	14.84	14.84	0.02	0.66	60.00	60.00	0.06	1.30	56.77	56.77	0.06
C1-Chrysenes	929	--	0.63	34.62	34.62	0.04	0.45	40.91	40.91	0.04	0.83	36.24	36.24	0.04
C1-Fluoranthenes/pyrene	770	--	1.60	87.91	87.91	0.11	1.60	145	145	0.19	2.20	96.07	96.07	0.12
C1-Fluorenes	611	--	0.28	15.38	15.38	0.03	0.09	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.63	34.62	34.62	0.08	0.09	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.60	87.91	87.91	0.13	0.64	58.18	58.18	0.09	0.89	38.86	38.86	0.06
C2-Chrysenes	1,008	--	0.64	35.16	35.16	0.03	0.32	29.09	29.09	0.03	0.70	30.57	30.57	0.03
C2-Fluoranthenes/Pyrene	--	--	1.10	60.44	60.44	--	0.80	72.73	72.73	--	1.30	56.77	56.77	--
C2-Fluorenes	686	--	0.37	20.33	20.33	0.03	0.09	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C2-Naphthalenes	510	--	2.70	148	148	0.29	0.36	32.73	32.73	0.06	0.37	16.16	16.16	0.03
C2-Phenanthrenes/Anthracenes	746	--	1.70	93.41	93.41	0.13	0.43	39.09	39.09	0.05	0.68	29.69	29.69	0.04
C3-Chrysenes	1,112	--	0.34	18.68	18.68	0.02	0.09	0.00	0.00	0.00	0.45	19.65	19.65	0.02
C3-Fluoranthenes/Pyrene	949	--	0.79	43.41	43.41	0.05	0.35	31.82	31.82	0.03	0.79	34.50	34.50	0.04
C3-Fluorenes	769	--	0.45	24.73	24.73	0.03	0.09	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C3-Naphthalenes	581	--	2.70	148	148	0.26	0.38	34.55	34.55	0.06	0.38	16.59	16.59	0.03
C3-Phenanthrenes/Anthracenes	829	--	1.90	104	104	0.13	0.39	35.45	35.45	0.04	0.75	32.75	32.75	0.04
C4-Chrysenes	1,214	--	0.16	8.79	8.79	0.01	0.09	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C4-Naphthalenes	657	--	1.30	71.43	71.43	0.11	0.18	16.36	16.36	0.02	0.14	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	1.30	71.43	71.43	0.08	0.20	18.18	18.18	0.02	0.51	22.27	22.27	0.02
Chrysene	844	826	0.53	29.12	29.12	0.03	0.93	84.55	84.55	0.10	1.60	69.87	69.87	0.08
Dibenzo(a,h)anthracene	1,123	2,389	0.07	4.01	4.01	0.00	0.15	13.64	13.64	0.01	0.280	12.23	12.23	0.01
Fluoranthene	707	23,870	0.91	50.00	50.00	0.07	1.90	173	173	0.24	3.10	135	135	0.19
Fluorene	538	26,000	0.24	13.19	13.19	0.02	0.19	17.27	17.27	0.03	0.25	10.92	10.92	0.02
Indeno(1,2,3-cd)pyrene	1,115	--	0.17	9.34	9.34	0.01	0.42	38.18	38.18	0.03	0.80	34.93	34.93	0.03
Naphthalene	385	61,700	0.18	9.89	9.89	0.03	0.05	0.00	0.00	0.00	0.065	0.00	0.00	0.00
Perylene	967	431	0.08	0.00	0.00	0.00	0.21	19.09	19.09	0.02	0.40	17.47	17.47	0.02
Phenanthrene	596	34,300	1.10	60.44	60.44	0.10	1.10	100	100	0.17	1.90	82.97	82.97	0.14
Pyrene	697	9,090	1.30	71.43	71.43	0.10	2.10	191	191	0.27	3.20	140	140	0.20
	---	**ESBTU FCVi**	--	--	--	2.03	--	--	--	2.03	--	--	--	1.57

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			RB15-21				RB15-22				RB15-22			
Sample Name:			RB15-21-1020				RB15-22-SURF				RB15-22-0010			
Sample Date:			11/5/2015				11/3/2015				11/4/2015			
Depth Interval (ft):			1-2				0-0.5				0-1			
	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
Total Organic Carbon (%)	--	--	8.45	0.0845	--	--	4	0.04	--	--	2.51	0.0251	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.50	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.24	0.00	0.00	0.00	0.09	2.25	2.25	0.01	0.32	12.75	12.75	0.03
Acenaphthene	491	33,400	0.61	7.22	7.22	0.01	0.14	3.50	3.50	0.01	0.540	21.51	21.51	0.04
Acenaphthylene	452	24,000	0.17	2.01	2.01	0.004	0.09	2.33	2.33	0.01	0.190	7.57	7.57	0.02
Anthracene	594	1,300	1.60	18.93	18.93	0.03	0.43	10.75	10.75	0.02	0.98	39.04	39.04	0.07
Benzo[a]anthracene	841	4,153	4.20	49.70	49.70	0.06	1.40	35.00	35.00	0.04	2.90	116	116	0.14
Benzo[a]pyrene	965	3,840	3.30	39.05	39.05	0.04	1.30	32.50	32.50	0.03	2.60	104	104	0.11
Benzo[b]fluoranthene	979	2,169	2.30	27.22	27.22	0.03	1.20	30.00	30.00	0.03	2.20	87.65	87.65	0.09
Benzo[e]pyrene	967	4,300	3.40	40.24	40.24	0.04	0.93	23.25	23.25	0.02	1.90	75.70	75.70	0.08
Benzo[g,h,i]perylene	1,095	648	2.10	24.85	24.85	0.02	0.78	19.50	19.50	0.02	1.30	51.79	51.79	0.05
Benzo[k]fluoranthene	981	1,220	2.20	26.04	26.04	0.03	1.00	25.00	25.00	0.03	2.10	83.67	83.67	0.09
C1-Chrysenes	929	--	6.60	78.11	78.11	0.08	0.74	18.50	18.50	0.02	1.30	51.79	51.79	0.06
C1-Fluoranthenes/pyrene	770	--	15.00	178	178	0.23	1.80	45.00	45.00	0.06	4.30	171	171	0.22
C1-Fluorenes	611	--	0.50	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.50	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	9.60	114	114	0.17	0.67	16.75	16.75	0.03	2.10	83.67	83.67	0.12
C2-Chrysenes	1,008	--	7.10	84.02	84.02	0.08	0.32	8.00	8.00	0.01	0.43	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	15.00	178	178	--	0.94	23.50	23.50	--	1.80	71.71	71.71	--
C2-Fluorenes	686	--	2.30	27.22	27.22	0.04	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
C2-Naphthalenes	510	--	4.80	56.80	56.80	0.11	0.33	8.25	8.25	0.02	1.80	71.71	71.71	0.14
C2-Phenanthrenes/Anthracenes	746	--	12.00	142	142	0.19	0.46	11.50	11.50	0.02	1.70	67.73	67.73	0.09
C3-Chrysenes	1,112	--	5.90	69.82	69.82	0.06	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	11.00	130	130	0.14	0.32	8.00	8.00	0.01	0.43	0.00	0.00	0.00
C3-Fluorenes	769	--	3.10	36.69	36.69	0.05	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
C3-Naphthalenes	581	--	7.80	92.31	92.31	0.16	0.33	8.25	8.25	0.01	3.30	131	131	0.23
C3-Phenanthrenes/Anthracenes	829	--	13.00	154	154	0.19	0.34	8.50	8.50	0.01	1.40	55.78	55.78	0.07
C4-Chrysenes	1,214	--	4.60	54.44	54.44	0.04	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
C4-Naphthalenes	657	--	4.50	53.25	53.25	0.08	0.13	0.00	0.00	0.00	1.40	55.78	55.78	0.08
C4-Phenanthrenes/Anthracenes	913	--	8.70	103	103	0.11	0.13	0.00	0.00	0.00	0.43	0.00	0.00	0.00
Chrysene	844	826	4.90	57.99	57.99	0.07	1.40	35.00	35.00	0.04	2.70	108	108	0.13
Dibenzo(a,h)anthracene	1,123	2,389	0.69	8.17	8.17	0.01	0.28	7.00	7.00	0.01	0.480	19.12	19.12	0.02
Fluoranthene	707	23,870	6.40	75.74	75.74	0.11	2.50	62.50	62.50	0.09	5.40	215	215	0.30
Fluorene	538	26,000	0.74	8.76	8.76	0.02	0.17	4.25	4.25	0.01	0.510	20.32	20.32	0.04
Indeno(1,2,3-cd)pyrene	1,115	--	1.50	17.75	17.75	0.02	0.79	19.75	19.75	0.02	1.30	51.79	51.79	0.05
Naphthalene	385	61,700	0.12	0.00	0.00	0.00	0.11	2.75	2.75	0.01	2.000	79.68	79.68	0.21
Perylene	967	431	0.50	0.00	0.00	0.00	0.33	8.25	8.25	0.01	0.43	0.00	0.00	0.00
Phenanthrene	596	34,300	6.20	73.37	73.37	0.12	1.30	32.50	32.50	0.05	3.70	147	147	0.25
Pyrene	697	9,090	9.50	112	112	0.16	2.40	60.00	60.00	0.09	5.80	231	231	0.33
	---	**ESBTU FCVi**	--	--	--	2.42	--	--	--	0.70	--	--	--	3.00

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-22**				**RB15-22**				**RB15-22**			
		Sample Name:	**RB15-22-1020**				**RB15-22-2030**				**RB15-22-3050**			
		Sample Date:	**11/4/2015**				**11/4/2015**				**11/4/2015**			
		Depth Interval (ft):	**1-2**				**2-3**				**3-5**			
	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 (%)	--	--	5.02	0.0502	--	--	9.52	0.0952	--	--	8.76	0.0876	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.42	0.00	0.00	0.00	1.00	0.00	0.00	0.00	2.50	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.26	5.18	5.18	0.01	0.71	7.46	7.46	0.02	1.40	15.98	15.98	0.04
Acenaphthene	491	33,400	0.62	12.35	12.35	0.03	3.10	32.56	32.56	0.07	6.20	70.78	70.78	0.14
Acenaphthylene	452	24,000	0.45	8.96	8.96	0.02	0.87	9.14	9.14	0.02	1.800	20.55	20.55	0.05
Anthracene	594	1,300	1.80	35.86	35.86	0.06	6.80	71.43	71.43	0.12	13.00	148	148	0.25
Benzo[a]anthracene	841	4,153	5.30	106	106	0.13	11.00	116	116	0.14	28.00	320	320	0.38
Benzo[a]pyrene	965	3,840	5.00	99.60	99.60	0.10	7.40	77.73	77.73	0.08	22.00	251	251	0.26
Benzo[b]fluoranthene	979	2,169	3.70	73.71	73.71	0.08	5.40	56.72	56.72	0.06	13.00	148	148	0.15
Benzo[e]pyrene	967	4,300	3.50	69.72	69.72	0.07	5.50	57.77	57.77	0.06	16.00	183	183	0.19
Benzo[g,h,i]perylene	1,095	648	2.30	45.82	45.82	0.04	3.40	35.71	35.71	0.03	11.00	126	126	0.11
Benzo[k]fluoranthene	981	1,220	3.50	69.72	69.72	0.07	5.10	53.57	53.57	0.05	16.00	183	183	0.19
C1-Chrysenes	929	--	3.20	63.75	63.75	0.07	8.70	91.39	91.39	0.10	20.00	228	228	0.25
C1-Fluoranthenes/pyrene	770	--	10.00	199	199	0.26	23.00	242	242	0.31	61.00	696	696	0.90
C1-Fluorenes	611	--	0.42	0.00	0.00	0.00	2.10	22.06	22.06	0.04	2.50	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.42	0.00	0.00	0.00	1.00	0.00	0.00	0.00	2.50	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	5.80	116	116	0.17	17.00	179	179	0.27	39.00	445	445	0.66
C2-Chrysenes	1,008	--	2.40	47.81	47.81	0.05	3.60	37.82	37.82	0.04	8.20	93.61	93.61	0.09
C2-Fluoranthenes/Pyrene	--	--	5.30	106	106	--	11.00	116	116	--	30.00	342	342	--
C2-Fluorenes	686	--	1.30	25.90	25.90	0.04	2.70	28.36	28.36	0.04	5.00	57.08	57.08	0.08
C2-Naphthalenes	510	--	4.30	85.66	85.66	0.17	12.00	126	126	0.25	19.00	217	217	0.43
C2-Phenanthrenes/Anthracenes	746	--	6.70	133	133	0.18	13.00	137	137	0.18	28.00	320	320	0.43
C3-Chrysenes	1,112	--	1.50	29.88	29.88	0.03	2.10	22.06	22.06	0.020	5.30	60.50	60.50	0.05
C3-Fluoranthenes/Pyrene	949	--	3.00	59.76	59.76	0.06	5.30	55.67	55.67	0.059	9.90	113	113	0.12
C3-Fluorenes	769	--	1.70	33.86	33.86	0.04	2.80	29.41	29.41	0.038	5.30	60.50	60.50	0.08
C3-Naphthalenes	581	--	8.50	169	169	0.29	12.00	126	126	0.22	22.00	251	251	0.43
C3-Phenanthrenes/Anthracenes	829	--	7.90	157	157	0.19	12.00	126	126	0.15	21.00	240	240	0.29
C4-Chrysenes	1,214	--	0.42	0.00	0.00	0.00	1.00	0.00	0.00	0.000	2.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	4.60	91.63	91.63	0.14	5.70	59.87	59.87	0.09	9.60	110	110	0.17
C4-Phenanthrenes/Anthracenes	913	--	4.60	91.63	91.63	0.10	6.70	70.38	70.38	0.08	11.00	126	126	0.14
Chrysene	844	826	5.00	99.60	99.60	0.12	9.60	101	101	0.12	26.00	297	297	0.35
Dibenzo(a,h)anthracene	1,123	2,389	0.75	14.94	14.94	0.01	1.30	13.66	13.66	0.012	4.30	49.09	49.09	0.04
Fluoranthene	707	23,870	8.60	171	171	0.24	16.00	168	168	0.24	41.00	468	468	0.66
Fluorene	538	26,000	0.69	13.75	13.75	0.03	3.00	31.51	31.51	0.059	5.20	59.36	59.36	0.11
Indeno(1,2,3-cd)pyrene	1,115	--	2.10	41.83	41.83	0.04	3.20	33.61	33.61	0.030	9.40	107	107	0.10
Naphthalene	385	61,700	0.30	0.00	0.00	0.00	0.30	0.00	0.00	0.000	0.800	0.00	0.00	0.00
Perylene	967	431	1.10	21.91	21.91	0.02	1.00	0.00	0.00	0.000	5.00	57.08	57.08	0.06
Phenanthrene	596	34,300	5.90	118	118	0.20	18.00	189	189	0.32	37.00	422	422	0.71
Pyrene	697	9,090	12.00	239	239	0.34	20.00	210	210	0.30	52.00	594	594	0.85
	---	**ESBTU FCVi**	--	--	--	3.30	--	--	--	3.50	--	--	--	8.56

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-23**				**RB15-23**			
		Sample Name:	**RB15-23-SURF**				**RB15-23-0010**			
		Sample Date:	**11/3/2015**				**11/5/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**			
	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**
Total Organic Carbon (%)	--	--	2.6	0.026	--	--	12.2	0.122	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.14	0.00	0.00	0.00	4.20	34.43	34.43	0.08
2-Methylnaphthalene	447	154,800	0.09	3.62	3.62	0.01	0.43	0.00	0.00	0.00
Acenaphthene	491	33,400	0.15	5.77	5.77	0.01	4.80	39.34	39.34	0.08
Acenaphthylene	452	24,000	0.06	2.15	2.15	0.00	1.10	9.02	9.02	0.02
Anthracene	594	1,300	0.42	16.15	16.15	0.03	10.00	81.97	81.97	0.14
Benzo[a]anthracene	841	4,153	1.30	50.00	50.00	0.06	14.00	115	115	0.14
Benzo[a]pyrene	965	3,840	1.10	42.31	42.31	0.04	9.60	78.69	78.69	0.08
Benzo[b]fluoranthene	979	2,169	1.10	42.31	42.31	0.04	5.90	48.36	48.36	0.05
Benzo[e]pyrene	967	4,300	0.88	33.85	33.85	0.04	7.20	59.02	59.02	0.06
Benzo[g,h,i]perylene	1,095	648	0.64	24.62	24.62	0.02	4.60	37.70	37.70	0.03
Benzo[k]fluoranthene	981	1,220	0.92	35.38	35.38	0.04	6.80	55.74	55.74	0.06
C1-Chrysenes	929	--	0.53	20.38	20.38	0.02	12.00	98.36	98.36	0.11
C1-Fluoranthenes/pyrene	770	--	1.40	53.85	53.85	0.07	34.00	279	279	0.36
C1-Fluorenes	611	--	0.14	0.00	0.00	0.00	3.30	27.05	27.05	0.04
C1-Naphthalenes	444	--	0.14	0.00	0.00	0.00	3.10	25.41	25.41	0.06
C1-Phenanthrenes/Anthracenes	670	--	0.46	17.69	17.69	0.03	29.00	238	238	0.35
C2-Chrysenes	1,008	--	0.14	0.00	0.00	0.00	6.10	50.00	50.00	0.05
C2-Fluoranthenes/Pyrene	--	--	0.72	27.69	27.69	--	16.00	131	131	--
C2-Fluorenes	686	--	0.14	0.00	0.00	0.00	3.80	31.15	31.15	0.05
C2-Naphthalenes	510	--	0.27	10.38	10.38	0.02	18.00	148	148	0.29
C2-Phenanthrenes/Anthracenes	746	--	0.31	11.92	11.92	0.02	19.00	156	156	0.21
C3-Chrysenes	1,112	--	0.14	0.00	0.00	0.00	3.50	28.69	28.69	0.03
C3-Fluoranthenes/Pyrene	949	--	0.14	0.00	0.00	0.00	7.70	63.11	63.11	0.07
C3-Fluorenes	769	--	0.14	0.00	0.00	0.00	3.30	27.05	27.05	0.04
C3-Naphthalenes	581	--	0.14	0.00	0.00	0.00	18.00	148	148	0.25
C3-Phenanthrenes/Anthracenes	829	--	0.14	0.00	0.00	0.00	13.00	107	107	0.13
C4-Chrysenes	1,214	--	0.14	0.00	0.00	0.00	1.25	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.14	0.00	0.00	0.00	6.90	56.56	56.56	0.09
C4-Phenanthrenes/Anthracenes	913	--	0.14	0.00	0.00	0.00	7.20	59.02	59.02	0.06
Chrysene	844	826	1.20	46.15	46.15	0.05	12.00	98.36	98.36	0.12
Dibenzo(a,h)anthracene	1,123	2,389	0.23	8.85	8.85	0.01	2.00	16.39	16.39	0.015
Fluoranthene	707	23,870	2.40	92.31	92.31	0.13	21.00	172	172	0.24
Fluorene	538	26,000	0.16	6.15	6.15	0.01	4.50	36.89	36.89	0.069
Indeno(1,2,3-cd)pyrene	1,115	--	0.72	27.69	27.69	0.02	4.00	32.79	32.79	0.03
Naphthalene	385	61,700	0.12	4.62	4.62	0.01	0.33	0.00	0.00	0.00
Perylene	967	431	0.34	13.08	13.08	0.01	1.25	0.00	0.00	0.00
Phenanthrene	596	34,300	1.20	46.15	46.15	0.08	25.00	205	205	0.34
Pyrene	697	9,090	2.30	88.46	88.46	0.13	26.00	213	213	0.31
	---	**ESBTU FCVi**	--	--	--	0.90	--	--	--	3.88

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-23**				**RB15-23**			
		Sample Name:	**RB15-23-1030**				**RB15-23-1030FD**			
		Sample Date:	**11/5/2015**				**11/5/2015**			
		Depth Interval (ft):	**1-3**				**1-3**			
	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**
Total Organic Carbon (%)	--	--	11.3	0.113	--	--	9.42	0.0942	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	12.00	106	106	0.24	13.00	138	138	0.31
2-Methylnaphthalene	447	154,800	14.00	124	124	0.28	15.00	159	159	0.36
Acenaphthene	491	33,400	9.30	82.30	82.30	0.17	9.60	102	102	0.21
Acenaphthylene	452	24,000	1.80	15.93	15.93	0.04	1.90	20.17	20.17	0.04
Anthracene	594	1,300	15.00	133	133	0.22	16.00	170	170	0.29
Benzo[a]anthracene	841	4,153	15.00	133	133	0.16	17.00	180	180	0.21
Benzo[a]pyrene	965	3,840	10.00	88.50	88.50	0.09	12.00	127	127	0.13
Benzo[b]fluoranthene	979	2,169	6.80	60.18	60.18	0.06	7.90	83.86	83.86	0.09
Benzo[e]pyrene	967	4,300	7.90	69.91	69.91	0.07	8.70	92.36	92.36	0.10
Benzo[g,h,i]perylene	1,095	648	5.40	47.79	47.79	0.04	5.40	57.32	57.32	0.05
Benzo[k]fluoranthene	981	1,220	7.00	61.95	61.95	0.06	7.40	78.56	78.56	0.08
C1-Chrysenes	929	--	14.00	124	124	0.13	17.00	180	180	0.19
C1-Fluoranthenes/pyrene	770	--	43.00	381	381	0.49	48.00	510	510	0.66
C1-Fluorenes	611	--	5.10	45.13	45.13	0.07	5.50	58.39	58.39	0.10
C1-Naphthalenes	444	--	18.00	159	159	0.36	18.00	191	191	0.43
C1-Phenanthrenes/Anthracenes	670	--	42.00	372	372	0.55	44.00	467	467	0.70
C2-Chrysenes	1,008	--	9.60	84.96	84.96	0.08	9.80	104	104	0.10
C2-Fluoranthenes/Pyrene	--	--	22.00	195	195	--	26.00	276	276	--
C2-Fluorenes	686	--	6.50	57.52	57.52	0.08	7.40	78.56	78.56	0.11
C2-Naphthalenes	510	--	42.00	372	372	0.73	45.00	478	478	0.94
C2-Phenanthrenes/Anthracenes	746	--	33.00	292	292	0.39	36.00	382	382	0.51
C3-Chrysenes	1,112	--	4.50	39.82	39.82	0.04	5.20	55.20	55.20	0.05
C3-Fluoranthenes/Pyrene	949	--	13.00	115	115	0.12	14.00	149	149	0.16
C3-Fluorenes	769	--	7.40	65.49	65.49	0.09	8.50	90.23	90.23	0.12
C3-Naphthalenes	581	--	36.00	319	319	0.55	36.00	382	382	0.66
C3-Phenanthrenes/Anthracenes	829	--	31.00	274	274	0.33	36.00	382	382	0.46
C4-Chrysenes	1,214	--	1.50	0.00	0.00	0.00	1.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	15.00	133	133	0.20	18.00	191	191	0.29
C4-Phenanthrenes/Anthracenes	913	--	19.00	168	168	0.18	21.00	223	223	0.24
Chrysene	844	826	15.00	133	133	0.16	16.00	170	170	0.20
Dibenzo(a,h)anthracene	1,123	2,389	2.40	21.24	21.24	0.02	2.30	24.42	24.42	0.02
Fluoranthene	707	23,870	24.00	212	212	0.30	25.00	265	265	0.38
Fluorene	538	26,000	8.10	71.68	71.68	0.13	7.90	83.86	83.86	0.16
Indeno(1,2,3-cd)pyrene	1,115	--	4.70	41.59	41.59	0.04	4.70	49.89	49.89	0.04
Naphthalene	385	61,700	8.10	71.68	71.68	0.19	8.80	93.42	93.42	0.24
Perylene	967	431	1.50	0.00	0.00	0.00	1.50	0.00	0.00	0.00
Phenanthrene	596	34,300	39.00	345	345	0.58	40.00	425	425	0.71
Pyrene	697	9,090	32.00	283	283	0.41	35.00	372	372	0.53
	---	**ESBTU FCVi**	--	--	--	6.98	--	--	--	8.98

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-23**				**RB15-24**			
		Sample Name:	**RB15-23-3050**				**RB15-24-SURF**			
		Sample Date:	**11/5/2015**				**11/4/2015**			
		Depth Interval (ft):	**3-5**				**0-0.5**			
	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**
Total Organic Carbon (%)	--	--	12	0.12	--	--	4.53	0.0453	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	13.00	108	108	0.24	0.06	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	15.00	125	125	0.28	0.05	1.04	1.04	0.002
Acenaphthene	491	33,400	9.70	80.83	80.83	0.165	0.08	1.70	1.70	0.003
Acenaphthylene	452	24,000	3.10	25.83	25.83	0.057	0.05	1.02	1.02	0.002
Anthracene	594	1,300	21.00	175	175	0.29	0.19	4.19	4.19	0.01
Benzo[a]anthracene	841	4,153	30.00	250	250	0.30	0.65	14.35	14.35	0.02
Benzo[a]pyrene	965	3,840	20.00	167	167	0.17	0.64	14.13	14.13	0.01
Benzo[b]fluoranthene	979	2,169	14.00	117	117	0.12	0.58	12.80	12.80	0.01
Benzo[e]pyrene	967	4,300	15.00	125	125	0.13	0.51	11.26	11.26	0.01
Benzo[g,h,i]perylene	1,095	648	10.00	83.33	83.33	0.08	0.41	9.05	9.05	0.01
Benzo[k]fluoranthene	981	1,220	15.00	125	125	0.13	0.59	13.02	13.02	0.01
C1-Chrysenes	929	--	23.00	192	192	0.21	0.33	7.28	7.28	0.01
C1-Fluoranthenes/pyrene	770	--	75.00	625	625	0.81	0.95	20.97	20.97	0.03
C1-Fluorenes	611	--	6.50	54.17	54.17	0.09	0.06	0.00	0.00	0.00
C1-Naphthalenes	444	--	18.00	150	150	0.34	0.06	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	62.00	517	517	0.77	0.36	7.95	7.95	0.01
C2-Chrysenes	1,008	--	15.00	125	125	0.12	0.20	4.42	4.42	0.004
C2-Fluoranthenes/Pyrene	--	--	37.00	308	308	--	0.48	10.60	10.60	--
C2-Fluorenes	686	--	9.00	75.00	75.00	0.11	0.06	0.00	0.00	0.00
C2-Naphthalenes	510	--	48.00	400	400	0.78	0.21	4.64	4.64	0.01
C2-Phenanthrenes/Anthracenes	746	--	47.00	392	392	0.53	0.32	7.06	7.06	0.01
C3-Chrysenes	1,112	--	6.60	55.00	55.00	0.05	0.06	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	16.00	133	133	0.14	0.26	5.74	5.74	0.01
C3-Fluorenes	769	--	10.00	83.33	83.33	0.11	0.06	0.00	0.00	0.00
C3-Naphthalenes	581	--	39.00	325	325	0.56	0.28	6.18	6.18	0.01
C3-Phenanthrenes/Anthracenes	829	--	39.00	325	325	0.39	0.32	7.06	7.06	0.01
C4-Chrysenes	1,214	--	3.10	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Naphthalenes	657	--	20.00	167	167	0.25	0.18	3.97	3.97	0.01
C4-Phenanthrenes/Anthracenes	913	--	22.00	183	183	0.20	0.21	4.64	4.64	0.01
Chrysene	844	826	27.00	225	225	0.27	0.71	15.67	15.67	0.02
Dibenzo(a,h)anthracene	1,123	2,389	4.40	36.67	36.67	0.03	0.14	3.09	3.09	0.003
Fluoranthene	707	23,870	41.00	342	342	0.48	1.20	26.49	26.49	0.04
Fluorene	538	26,000	7.70	64.17	64.17	0.12	0.09	1.92	1.92	0.004
Indeno(1,2,3-cd)pyrene	1,115	--	9.10	75.83	75.83	0.07	0.40	8.83	8.83	0.01
Naphthalene	385	61,700	7.90	65.83	65.83	0.17	0.03	0.00	0.00	0.00
Perylene	967	431	3.10	0.00	0.00	0.00	0.19	4.19	4.19	0.004
Phenanthrene	596	34,300	49.00	408	408	0.69	0.58	12.80	12.80	0.02
Pyrene	697	9,090	53.00	442	442	0.63	1.20	26.49	26.49	0.04
	---	**ESBTU FCVi**	---	---	---	9.14	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-24**				**RB15-24**			
		Sample Name:	**RB15-24-0010**				**RB15-24-1020**			
		Sample Date:	**11/5/2015**				**11/5/2015**			
		Depth Interval (ft):	**0-1**				**1-2**			
	Coc, PAHi, FCVi[a]	**Coc, PAHi, Maxi[a]**	**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**
Total Organic Carbon (%)	--	--	8.85	0.0885	--	--	16.7	0.167	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--								
1-Methylnaphthalene	446	165,700	0.30	0.00	0.00	0.00	7.40	44.31	44.31	0.10
2-Methylnaphthalene	447	154,800	0.16	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Acenaphthene	491	33,400	1.00	11.30	11.30	0.02	13.00	77.84	77.84	0.16
Acenaphthylene	452	24,000	0.36	4.07	4.07	0.01	1.50	8.98	8.98	0.02
Anthracene	594	1,300	1.40	15.82	15.82	0.03	13.00	77.84	77.84	0.13
Benzo[a]anthracene	841	4,153	4.20	47.46	47.46	0.06	15.00	89.82	89.82	0.11
Benzo[a]pyrene	965	3,840	3.80	42.94	42.94	0.04	12.00	71.86	71.86	0.07
Benzo[b]fluoranthene	979	2,169	2.50	28.25	28.25	0.03	6.90	41.32	41.32	0.04
Benzo[e]pyrene	967	4,300	2.60	29.38	29.38	0.03	8.00	47.90	47.90	0.05
Benzo[g,h,i]perylene	1,095	648	2.00	22.60	22.60	0.02	6.60	39.52	39.52	0.04
Benzo[k]fluoranthene	981	1,220	2.90	32.77	32.77	0.03	8.60	51.50	51.50	0.05
C1-Chrysenes	929	--	2.10	23.73	23.73	0.03	9.40	56.29	56.29	0.06
C1-Fluoranthenes/pyrene	770	--	7.60	85.88	85.88	0.11	39.00	234	234	0.30
C1-Fluorenes	611	--	0.30	0.00	0.00	0.00	4.30	25.75	25.75	0.04
C1-Naphthalenes	444	--	0.30	0.00	0.00	0.00	5.60	33.53	33.53	0.08
C1-Phenanthrenes/Anthracenes	670	--	3.60	40.68	40.68	0.06	29.00	174	174	0.26
C2-Chrysenes	1,008	--	1.20	13.56	13.56	0.01	6.20	37.13	37.13	0.04
C2-Fluoranthenes/Pyrene	--	--	3.20	36.16	36.16	--	16.00	95.81	95.81	--
C2-Fluorenes	686	--	0.30	0.00	0.00	0.00	4.40	26.35	26.35	0.04
C2-Naphthalenes	510	--	2.00	22.60	22.60	0.04	33.00	198	198	0.39
C2-Phenanthrenes/Anthracenes	746	--	2.70	30.51	30.51	0.04	20.00	120	120	0.16
C3-Chrysenes	1,112	--	0.30	0.00	0.00	0.00	1.50	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	1.30	14.69	14.69	0.02	7.30	43.71	43.71	0.05
C3-Fluorenes	769	--	0.30	0.00	0.00	0.00	3.70	22.16	22.16	0.03
C3-Naphthalenes	581	--	2.30	25.99	25.99	0.04	25.00	150	150	0.26
C3-Phenanthrenes/Anthracenes	829	--	2.50	28.25	28.25	0.03	18.00	108	108	0.13
C4-Chrysenes	1,214	--	0.30	0.00	0.00	0.00	1.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	1.10	12.43	12.43	0.02	9.40	56.29	56.29	0.09
C4-Phenanthrenes/Anthracenes	913	--	1.50	16.95	16.95	0.02	11.00	65.87	65.87	0.07
Chrysene	844	826	3.90	44.07	44.07	0.05	14.00	83.83	83.83	0.10
Dibenzo(a,h)anthracene	1,123	2,389	0.61	6.89	6.89	0.01	2.10	12.57	12.57	0.01
Fluoranthene	707	23,870	6.60	74.58	74.58	0.11	25.00	150	150	0.21
Fluorene	538	26,000	0.87	9.83	9.83	0.02	8.20	49.10	49.10	0.09
Indeno(1,2,3-cd)pyrene	1,115	--	1.80	20.34	20.34	0.02	5.70	34.13	34.13	0.03
Naphthalene	385	61,700	0.23	0.00	0.00	0.00	0.95	0.00	0.00	0.00
Perylene	967	431	0.86	9.72	9.72	0.01	1.50	0.00	0.00	0.00
Phenanthrene	596	34,300	4.80	54.24	54.24	0.09	35.00	210	210	0.35
Pyrene	697	9,090	8.90	101	101	0.14	39.00	234	234	0.34
	---	**ESBTU FCVi**	--	--	--	1.15	--	--	--	3.72

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-24**				**RB15-24**				**RB15-24**			
Sample Name:			**RB15-24-2040**				**RB15-24-2040FD**				**RB15-24-4050**			
Sample Date:			**11/5/2015**				**11/5/2015**				**11/5/2015**			
Depth Interval (ft):			**2-4**				**2-4**				**4-5**			
	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 (%)	--	--	12.1	0.121	--	--	12.3	0.123	--	--	9.06	0.0906	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	40.00	331	331	0.74	37.00	301	301	0.67	28.00	309	309	0.69
2-Methylnaphthalene	447	154,800	29.00	240	240	0.54	29.00	236	236	0.53	35.00	386	386	0.86
Acenaphthene	491	33,400	31.00	256	256	0.52	28.00	228	228	0.46	23.00	254	254	0.52
Acenaphthylene	452	24,000	2.60	21.49	21.49	0.05	2.30	18.70	18.70	0.04	2.10	23.18	23.18	0.05
Anthracene	594	1,300	33.00	273	273	0.46	30.00	244	244	0.41	31.00	342	342	0.58
Benzo[a]anthracene	841	4,153	26.00	215	215	0.26	24.00	195	195	0.23	26.00	287	287	0.34
Benzo[a]pyrene	965	3,840	19.00	157	157	0.16	16.00	130	130	0.13	18.00	199	199	0.21
Benzo[b]fluoranthene	979	2,169	12.00	99.17	99.17	0.10	9.50	77.24	77.24	0.08	10.00	110	110	0.11
Benzo[e]pyrene	967	4,300	12.00	99.17	99.17	0.10	11.00	89.43	89.43	0.09	12.00	132	132	0.14
Benzo[g,h,i]perylene	1,095	648	8.60	71.07	71.07	0.06	7.60	61.79	61.79	0.06	4.30	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	12.00	99.17	99.17	0.10	11.00	89.43	89.43	0.09	14.00	155	155	0.16
C1-Chrysenes	929	--	20.00	165	165	0.18	18.00	146	146	0.16	17.00	188	188	0.20
C1-Fluoranthenes/pyrene	770	--	76.00	628	628	0.82	64.00	520	520	0.68	61.00	673	673	0.87
C1-Fluorenes	611	--	11.00	90.91	90.91	0.15	12.00	97.56	97.56	0.16	5.50	0.00	0.00	0.00
C1-Naphthalenes	444	--	44.00	364	364	0.82	41.00	333	333	0.75	40.00	442	442	0.99
C1-Phenanthrenes/Anthracenes	670	--	66.00	545	545	0.81	65.00	528	528	0.79	55.00	607	607	0.91
C2-Chrysenes	1,008	--	10.00	82.64	82.64	0.08	8.90	72.36	72.36	0.07	5.50	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	31.00	256	256	--	28.00	228	228	--	23.00	254	254	--
C2-Fluorenes	686	--	9.80	80.99	80.99	0.12	8.50	69.11	69.11	0.10	5.50	0.00	0.00	0.00
C2-Naphthalenes	510	--	110	909	909	1.78	99.00	805	805	1.58	71.00	784	784	1.54
C2-Phenanthrenes/Anthracenes	746	--	39.00	322	322	0.43	41.00	333	333	0.45	30.00	331	331	0.44
C3-Chrysenes	1,112	--	7.00	57.85	57.85	0.05	6.10	49.59	49.59	0.04	5.50	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	14.00	116	116	0.12	12.00	97.56	97.56	0.10	5.50	0.00	0.00	0.00
C3-Fluorenes	769	--	8.00	66.12	66.12	0.09	7.60	61.79	61.79	0.08	5.50	0.00	0.00	0.00
C3-Naphthalenes	581	--	65.00	537	537	0.92	59.00	480	480	0.83	43.00	475	475	0.82
C3-Phenanthrenes/Anthracenes	829	--	35.00	289	289	0.35	29.00	236	236	0.28	21.00	232	232	0.28
C4-Chrysenes	1,214	--	3.00	0.00	0.00	0.00	2.90	0.00	0.00	0.00	5.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	18.00	149	149	0.23	18.00	146	146	0.22	12.00	132	132	0.20
C4-Phenanthrenes/Anthracenes	913	--	22.00	182	182	0.20	18.00	146	146	0.16	5.50	0.00	0.00	0.00
Chrysene	844	826	23.00	190	190	0.23	21.00	171	171	0.20	23.00	254	254	0.30
Dibenzo(a,h)anthracene	1,123	2,389	2.90	23.97	23.97	0.02	2.60	21.14	21.14	0.02	2.90	32.01	32.01	0.03
Fluoranthene	707	23,870	44.00	364	364	0.51	44.00	358	358	0.51	47.00	519	519	0.73
Fluorene	538	26,000	22.00	182	182	0.34	20.00	163	163	0.30	20.00	221	221	0.41
Indeno(1,2,3-cd)pyrene	1,115	--	7.50	61.98	61.98	0.06	6.60	53.66	53.66	0.05	7.60	83.89	83.89	0.08
Naphthalene	385	61,700	2.95	0.00	0.00	0.00	2.80	0.00	0.00	0.00	20.00	221	221	0.57
Perylene	967	431	3.00	0.00	0.00	0.00	2.90	0.00	0.00	0.00	5.50	0.00	0.00	0.00
Phenanthrene	596	34,300	83.00	686	686	1.15	77.00	626	626	1.05	78.00	861	861	1.44
Pyrene	697	9,090	70.00	579	579	0.83	58.00	472	472	0.68	62.00	684	684	0.98
	---	**ESBTU FCVi**	--	--	--	11.90	--	--	--	10.68	--	--	--	12.90

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).

ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-24**				**RB15-24**				**RB15-25**			
Sample Name:			**RB15-24-5060**				**RB15-24-6080**				**RB15-25-SURF**			
Sample Date:			**11/5/2015**				**11/5/2015**				**11/4/2015**			
Depth Interval (ft):			**5-6**				**6-8**				**0-0.5**			
	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 (%)	--	--	1.87	0.0187	--	--	1.63	0.0163	--	--	0.721	0.00721	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	1.60	85.56	85.56	0.19	0.08	4.91	4.91	0.01	0.00	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	1.40	74.87	74.87	0.17	0.09	5.34	5.34	0.01	0.00	0.58	0.58	0.001
Acenaphthene	491	33,400	2.10	112	112	0.23	0.09	5.46	5.46	0.01	0.00	0.58	0.58	0.001
Acenaphthylene	452	24,000	0.29	15.51	15.51	0.03	0.01	0.61	0.61	0.001	0.00	0.00	0.00	0.00
Anthracene	594	1,300	3.10	166	166	0.28	0.10	6.13	6.13	0.01	0.00	0.58	0.58	0.00
Benzo[a]anthracene	841	4,153	4.40	235	235	0.28	0.12	7.36	7.36	0.01	0.00	0.58	0.58	0.00
Benzo[a]pyrene	965	3,840	3.50	187	187	0.19	0.09	5.52	5.52	0.01	0.00	0.58	0.58	0.00
Benzo[b]fluoranthene	979	2,169	2.00	107	107	0.11	0.05	3.25	3.25	0.003	0.00	0.58	0.58	0.00
Benzo[e]pyrene	967	4,300	2.10	112	112	0.12	0.06	3.80	3.80	0.004	0.00	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	1.60	85.56	85.56	0.08	0.05	3.31	3.31	0.003	0.00	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	2.60	139	139	0.14	0.06	3.93	3.93	0.004	0.00	0.58	0.58	0.00
C1-Chrysenes	929	--	2.60	139	139	0.15	0.08	4.66	4.66	0.01	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	9.00	481	481	0.63	0.27	16.56	16.56	0.02	0.01	0.97	0.97	0.00
C1-Fluorenes	611	--	0.89	47.59	47.59	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	2.00	107	107	0.24	0.11	6.75	6.75	0.02	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	5.80	310	310	0.46	0.21	12.88	12.88	0.02	0.00	0.58	0.58	0.00
C2-Chrysenes	1,008	--	0.96	51.34	51.34	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	3.60	193	193	--	0.12	7.36	7.36	--	0.01	0.80	0.80	--
C2-Fluorenes	686	--	0.85	45.45	45.45	0.07	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Naphthalenes	510	--	4.60	246	246	0.48	0.22	13.50	13.50	0.03	0.00	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	3.90	209	209	0.28	0.13	7.98	7.98	0.01	0.01	0.85	0.85	0.00
C3-Chrysenes	1,112	--	0.39	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	1.40	74.87	74.87	0.08	0.06	3.44	3.44	0.004	0.00	0.67	0.67	0.00
C3-Fluorenes	769	--	0.39	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	3.30	176	176	0.30	0.15	9.20	9.20	0.02	0.01	0.94	0.94	0.00
C3-Phenanthrenes/Anthracenes	829	--	2.10	112	112	0.14	0.10	6.13	6.13	0.01	0.01	1.37	1.37	0.00
C4-Chrysenes	1,214	--	0.39	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	1.10	58.82	58.82	0.09	0.06	3.37	3.37	0.01	0.01	0.97	0.97	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.86	45.99	45.99	0.05	0.06	3.56	3.56	0.004	0.01	1.01	1.01	0.00
Chrysene	844	826	4.00	214	214	0.25	0.11	6.75	6.75	0.01	0.00	0.58	0.58	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.51	27.27	27.27	0.02	0.01	0.86	0.86	0.001	0.00	0.58	0.58	0.001
Fluoranthene	707	23,870	7.70	412	412	0.58	0.18	11.04	11.04	0.02	0.00	0.00	0.00	0.00
Fluorene	538	26,000	1.50	80.21	80.21	0.15	0.06	3.80	3.80	0.01	0.00	0.58	0.58	0.001
Indeno(1,2,3-cd)pyrene	1,115	--	1.40	74.87	74.87	0.07	0.04	2.39	2.39	0.002	0.00	0.58	0.58	0.00
Naphthalene	385	61,700	1.30	69.52	69.52	0.18	0.08	4.60	4.60	0.01	0.01	0.00	0.00	0.00
Perylene	967	431	0.39	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenanthrene	596	34,300	6.50	348	348	0.58	0.26	15.95	15.95	0.03	0.00	0.00	0.00	0.00
Pyrene	697	9,090	8.30	444	444	0.64	0.28	17.18	17.18	0.02	0.00	0.00	0.00	0.00
	---	**ESBTU FCVi**	--	--	--	6.97	--	--	--	0.28	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-25**				**RB15-26**				**RB15-26**			
Sample Name:			**RB15-25-0010**				**RB15-26-SURF**				**RB15-26-0010**			
Sample Date:			**11/5/2015**				**11/3/2015**				**11/4/2015**			
Depth Interval (ft):			**0-1**				**0-0.5**				**0-1**			
	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**
Total Organic Carbon (%)	--	--	0.629	0.00629	--	--	0.653	0.00653	--	--	1.53	0.0153	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.00	0.00	0.00	0.00	0.03	4.90	4.90	0.01	0.02	1.05	1.05	0.002
Acenaphthene	491	33,400	0.01	0.87	0.87	0.002	0.05	7.20	7.20	0.01	0.01	0.52	0.52	0.001
Acenaphthylene	452	24,000	0.00	0.15	0.15	0.00	0.03	3.98	3.98	0.01	0.00	0.11	0.11	0.00
Anthracene	594	1,300	0.01	0.83	0.83	0.001	0.11	16.85	16.85	0.03	0.01	0.52	0.52	0.001
Benzo[a]anthracene	841	4,153	0.01	1.07	1.07	0.001	0.23	35.22	35.22	0.04	0.01	0.72	0.72	0.001
Benzo[a]pyrene	965	3,840	0.00	0.67	0.67	0.001	0.20	30.63	30.63	0.03	0.01	0.56	0.56	0.001
Benzo[b]fluoranthene	979	2,169	0.00	0.76	0.76	0.001	0.12	18.38	18.38	0.02	0.01	0.53	0.53	0.001
Benzo[e]pyrene	967	4,300	0.00	0.67	0.67	0.001	0.13	19.91	19.91	0.02	0.01	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.00	0.00	0.00	0.08	12.86	12.86	0.01	0.01	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.01	0.81	0.81	0.001	0.12	18.38	18.38	0.02	0.01	0.38	0.38	0.00
C1-Chrysenes	929	--	0.01	0.89	0.89	0.001	0.17	26.03	26.03	0.03	0.01	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.02	2.54	2.54	0.003	0.53	81.16	81.16	0.11	0.03	1.83	1.83	0.002
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.05	7.66	7.66	0.01	0.01	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.00	0.67	0.67	0.002	0.02	0.00	0.00	0.00	0.02	1.11	1.11	0.003
C1-Phenanthrenes/Anthracenes	670	--	0.01	2.07	2.07	0.003	0.24	36.75	36.75	0.05	0.02	1.11	1.11	0.002
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.07	10.41	10.41	0.01	0.01	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.01	1.59	1.59	--	0.22	33.69	33.69	--	0.02	1.50	1.50	--
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.02	2.54	2.54	0.005	0.12	18.38	18.38	0.04	0.02	1.37	1.37	0.003
C2-Phenanthrenes/Anthracenes	746	--	0.01	1.91	1.91	0.003	0.17	26.03	26.03	0.03	0.02	1.31	1.31	0.002
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.01	1.22	1.22	0.001	0.07	9.95	9.95	0.01	0.02	1.18	1.18	0.001
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.02	2.70	2.70	0.005	0.13	19.91	19.91	0.03	0.02	1.44	1.44	0.002
C3-Phenanthrenes/Anthracenes	829	--	0.02	2.38	2.38	0.003	0.11	16.85	16.85	0.02	0.03	1.83	1.83	0.002
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.01	1.75	1.75	0.003	0.05	7.50	7.50	0.01	0.02	1.31	1.31	0.002
C4-Phenanthrenes/Anthracenes	913	--	0.01	1.59	1.59	0.002	0.05	7.66	7.66	0.01	0.02	1.37	1.37	0.002
Chrysene	844	826	0.01	1.38	1.38	0.002	0.20	30.63	30.63	0.04	0.01	0.92	0.92	0.001
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.15	0.15	0.00	0.03	4.90	4.90	0.004	0.00	0.13	0.13	0.00
Fluoranthene	707	23,870	0.02	2.54	2.54	0.004	0.34	52.07	52.07	0.07	0.02	1.31	1.31	0.002
Fluorene	538	26,000	0.00	0.65	0.65	0.001	0.04	5.67	5.67	0.01	0.01	0.53	0.53	0.001
Indeno(1,2,3-cd)pyrene	1,115	--	0.00	0.40	0.40	0.00	0.08	12.86	12.86	0.01	0.00	0.29	0.29	0.00
Naphthalene	385	61,700	0.00	0.00	0.00	0.00	0.05	7.96	7.96	0.02	0.13	8.50	8.50	0.02
Perylene	967	431	0.00	0.00	0.00	0.00	0.04	6.74	6.74	0.01	0.01	0.00	0.00	0.00
Phenanthrene	596	34,300	0.02	2.86	2.86	0.005	0.20	30.63	30.63	0.05	0.03	1.83	1.83	0.003
Pyrene	697	9,090	0.02	2.70	2.70	0.004	0.50	76.57	76.57	0.11	0.02	1.57	1.57	0.002
	---	**ESBTU FCVi**	--	--	--	0.05	--	--	--	0.89	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			RB15-26				RB15-26				RB15-26			
Sample Name:			RB15-26-1030				RB15-26-1030FD				RB15-26-3050			
Sample Date:			11/4/2015				11/4/2015				11/4/2015			
Depth Interval (ft):			1-3				1-3				3-5			
	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
Total Organic Carbon (%)	--	--	1.55	0.0155	--	--	1.93	0.0193	--	--	1.16	0.0116	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.004	0.26	0.26	0.001	0.00	0.21	0.21	0.0005	0.003	0.25	0.25	0.00
Acenaphthene	491	33,400	0.004	0.26	0.26	0.001	0.00	0.21	0.21	0.0004	0.002	0.15	0.15	0.00
Acenaphthylene	452	24,000	0.004	0.26	0.26	0.001	0.00	0.21	0.21	0.0005	0.0003	0.03	0.03	0.00
Anthracene	594	1,300	0.004	0.26	0.26	0.00	0.00	0.21	0.21	0.0003	0.001	0.12	0.12	0.00
Benzo[a]anthracene	841	4,153	0.004	0.26	0.26	0.00	0.01	0.29	0.29	0.0003	0.004	0.34	0.34	0.00
Benzo[a]pyrene	965	3,840	0.004	0.26	0.26	0.00	0.00	0.21	0.21	0.0002	0.001	0.12	0.12	0.00
Benzo[b]fluoranthene	979	2,169	0.004	0.27	0.27	0.00	0.01	0.27	0.27	0.0003	0.002	0.13	0.13	0.00
Benzo[e]pyrene	967	4,300	0.005	0.30	0.30	0.00	0.01	0.31	0.31	0.0003	0.002	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.21	0.21	0.00
Benzo[k]fluoranthene	981	1,220	0.004	0.26	0.26	0.00	0.00	0.21	0.21	0.0002	0.001	0.08	0.08	0.00
C1-Chrysenes	929	--	0.01	0.59	0.59	0.001	0.01	0.62	0.62	0.001	0.002	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.02	1.03	1.03	0.001	0.02	1.09	1.09	0.001	0.01	0.59	0.59	0.00
C1-Fluorenes	611	--	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.002	0.00	0.00	0.00	0.00	0.24	0.24	0.001	0.002	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.01	0.52	0.52	0.001	0.01	0.57	0.57	0.001	0.004	0.34	0.34	0.00
C2-Chrysenes	1,008	--	0.01	0.71	0.71	0.001	0.01	0.47	0.47	0.0005	0.002	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.02	1.16	1.16	--	0.02	1.14	1.14	--	0.01	0.56	0.56	--
C2-Fluorenes	686	--	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.00	0.00	0.00
C2-Naphthalenes	510	--	0.01	0.43	0.43	0.001	0.01	0.62	0.62	0.001	0.01	0.47	0.47	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.01	0.90	0.90	0.001	0.02	0.88	0.88	0.001	0.01	0.47	0.47	0.00
C3-Chrysenes	1,112	--	0.01	0.46	0.46	0.00	0.01	0.52	0.52	0.0005	0.002	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.02	1.10	1.10	0.001	0.02	0.98	0.98	0.001	0.01	0.55	0.55	0.00
C3-Fluorenes	769	--	0.005	0.32	0.32	0.00	0.01	0.28	0.28	0.0004	0.002	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.01	0.84	0.84	0.001	0.02	0.98	0.98	0.002	0.01	0.50	0.50	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.03	1.61	1.61	0.002	0.03	1.50	1.50	0.002	0.01	0.76	0.76	0.00
C4-Chrysenes	1,214	--	0.005	0.30	0.30	0.00	0.00	0.25	0.25	0.0002	0.002	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.02	1.23	1.23	0.002	0.02	1.14	1.14	0.002	0.01	0.52	0.52	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.02	1.42	1.42	0.002	0.03	1.30	1.30	0.001	0.01	0.67	0.67	0.00
Chrysene	844	826	0.01	0.50	0.50	0.001	0.01	0.52	0.52	0.001	0.003	0.28	0.28	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.004	0.26	0.26	0.00	0.00	0.21	0.21	0.0002	0.0003	0.03	0.03	0.00
Fluoranthene	707	23,870	0.002	0.00	0.00	0.00	0.01	0.44	0.44	0.001	0.004	0.34	0.34	0.00
Fluorene	538	26,000	0.004	0.26	0.26	0.00	0.00	0.21	0.21	0.0004	0.001	0.09	0.09	0.00
Indeno(1,2,3-cd)pyrene	1,115	--	0.004	0.26	0.26	0.00	0.00	0.21	0.21	0.0002	0.004	0.34	0.34	0.00
Naphthalene	385	61,700	0.003	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.47	0.47	0.00
Perylene	967	431	0.01	0.48	0.48	0.00	0.01	0.42	0.42	0.0004	0.002	0.00	0.00	0.00
Phenanthrene	596	34,300	0.002	0.00	0.00	0.00	0.01	0.62	0.62	0.001	0.004	0.37	0.37	0.00
Pyrene	697	9,090	0.003	0.00	0.00	0.00	0.01	0.62	0.62	0.001	0.004	0.38	0.38	0.00
	---	**ESBTU FCVi**	7.10	57.72	57.72	0.13	--	--	--	0.02	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	RB15-27				RB15-27				RB15-27			
		Sample Name:	**RB15-27-SURF**				**RB15-27-0010**				**RB15-27-1030**			
		Sample Date:	**10/26/2015**				**10/28/2015**				**10/28/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**				**1-3**			
	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 (%)	--	--	1.95	0.0195	--	--	18.1	0.181	--	--	12.1	0.121	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	19.00	157	157	0.35
2-Methylnaphthalene	447	154,800	21.00	0.00	0.00	0.00	0.43	2.38	2.38	0.01	27.00	223	223	0.50
Acenaphthene	491	33,400	66.00	3385	3385	6.89	7.70	42.54	42.54	0.09	30.00	248	248	0.50
Acenaphthylene	452	24,000	11.00	564	564	1.25	0.91	5.03	5.03	0.01	1.800	14.88	14.88	0.03
Anthracene	594	1,300	120	6154	1300	2.19	7.70	42.54	42.54	0.07	23.00	190	190	0.32
Benzo[a]anthracene	841	4,153	130	6667	4153	4.94	13.00	71.82	71.82	0.09	23.00	190	190	0.23
Benzo[a]pyrene	965	3,840	100	5128	3840	3.98	11.00	60.77	60.77	0.06	18.00	149	149	0.15
Benzo[b]fluoranthene	979	2,169	85.00	4359	2169	2.22	9.80	54.14	54.14	0.06	13.00	107	107	0.11
Benzo[e]pyrene	967	4,300	63.00	3231	3231	3.34	6.80	37.57	37.57	0.04	11.00	90.91	90.91	0.09
Benzo[g,h,i]perylene	1,095	648	41.00	2103	648	0.59	4.80	26.52	26.52	0.02	7.30	60.33	60.33	0.06
Benzo[k]fluoranthene	981	1,220	96.00	4923	1220	1.24	7.80	43.09	43.09	0.04	12.00	99.17	99.17	0.10
C1-Chrysenes	929	--	21.00	0.00	0.00	0.00	4.10	22.65	22.65	0.02	14.00	116	116	0.12
C1-Fluoranthenes/pyrene	770	--	180	9231	9231	11.99	20.00	110	110	0.14	52.00	430	430	0.56
C1-Fluorenes	611	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	7.00	57.85	57.85	0.09
C1-Naphthalenes	444	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	33.00	273	273	0.61
C1-Phenanthrenes/Anthracenes	670	--	76.00	3897	3897	5.82	8.40	46.41	46.41	0.07	48.00	397	397	0.59
C2-Chrysenes	1,008	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	8.10	66.94	66.94	0.07
C2-Fluoranthenes/Pyrene	--	--	45.00	2308	2308	--	6.30	34.81	34.81	--	22.00	182	182	--
C2-Fluorenes	686	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	3.50	0.00	0.00	0.00
C2-Naphthalenes	510	--	21.00	0.00	0.00	0.00	3.70	20.44	20.44	0.04	65.00	537	537	1.05
C2-Phenanthrenes/Anthracenes	746	--	21.00	0.00	0.00	0.00	4.40	24.31	24.31	0.03	29.00	240	240	0.32
C3-Chrysenes	1,112	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	3.50	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	7.90	65.29	65.29	0.07
C3-Fluorenes	769	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	3.50	0.00	0.00	0.00
C3-Naphthalenes	581	--	21.00	0.00	0.00	0.00	3.40	18.78	18.78	0.03	36.00	298	298	0.51
C3-Phenanthrenes/Anthracenes	829	--	21.00	0.00	0.00	0.00	2.90	16.02	16.02	0.02	20.00	165	165	0.20
C4-Chrysenes	1,214	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	3.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	12.00	99.17	99.17	0.15
C4-Phenanthrenes/Anthracenes	913	--	21.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	9.00	74.38	74.38	0.08
Chrysene	844	826	120	6154	826	0.98	11.00	60.77	60.77	0.07	20.00	165	165	0.20
Dibenzo(a,h)anthracene	1,123	2,389	13.00	667	667	0.59	1.80	9.94	9.94	0.01	2.100	17.36	17.36	0.02
Fluoranthene	707	23,870	330	16923	16923	23.94	27.00	149	149	0.21	48.00	397	397	0.56
Fluorene	538	26,000	72.00	3692	3692	6.86	5.10	28.18	28.18	0.05	22.00	182	182	0.34
Indeno(1,2,3-cd)pyrene	1,115	--	42.00	2154	2154	1.93	4.70	25.97	25.97	0.02	6.60	54.55	54.55	0.05
Naphthalene	385	61,700	21.00	0.00	0.00	0.00	1.90	10.50	10.50	0.03	55.00	455	455	1.18
Perylene	967	431	21.00	0.00	0.00	0.00	2.80	15.47	15.47	0.02	3.50	0.00	0.00	0.00
Phenanthrene	596	34,300	370	18974	18974	31.84	21.00	116	116	0.19	83.00	686	686	1.15
Pyrene	697	9,090	200	10256	9090	13.04	19.00	105	105	0.15	41.00	339	339	0.49
	---	**ESBTU FCVi**	--	--	--	123.63	--	--	--	1.60	--	--	--	10.01

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

Location ID:			**RB15-27**				**RB15-27**				**RB15-27**			
Sample Name:			**RB15-27-3050**				**RB15-27-5065**				**RB15-27-6570**			
Sample Date:			**10/28/2015**				**10/28/2015**				**10/28/2015**			
Depth Interval (ft):			**3-5**				**5-6.5**				**6.5-7**			
	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 (%)	--	--	12.2	0.122	--	--	4.27	0.0427	--	--	1.1	0.011	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	34.00	279	279	0.62	89.00	2084	2084	4.67	1.20	109	109	0.24
2-Methylnaphthalene	447	154,800	51.00	418	418	0.94	150	3513	3513	7.86	1.80	164	164	0.37
Acenaphthene	491	33,400	56.00	459	459	0.93	42.00	984	984	2.00	0.520	47.27	47.27	0.10
Acenaphthylene	452	24,000	2.90	23.77	23.77	0.05	78.00	1827	1827	4.04	1.200	109	109	0.24
Anthracene	594	1,300	57.00	467	467	0.79	140	3279	1300	2.19	1.30	118	118	0.20
Benzo[a]anthracene	841	4,153	43.00	352	352	0.42	91.00	2131	2131	2.53	0.60	54.55	54.55	0.06
Benzo[a]pyrene	965	3,840	34.00	279	279	0.29	59.00	1382	1382	1.43	0.37	33.64	33.64	0.03
Benzo[b]fluoranthene	979	2,169	19.00	156	156	0.16	38.00	890	890	0.91	0.30	27.27	27.27	0.03
Benzo[e]pyrene	967	4,300	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
Benzo[g,h,i]perylene	1,095	648	13.00	107	107	0.10	22.00	515	515	0.47	0.18	16.36	16.36	0.01
Benzo[k]fluoranthene	981	1,220	23.00	189	189	0.19	51.00	1194	1194	1.22	0.32	29.09	29.09	0.03
C1-Chrysenes	929	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	97.00	795	795	1.03	200	4684	4684	6.08	1.40	127	127	0.17
C1-Fluorenes	611	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C1-Naphthalenes	444	--	60.00	492	492	1.11	170	3981	3981	8.97	2.10	191	191	0.43
C1-Phenanthrenes/Anthracenes	670	--	77.00	631	631	0.94	140	3279	3279	4.89	1.20	109	109	0.16
C2-Chrysenes	1,008	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	30.00	246	246	--	72.00	1686	1686	--	0.66	60.00	60.00	--
C2-Fluorenes	686	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C2-Naphthalenes	510	--	97.00	795	795	1.56	200	4684	4684	9.18	3.20	291	291	0.57
C2-Phenanthrenes/Anthracenes	746	--	28.00	230	230	0.31	61.00	1429	1429	1.91	0.32	0.00	0.00	0.00
C3-Chrysenes	1,112	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C3-Fluorenes	769	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C3-Naphthalenes	581	--	40.00	328	328	0.56	99.00	2319	2319	3.99	1.70	155	155	0.27
C3-Phenanthrenes/Anthracenes	829	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C4-Chrysenes	1,214	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C4-Naphthalenes	657	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
Chrysene	844	826	37.00	303	303	0.36	80.00	1874	826	0.98	0.55	50.00	50.00	0.06
Dibenzo(a,h)anthracene	1,123	2,389	3.80	31.15	31.15	0.03	7.80	183	183	0.16	0.054	4.91	4.91	0.004
Fluoranthene	707	23,870	95.00	779	779	1.10	190	4450	4450	6.29	1.20	109	109	0.15
Fluorene	538	26,000	44.00	361	361	0.67	120	2810	2810	5.22	1.300	118	118	0.22
Indeno(1,2,3-cd)pyrene	1,115	--	12.00	98.36	98.36	0.09	22.00	515	515	0.46	0.15	13.64	13.64	0.01
Naphthalene	385	61,700	92.00	754	754	1.96	380	8899	8899	23.12	6.900	627	627	1.63
Perylene	967	431	10.50	0.00	0.00	0.00	25.50	0.00	0.00	0.00	0.32	0.00	0.00	0.00
Phenanthrene	596	34,300	190	1557	1557	2.61	350	8197	8197	13.75	3.20	291	291	0.49
Pyrene	697	9,090	95.00	779	779	1.12	140	3279	3279	4.70	0.88	80.00	80.00	0.11
	---	**ESBTU FCVi**	--	--	--	16.38	--	--	--	104.52	--	--	--	4.99

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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-1 ESBTUs FOR PAHS

		Location ID:	**RB15-28**				**RB15-28**				**RB15-28**			
		Sample Name:	**RB15-28-SURF**				**RB15-28-0010**				**RB15-28-1030**			
		Sample Date:	**10/26/2015**				**10/28/2015**				**10/28/2015**			
		Depth Interval (ft):	**0-0.5**				**0-1**				**1-3**			
	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 (%)	--	--	3.16	0.0316	--	--	4.8	0.048	--	--	2.27	0.0227	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)		--												
1-Methylnaphthalene	446	165,700	1.90	60.13	60.13	0.13	0.70	0.00	0.00	0.00	0.10	4.27	4.27	0.01
2-Methylnaphthalene	447	154,800	0.39	12.34	12.34	0.03	0.32	6.67	6.67	0.01	0.027	1.19	1.19	0.003
Acenaphthene	491	33,400	4.80	152	152	0.31	1.40	29.17	29.17	0.06	0.064	2.82	2.82	0.01
Acenaphthylene	452	24,000	0.46	14.56	14.56	0.03	1.10	22.92	22.92	0.05	0.067	2.95	2.95	0.01
Anthracene	594	1,300	2.30	72.78	72.78	0.12	4.30	89.58	89.58	0.15	0.150	6.61	6.61	0.01
Benzo[a]anthracene	841	4,153	4.40	139	139	0.17	4.10	85.42	85.42	0.10	0.14	6.17	6.17	0.01
Benzo[a]pyrene	965	3,840	4.00	127	127	0.13	3.30	68.75	68.75	0.07	0.110	4.85	4.85	0.01
Benzo[b]fluoranthene	979	2,169	3.70	117	117	0.12	2.60	54.17	54.17	0.06	0.09	3.96	3.96	0.004
Benzo[e]pyrene	967	4,300	2.70	85.44	85.44	0.09	2.10	43.75	43.75	0.05	0.08	3.39	3.39	0.004
Benzo[g,h,i]perylene	1,095	648	2.00	63.29	63.29	0.06	1.50	31.25	31.25	0.03	0.06	2.82	2.82	0.003
Benzo[k]fluoranthene	981	1,220	2.90	91.77	91.77	0.09	2.60	54.17	54.17	0.06	0.068	3.00	3.00	0.003
C1-Chrysenes	929	--	1.80	56.96	56.96	0.06	1.50	31.25	31.25	0.03	0.09	3.74	3.74	0.004
C1-Fluoranthenes/pyrene	770	--	6.90	218	218	0.28	7.10	148	148	0.19	0.34	14.98	14.98	0.02
C1-Fluorenes	611	--	0.39	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.06	2.69	2.69	0.004
C1-Naphthalenes	444	--	1.60	50.63	50.63	0.11	0.70	0.00	0.00	0.00	0.09	3.74	3.74	0.01
C1-Phenanthrenes/Anthracenes	670	--	3.20	101	101	0.15	4.40	91.67	91.67	0.14	0.31	13.66	13.66	0.02
C2-Chrysenes	1,008	--	0.88	27.85	27.85	0.03	0.70	0.00	0.00	0.00	0.06	2.82	2.82	0.003
C2-Fluoranthenes/Pyrene	--	--	2.50	79.11	79.11	--	2.70	56.25	56.25	--	0.18	7.93	7.93	--
C2-Fluorenes	686	--	0.39	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.06	2.47	2.47	0.004
C2-Naphthalenes	510	--	3.30	104	104	0.20	5.30	110	110	0.22	0.42	18.50	18.50	0.04
C2-Phenanthrenes/Anthracenes	746	--	1.70	53.80	53.80	0.07	2.10	43.75	43.75	0.06	0.21	9.25	9.25	0.01
C3-Chrysenes	1,112	--	0.39	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.06	2.47	2.47	0.002
C3-Fluoranthenes/Pyrene	949	--	0.82	25.95	25.95	0.03	0.70	0.00	0.00	0.00	0.10	4.23	4.23	0.004
C3-Fluorenes	769	--	0.39	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.04	1.89	1.89	0.002
C3-Naphthalenes	581	--	2.00	63.29	63.29	0.11	3.70	77.08	77.08	0.13	0.51	22.47	22.47	0.04
C3-Phenanthrenes/Anthracenes	829	--	1.10	34.81	34.81	0.04	1.40	29.17	29.17	0.04	0.19	8.37	8.37	0.01
C4-Chrysenes	1,214	--	0.39	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.02	0.00	0.00	0.000
C4-Naphthalenes	657	--	0.39	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.32	14.10	14.10	0.02
C4-Phenanthrenes/Anthracenes	913	--	0.39	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.12	5.29	5.29	0.01
Chrysene	844	826	4.00	127	127	0.15	3.80	79.17	79.17	0.09	0.13	5.73	5.73	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.66	20.89	20.89	0.02	0.44	9.17	9.17	0.01	0.020	0.88	0.88	0.001
Fluoranthene	707	23,870	6.70	212	212	0.30	9.00	188	188	0.27	0.29	12.78	12.78	0.02
Fluorene	538	26,000	1.10	34.81	34.81	0.06	2.50	52.08	52.08	0.10	0.140	6.17	6.17	0.01
Indeno(1,2,3-cd)pyrene	1,115	--	1.80	56.96	56.96	0.05	1.50	31.25	31.25	0.03	0.047	2.07	2.07	0.002
Naphthalene	385	61,700	2.10	66.46	66.46	0.17	1.60	33.33	33.33	0.09	0.084	3.70	3.70	0.01
Perylene	967	431	1.00	31.65	31.65	0.03	0.70	0.00	0.00	0.00	0.02	0.00	0.00	0.000
Phenanthrene	596	34,300	9.70	307	307	0.52	12.00	250	250	0.42	0.53	23.35	23.35	0.04
Pyrene	697	9,090	5.50	174	174	0.25	6.50	135	135	0.19	0.26	11.45	11.45	0.02
	---	**ESBTU FCVi**	--	--	--	3.77	--	--	--	2.62	--	--	--	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).

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

TABLE 4-2 ESBTUS FOR SEM/AVS METALS

	Location ID:	RB15-01	RB15-02	RB15-02	RB15-03	RB15-04	RB15-05	RB15-06
	Sample Name:	RB15-01-SURF	RB15-02-SURF	RB15-02-SURFFD	RB15-03-SURF	RB15-04-SURF	RB15-05-SURF	RB15-06-SURF
	Sample Date:	10/30/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015	10/31/2015
	Depth Interval (feet):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
SEM/AVS Ratio	none	0.31	**1.30**	**2.20**	0.20	**--**	0.99	**--**
Σ SEM	µmole/g dry	2.5783	3.4868	3.7803	1.7298	12.2932	1.8148	2.0232
AVS	µmole/g dry	8.3	2.7	1.8	9.1	0.72 U	1.9	0.69 U
foc	fraction	0.0392	0.0134	0.0089	0.0376	0.0169	0.0170	0.0174
(Σ SEM - AVS) / foc	µmole/g dry	-146	59	**222**	-196	**685**	-5	77

NOTES:
AVS = Acid Volatile Sulfides
Bolded values exceed 1 SEM/AVS ratio
Bolded and shaded values exceed 130 µmole/g_{oc}
foc = fraction organic carbon
FD = Field Duplicate
SEM = Simultaneously Extracted Metals
µmole/g dry = micromole per gram dry weight basis
U = Indicates the analyte was analyzed but not detected

TABLE 4-2 ESBTUS FOR SEM/AVS METALS

	Location ID:	RB15-07	RB15-08	RB15-08	RB15-09	RB15-09	RB15-10
	Sample Name:	RB15-07-SURF	RB15-08-SURF	RB15-08-SURFFD	RB15-09-SURF	RB15-09-SURFFD	RB15-10-SURF
	Sample Date:	11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015	11/1/2015
	Depth Interval (feet):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**						
SEM/AVS Ratio	none	--	--	--	0.50	--	--
Σ SEM	µmole/g dry	0.5810	1.3180	1.4690	2.4944	2.4871	0.9050
AVS	µmole/g dry	0.78 U	0.68 U	0.66 U	5	0.84 U	0.65 U
foc	fraction	0.0153	0.0085	0.0127	0.0239	0.0310	0.0486
(Σ SEM - AVS) / foc	µmole/g dry	-13	75	64	-105	53	5

NOTES:
AVS = Acid Volatile Sulfides
Bolded values exceed 1 SEM/AVS ratio
Bolded and shaded values exceed 130 µmole/g$_{oc}$
foc = fraction organic carbon
FD = Field Duplicate
SEM = Simultaneously Extracted Metals
µmole/g dry = micromole per gram dry weight basis
U = Indicates the analyte was analyzed but not detected

TABLE 4-2 ESBTUS FOR SEM/AVS METALS

	Location ID:	RB15-11	RB15-13	RB15-14	RB15-15	RB15-16	RB15-17	RB15-18
	Sample Name:	RB15-11-SURF	RB15-13-SURF	RB15-14-SURF	RB15-15-SURF	RB15-16-SURF	RB15-17-SURF	RB15-18-SURF
	Sample Date:	11/3/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015	11/2/2015	11/1/2015
	Depth Interval (feet):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
SEM/AVS Ratio	none	--	0.97	0.50	0.47	--	--	--
Σ SEM	µmole/g dry	2.6001	5.0054	4.4139	2.6780	2.8681	0.5570	1.1580
AVS	µmole/g dry	0.97 U	5.2	8.8	5.7	0.83 U	0.67 U	0.59 U
foc	fraction	0.0471	0.0442	0.0194	0.0419	0.0456	0.0141	0.0124
(Σ SEM - AVS) / foc	µmole/g dry	35	-4	-226	-72	45	-8	46

NOTES:
AVS = Acid Volatile Sulfides
Bolded values exceed 1 SEM/AVS ratio
Bolded and shaded values exceed 130 µmole/g$_{oc}$
foc = fraction organic carbon
FD = Field Duplicate
SEM = Simultaneously Extracted Metals
µmole/g dry = micromole per gram dry weight basis
U = Indicates the analyte was analyzed but not detected

TABLE 4-2 ESBTUS FOR SEM/AVS METALS

	Location ID:	RB15-19	RB15-20	RB15-21	RB15-22	RB15-23	RB15-24	RB15-25
	Sample Name:	RB15-19-SURF	RB15-20-SURF	RB15-21-SURF	RB15-22-SURF	RB15-23-SURF	RB15-24-SURF	RB15-25-SURF
	Sample Date:	11/2/2015	11/4/2015	11/4/2015	11/3/2015	11/3/2015	11/4/2015	11/4/2015
	Depth Interval (feet):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**							
SEM/AVS Ratio	none	--	0.97	0.78	0.44	0.13	0.50	--
Σ SEM	µmole/g dry	7.4972	8.2940	2.8640	3.1945	1.8180	2.5588	0.3230
AVS	µmole/g dry	0.71 U	8.6	3.6	7.4	14	5.1	0.63 U
foc	fraction	0.0127	0.0518	0.0110	0.0400	0.0260	0.0453	0.0072
(Σ SEM - AVS) / foc	µmole/g dry	**534**	-6	-67	-105	-469	-56	-43

NOTES:
AVS = Acid Volatile Sulfides
Bolded values exceed 1 SEM/AVS ratio
Bolded and shaded values exceed 130 µmole/g$_{oc}$
foc = fraction organic carbon
FD = Field Duplicate
SEM = Simultaneously Extracted Metals
µmole/g dry = micromole per gram dry weight basis
U = Indicates the analyte was analyzed but not detected

TABLE 4-2 ESBTUS FOR SEM/AVS METALS

	Location ID:	RB15-26	RB15-27	RB15-28
	Sample Name:	RB15-26-SURF	RB15-27-SURF	RB15-28-SURF
	Sample Date:	11/3/2015	10/26/2015	10/26/2015
	Depth Interval (feet):	0-0.5	0-0.5	0-0.5
Analyte	**Unit**			
SEM/AVS Ratio	none	0.44	0.93	0.07
Σ SEM	µmole/g dry	0.2600	1.3996	1.6350
AVS	µmole/g dry	0.57	1.5	23
foc	fraction	0.0065	0.0195	0.0316
(Σ SEM - AVS) / foc	µmole/g dry	-47	-5	-676

NOTES:
AVS = Acid Volatile Sulfides
Bolded values exceed 1 SEM/AVS ratio
Bolded and shaded values exceed 130 µmole/g_{oc}
foc = fraction organic carbon
FD = Field Duplicate
SEM = Simultaneously Extracted Metals
µmole/g dry = micromole per gram dry weight basis
U = Indicates the analyte was analyzed but not detected

Tables for
Section 5: Probable Effects Concentration Quotients

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TABLE 5-1 PEC-Qs

Location ID	Field Sample ID	mean PEC-Q metals	PEC-Q Total 17PAHs	PEC-Q Total PCBs	mean PEC-Q
RB15-01	RB15-01-0010	0.63	1.29	1.49	1.14
RB15-01	RB15-01-1030	1.29	1.24	5.18	2.57
RB15-01	RB15-01-3050	1.43	1.78	14.70	5.97
RB15-01	RB15-01-SURF	0.50	0.62	0.31	0.48
RB15-02	RB15-02-0010	1.33	32.61	3.79	12.58
RB15-02	RB15-02-1030	1.81	26.30	0.09	9.40
RB15-02	RB15-02-3040	0.19	0.29	0.00	0.16
RB15-02	RB15-02-SURF	0.57	2.19	1.00	1.25
RB15-02	RB15-02-SURFFD	0.46	1.67	0.81	0.98
RB15-03	RB15-03-0010	1.86	1.58	0.58	1.34
RB15-03	RB15-03-1030	3.94	3.51	0.25	2.56
RB15-03	RB15-03-3050	2.73	11.51	0.00	4.75
RB15-03	RB15-03-5070	0.22	0.27	0.00	0.16
RB15-03	RB15-03-SURF	0.29	0.44	0.20	0.31
RB15-04	RB15-04-0010	3.36	14.26	1.09	6.24
RB15-04	RB15-04-1030	0.61	3.01	0.00	1.20
RB15-04	RB15-04-1030FD	0.29	3.71	0.00	1.33
RB15-04	RB15-04-3040	0.18	0.01	0.00	0.06
RB15-04	RB15-04-SURF	2.35	5.81	0.14	2.77
RB15-05	RB15-05-0010	0.27	6.64	0.31	2.41
RB15-05	RB15-05-1030	0.18	0.01	0.02	0.07
RB15-05	RB15-05-SURF	0.22	0.60	0.09	0.30
RB15-06	RB15-06-0010	0.27	0.07	0.10	0.14
RB15-06	RB15-06-1030	0.25	0.00	0.00	0.08
RB15-06	RB15-06-SURF	0.65	1.12	0.48	0.75
RB15-07	RB15-07-0010	0.45	0.46	0.36	0.42
RB15-07	RB15-07-1020	0.28	0.71	1.27	0.76
RB15-07	RB15-07-2030	0.18	0.05	0.05	0.09
RB15-07	RB15-07-SURF	0.17	1.65	0.10	0.64
RB15-08	RB15-08-0010	0.21	0.57	0.38	0.39
RB15-08	RB15-08-SURF	0.30	0.60	0.79	0.56
RB15-08	RB15-08-SURFFD	0.31	0.26	0.60	0.39
RB15-09	RB15-09-0010	0.23	4.05	0.95	1.74
RB15-09	RB15-09-SURF	0.37	1.17	1.27	0.93
RB15-09	RB15-09-SURFFD	0.47	0.94	2.31	1.24
RB15-10	RB15-10-0010	0.17	0.39	0.14	0.24
RB15-10	RB15-10-SURF	0.19	0.44	0.66	0.43
RB15-11	RB15-11-0010	0.33	3.97	0.08	1.46
RB15-11	RB15-11-1030	0.26	0.08	0.00	0.11
RB15-11	RB15-11-1030FD	0.28	0.03	0.00	0.10
RB15-11	RB15-11-SURF	0.49	38.34	0.31	13.05
RB15-12	RB15-12-0010	0.51	278.57	0.65	93.25

TABLE 5-1 PEC-Qs

Location ID	Field Sample ID	mean PEC-Q metals	PEC-Q Total 17PAHs	PEC-Q Total PCBs	mean PEC-Q
RB15-12	RB15-12-1030	1.25	7992.54	1.67	2665.16
RB15-13	RB15-13-0010	0.93	5.14	3.93	3.33
RB15-13	RB15-13-1025	1.32	12.56	6.02	6.63
RB15-13	RB15-13-2535	1.02	54.54	1.36	18.97
RB15-13	RB15-13-3550	0.26	1.15	0.00	0.47
RB15-13	RB15-13-SURF	0.32	11.53	1.58	4.48
RB15-14	RB15-14-0010	1.16	24.32	0.77	8.75
RB15-14	RB15-14-1030	1.07	57.92	0.10	19.70
RB15-14	RB15-14-3050	0.19	0.64	0.00	0.28
RB15-14	RB15-14-SURF	0.50	2.77	1.43	1.57
RB15-15	RB15-15-0010	1.05	50.27	0.69	17.34
RB15-15	RB15-15-1020	0.20	3.86	0.05	1.37
RB15-15	RB15-15-2040	0.67	42.81	0.07	14.52
RB15-15	RB15-15-2040FD	0.47	29.71	0.08	10.08
RB15-15	RB15-15-4060	0.21	0.50	0.00	0.24
RB15-15	RB15-15-SURF	0.35	1.04	0.53	0.64
RB15-16	RB15-16-0010	0.53	11.11	0.47	4.04
RB15-16	RB15-16-1030	1.00	138.62	0.17	46.60
RB15-16	RB15-16-3040	0.72	134.56	0.14	45.14
RB15-16	RB15-16-4060	0.25	1.46	0.00	0.57
RB15-16	RB15-16-SURF	0.36	1.49	0.35	0.73
RB15-17	RB15-17-0010	0.19	0.88	0.03	0.37
RB15-17	RB15-17-1030	0.20	0.01	0.00	0.07
RB15-17	RB15-17-SURF	0.20	0.05	0.03	0.09
RB15-18	RB15-18-0010	0.30	2.14	0.51	0.98
RB15-18	RB15-18-SURF	3.77	0.91	0.04	1.57
RB15-19	RB15-19-0010	0.62	4.32	1.98	2.31
RB15-19	RB15-19-1030	0.20	0.01	0.03	0.08
RB15-19	RB15-19-SURF	2.03	1.34	1.30	1.56
RB15-20	RB15-20-0010	4.27	2.52	0.87	2.55
RB15-20	RB15-20-1020	10.52	3.82	0.78	5.04
RB15-20	RB15-20-2040	0.71	0.32	0.02	0.35
RB15-20	RB15-20-SURF	1.13	1.26	0.78	1.06
RB15-21	RB15-21-0010	0.77	0.81	0.48	0.69
RB15-21	RB15-21-1020	2.26	2.05	0.13	1.48
RB15-21	RB15-21-SURF	0.28	0.49	0.60	0.46
RB15-22	RB15-22-0010	0.97	1.54	1.55	1.35
RB15-22	RB15-22-1020	1.38	2.56	0.40	1.44
RB15-22	RB15-22-2030	3.50	5.05	0.12	2.89
RB15-22	RB15-22-3050	2.66	12.64	0.14	5.14
RB15-22	RB15-22-SURF	0.40	0.67	0.81	0.63
RB15-23	RB15-23-0010	2.06	6.67	0.62	3.12

TABLE 5-1 PEC-Qs

Location ID	Field Sample ID	mean PEC-Q metals	PEC-Q Total 17PAHs	PEC-Q Total PCBs	mean PEC-Q
RB15-23	RB15-23-1030	4.30	9.54	0.27	4.70
RB15-23	RB15-23-1030FD	4.18	10.17	0.20	4.85
RB15-23	RB15-23-3050	4.44	14.78	0.23	6.48
RB15-23	RB15-23-SURF	0.24	0.62	0.55	0.47
RB15-24	RB15-24-0010	1.41	2.02	1.20	1.54
RB15-24	RB15-24-1020	2.03	9.10	0.51	3.88
RB15-24	RB15-24-2040	2.95	18.80	0.16	7.30
RB15-24	RB15-24-2040FD	2.94	17.08	0.20	6.74
RB15-24	RB15-24-4050	2.39	18.59	0.08	7.02
RB15-24	RB15-24-5060	0.35	2.29	0.00	0.88
RB15-24	RB15-24-6080	0.10	0.07	0.00	0.06
RB15-24	RB15-24-SURF	0.34	0.33	0.49	0.39
RB15-25	RB15-25-0010	0.08	0.00	0.00	0.03
RB15-25	RB15-25-SURF	0.06	0.00	0.00	0.02
RB15-26	RB15-26-0010	0.13	0.01	0.00	0.05
RB15-26	RB15-26-1030	0.11	0.00	0.00	0.04
RB15-26	RB15-26-1030FD	0.12	0.00	0.00	0.04
RB15-26	RB15-26-3050	0.08	0.00	0.00	0.03
RB15-26	RB15-26-SURF	0.12	0.11	0.04	0.09
RB15-27	RB15-27-0010	0.35	6.78	0.31	2.48
RB15-27	RB15-27-1030	2.39	18.98	0.11	7.16
RB15-27	RB15-27-3050	1.38	38.06	0.00	13.14
RB15-27	RB15-27-5065	0.99	86.00	0.00	29.00
RB15-27	RB15-27-6570	0.07	0.91	0.00	0.33
RB15-27	RB15-27-SURF	0.19	82.46	0.30	27.65
RB15-28	RB15-28-0010	0.31	2.57	0.26	1.05
RB15-28	RB15-28-1030	0.20	0.10	0.01	0.11
RB15-28	RB15-28-SURF	2.05	2.48	0.58	1.70

mean PEC-Q = mean PEC-Q metals + PEC-Q Total 17PAHs + PEC-Q Total PCBs/3

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Tables for
Section 7: Michigan Department of Environmental Quality
Samples collected from locations near Riverside Park

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TABLE 7-1A SEDIMENT RESULTS FOR VOLATILES

Location ID:		RB15-12	RB15-13	RB15-13	RB15-13	RB15-13	RB15-14	RB15-14	RB15-14	RB15-15	RB15-15	RB15-15	RB15-16	RB15-16	RB15-16	RB15-16
Sample Name:		RB15-12 15.0"	RB15-13 6"	RB15-13 24"	RB15-13 36"	RB15-13 52"	RB15-14 0.5'	RB15-14 18"	RB15-14 42"	RB15-15 0.5'	RB15-15 32"	RB15-15 50"	RB15-16 0.5'	RB15-16 1.5'	RB15-16 3.5'	RB15-16 3.5' Dup
Sample Date:		11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
Depth Interval (ft):		1.25	0.5	2	3	4.3	0.5	1.5	3.5	0.5	2.6	4.2	0.5	1.5	3.5	3.5
Analyte	**Unit**															
1,1,1,2-Tetrachloroethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,1,1-Trichloroethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,1,2,2-Tetrachloroethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,1,2-Trichloroethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,1-Dichloroethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,1-Dichloroethylene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,2,3-Trichlorobenzene	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
1,2,3-Trichloropropane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,2,3-Trimethylbenzene	ug/kg	140,000	<93	770	1,700	<71	210	4,500	<74	970	16,000	<1200	160	8,900	15,000	17,000
1,2,4-Trichlorobenzene	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
1,2,4-Trimethylbenzene	ug/kg	530,000	170	970	3,800	<71	190	11,000	<74	780	47,000	2,500	120	24,000	45,000	50,000
1,2-Dibromo-3-chloropropane	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
1,2-Dibromoethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,2-Dichlorobenzene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,2-Dichloroethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,2-Dichloropropane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,3,5-Trimethylbenzene	ug/kg	240,000	<93	440	770	<71	82	<3800	<74	150	12,000	<1200	<78	<7700	13,000	15,000
1,3-Dichlorobenzene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
1,4-Dichlorobenzene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
2-Butanone (MEK)	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
2-Hexanone	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
2-Methylnaphthalene	ug/kg	2,800,000	<470	1,200	54,000	<350	1,100	130,000	<370	1,000	380,000	12,000	570	290,000	430,000	500,000
2-Propanone (acetone)	ug/kg	<410000	<1900	<2200	<16000	<1400	<1700	<76000	<1500	<1500	<130000	<23000	<1600	<150000	<160000	<140000
4-Methyl-2-pentanone (MIBK)	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Acrylonitrile	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Benzene	ug/kg	690,000	<93	130	<810	260	96	<3800	<74	170	<6500	<1200	79	<7700	<8100	<7200
Bromobenzene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Bromochloromethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Bromodichloromethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Bromoform	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Bromomethane	ug/kg	<82000	<370	<450	<3200	<280	<330	<15000	<300	<290	<26000	<4600	<310	<31000	<32000	<29000
Carbon disulfide	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Carbon tetrachloride	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Chlorobenzene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Chloroethane	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Chloroform	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Chloromethane	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
cis-1,2-Dichloroethylene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
cis-1,3-Dichloropropylene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Cyclohexane	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Dibromochloromethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Dibromomethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Dichlorodifluoromethane	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Diethyl ether	ug/kg	<82000	<370	<450	<3200	<280	<330	<15000	<300	<290	<26000	<4600	<310	<31000	<32000	<29000
Diisopropyl Ether	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Ethylbenzene	ug/kg	900,000	210	210	2,100	450	310	20,000	<74	420	37,000	4,100	210	20,000	33,000	35,000
Ethyltertiarybutylether	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Hexachloroethane	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Isopropylbenzene	ug/kg	46,000	100	390	860	<71	310	<3800	<74	720	8,100	<1200	240	<7700	7,900	9,000
m & p - Xylene	ug/kg	1,700,000	190	270	<1600	<140	200	<7600	<150	280	<13000	<2300	<160	<15000	<16000	<14000
Methyl iodide	ug/kg	<21000	<470	<110	<810	<430	<500	<3800	<440	<440	<6500	<1200	<470	<7700	<8100	<7200
Methylene chloride	ug/kg	<41000	<190	<220	<1600	<140	<170	<7600	<150	<150	<13000	<2300	<160	<15000	<16000	<14000
Methyltertiarybutylether	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Naphthalene	ug/kg	8,000,000	1,100	3,600	15,000	<350	2,500	330,000	<370	3,000	720,000	43,000	1,600	620,000	830,000	960,000
n-Butylbenzene	ug/kg	<21000	<93	<110	<810	<71	200	<3800	<74	<73	<6500	<1200	130	<7700	<8100	<7200
n-Propylbenzene	ug/kg	25,000	<93	120	<810	<71	110	<3800	<74	160	<6500	<1200	<78	<7700	<8100	<7200
o-Xylene	ug/kg	580,000	<93	270	<810	140	89	<3800	<74	140	18,000	<1200	<78	7,900	15,000	18,000
p-Isopropyl toluene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
sec-Butylbenzene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Styrene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
tert-Butylbenzene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
tertiary Butyl Alcohol	ug/kg	<1000000	<4700	<5600	<40000	<3500	<4100	<190000	<3700	<3700	<320000	<58000	<3900	<390000	<400000	<360000
tertiaryAmylmethylether	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Tetrachloroethylene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Tetrahydrofuran	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Toluene	ug/kg	1,700,000	310	200	<810	87	200	<3800	<74	340	<6500	<1200	190	<7700	<8100	<7200
trans-1,2-Dichloroethylene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
trans-1,3-Dichloropropylene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
trans-1,4-Dichloro-2-butene	ug/kg	<100000	<470	<560	<4000	<350	<410	<19000	<370	<370	<32000	<5800	<390	<39000	<40000	<36000
Trichloroethylene	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Trichlorofluoromethane	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200
Vinyl chloride	ug/kg	<21000	<93	<110	<810	<71	<83	<3800	<74	<73	<6500	<1200	<78	<7700	<8100	<7200

NOTES:

ug/kg = micrograms per kilogram

< = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

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TABLE 7-1B SEDIMENT RESULTS FOR SVOC

			Location ID:	RB15-12	RB15-13	RB15-14	RB15-15	RB15-16
			Sample Name:	RB15-12 1-2'	RB15-13 2.5-3.5'	RB15-14 18"	RB15-15 2-4'	RB15-16 3-4'
			Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
			Depth Interval (ft):	1-2	2.5-3.5	1.5	2-4	3-4
Analyte	**TEC***	**PEC***	**Unit**					
1,2,4-Trichlorobenzene*	8	18	ug/kg	<430000	<6300	<6200	<5400	<5500
2,4,5-Trichlorophenol	---	---	ug/kg	<710000	<10000	<10000	<8900	<9000
2,4,6-Tribromophenol	---	---	ug/kg	0.0	6,650	5,530	4,210	4,640
2,4,6-Trichlorophenol	---	---	ug/kg	<710000	<10000	<10000	<8900	<9000
2,4-Dichlorophenol	---	---	ug/kg	<710000	<10000	<10000	<8900	<9000
2,4-Dimethylphenol*	290	290	ug/kg	<710000	<10000	<10000	<8900	<9000
2,4-Dinitrophenol	---	---	ug/kg	<3700000	<54000	<53000	<46000	<47000
2,4-Dinitrotoluene	---	---	ug/kg	<540000	<7900	<7800	<6700	<6900
2,6-Dinitrotoluene	---	---	ug/kg	<540000	<7900	<7800	<6700	<6900
2-Chloronaphthalene	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
2-Chlorophenol	---	---	ug/kg	<710000	<10000	<10000	<8900	<9000
2-Methyl-4,6-dinitrophenol	---	---	ug/kg	<3700000	<54000	<53000	<46000	<47000
2-Methylnaphthalene*	20.2	201	ug/kg	**5,000,000**	**40,000**	**91,000**	**180,000**	**290,000**
2-Methylphenol (o-Cresol)*	6700	6700	ug/kg	<710000	<10000	<10000	<8900	<9000
2-Nitroaniline	---	---	ug/kg	<1100000	<16000	<16000	<13000	<14000
2-Nitrophenol	---	---	ug/kg	<710000	<10000	<10000	<8900	<9000
3 & 4-Methylphenol	---	---	ug/kg	<1400000	<21000	<21000	<18000	<18000
3-Nitroaniline	---	---	ug/kg	<1100000	<16000	<16000	<13000	<14000
4-Bromophenyl phenyl ether	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
4-Chloro-3-methyl-phenol	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
4-Chlorodiphenylether	---	---	ug/kg	<220000	<3200	<3100	<2700	<2700
4-Nitroaniline	---	---	ug/kg	<1100000	<16000	<16000	<13000	<14000
4-Nitrophenol	---	---	ug/kg	<3700000	<54000	<53000	<46000	<47000
Acenaphthene*	6.7	89	ug/kg	**3,100,000**	**39,000**	**78,000**	**150,000**	**230,000**
Acenaphthylene*	5.9	128	ug/kg	**280,000**	<3200	**3,500**	**5,500**	**6,600**
Anthracene**	57.2	845	ug/kg	**2,900,000**	**33,000**	**62,000**	**92,000**	**120,000**
Azobenzene	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
Benzo[a]anthracene**	108	1050	ug/kg	**1,300,000**	**32,000**	**49,000**	**52,000**	**72,000**
Benzo[a]pyrene**	150	1450	ug/kg	**960,000**	**28,000**	**41,000**	**42,000**	**56,000**
Benzo[b]fluoranthene*	240	13400	ug/kg	**1,100,000**	**29,000**	**43,000**	**32,000**	**49,000**
Benzo[g,h,i]perylene*	170	3200	ug/kg	**540,000**	**13,000**	**18,000**	**18,000**	**23,000**
Benzo[k]fluoranthene*	240	13400	ug/kg	<430000	**9,600**	**15,000**	**11,000**	**13,000**
Benzyl Alcohol*	570	730	ug/kg	<5400000	<79000	<78000	<67000	<69000
Bis(2-chloroethoxy)methane	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
Bis(2-chloroethyl)ether	---	---	ug/kg	<220000	<3200	<3100	<2700	<2700
Bis(2-chloroisopropyl)ether	---	---	ug/kg	<220000	<3200	<3100	<2700	<2700
Bis(2-ethylhexyl)phthalate	---	---	ug/kg	<540000	<7900	<7800	<6700	<6900
Butyl benzyl phthalate	---	---	ug/kg	<540000	<7900	<7800	<6700	<6900
Carbazole	---	---	ug/kg	1,200,000	<7900	<7800	<6700	<6900
Chrysene**	166	1290	ug/kg	**1,300,000**	**30,000**	**46,000**	**49,000**	**67,000**
Dibenz[a,h]anthracene**	33	135	ug/kg	<430000	<6300	<6200	<5400	**6,400**
Dibenzofuran*	150	580	ug/kg	**1,900,000**	<7900	**11,000**	<6700	**20,000**
Diethylphthalate*	610	1000	ug/kg	<540000	<7900	<7800	<6700	<6900
Dimethyl phthalate*	530	530	ug/kg	<540000	<7900	<7800	<6700	<6900
Di-n-butyl phthalate*	2200	17000	ug/kg	<540000	<7900	<7800	<6700	<6900
Di-n-octyl phthalate*	580	45000	ug/kg	<540000	<7900	<7800	<6700	<6900
Fluoranthene**	423	2230	ug/kg	**5,400,000**	**73,000**	**110,000**	**110,000**	**150,000**
Fluorene**	77.4	536	ug/kg	**2,800,000**	**23,000**	**50,000**	**65,000**	**97,000**
Hexachlorobenzene	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
Hexachlorobutadiene	---	---	ug/kg	<220000	<3200	<3100	<2700	<2700
Hexachlorocyclopentadiene	---	---	ug/kg	<2200000	<32000	<31000	<27000	<27000
Hexachloroethane	---	---	ug/kg	<220000	<3200	<3100	<2700	<2700
Indeno(1,2,3-c,d)pyrene*	200	3200	ug/kg	**500,000**	**11,000**	**17,000**	**13,000**	**18,000**
Isophorone	---	---	ug/kg	<220000	<3200	<3100	<2700	<2700
Naphthalene**	176	561	ug/kg	**74,000,000.**	**21,000**	**170,000**	**250,000**	**420,000**
Nitrobenzene	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
N-Nitrosodimethylamine	---	---	ug/kg	<540000	<7900	<7800	<6700	<6900
N-Nitrosodi-n-propylamine	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
N-Nitrosodiphenylamine	---	---	ug/kg	<430000	<6300	<6200	<5400	<5500
Pentachlorophenol*	150	200	ug/kg	<3700000	<54000	<53000	<46000	<47000
Phenanthrene**	204	1170	ug/kg	**9,100,000**	**120,000**	**230,000**	**290,000**	**430,000**
Phenol*	4200	12000	ug/kg	<710000	<10000	<10000	<8900	<9000
Pyrene**	195	1520	ug/kg	**3,200,000**	**83,000**	**120,000**	**150,000**	**200,000**

NOTES:

Bolded detected values exceed TEC screening value

Bolded and Shaded detected values exceed PEC screening value

ug/kg = micrograms per kilogram

< = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NSL = No screening value

PEC = Probable effect concentration. Development and

TEC = Threshold effect concentration. Development and Evaluation of

* Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003.

** Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).

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TABLE 7-1C SEDIMENT RESULTS: FINGERPRINT

Location ID:	RB15-12	RB15-13	RB15-14	RB15-15	RB15-16
Sample Name:	RB15-12 1-2'	RB15-13 2.5-3.5'	RB15-14 18"	RB15-15 2-4'	RB15-16 3-4'
Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
Depth Interval (ft):	1-2	2.5-3.5	1.5	2-4	3-4
Fingerprint Analysis	Completed	Completed	Completed	Completed	Completed
DEQ Lab ID	1511040-21	1511040-19	1511040-12	1511040-09	1511040-05
Analysis Method	8270	8270	8270	8270	8270
Lab Code	Y20, Y25	Y20, Y25, Y34	Y20, Y25	Y20, Y25	100, Y20, Y25
Lab Code Description	Reporting Limits (RL) raised due to matrix. Sample extract would not concentrate to the normal volume causing raised reporting limits.	Reporting Limits (RL) raised due to matrix. Sample extract would not concentrate to the normal volume causing raised reporting limits. Pattern similar to hydraulic and/or motor oil present in sample.	Reporting Limits (RL) raised due to matrix. Sample extract would not concentrate to the normal volume causing raised reporting limits.	Reporting Limits (RL) raised due to matrix. Sample extract would not concentrate to the normal volume causing raised reporting limits.	No significant pattern present for fingerprint.

NOTES:

TABLE 7-1D SEDIMENT RESULTS FOR GEN CHEM

	Location ID:	RB15-12	RB15-12	RB15-13	RB15-13	RB15-13	RB15-13	RB15-13	RB15-14	RB15-14
	Sample Name:	RB15-12 15.0"	RB15-12 1-2'	RB15-13 6"	RB15-13 24"	RB15-13 36"	RB15-13 2.5-3.5	RB15-13 52"	RB15-14 0.5'	RB15-14 18"
	Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
	Depth Interval (ft):	1.25	1-2	0.7	2	3	2.5-3.5	4.3	0.5	1.5
Analyte	**Unit**									
Total Cyanide	mg/kg	---	140	---	---	---	300	---	---	---
% Total Solids	%	59.4	58.0	71.2	63.0	64.9	63	81.1	76.9	67.5

NOTES:

TABLE 7-1D SEDIMENT RESULTS FOR GEN CHEM

	Location ID:	RB15-14	RB15-14	RB15-14	RB15-15	RB15-15	RB15-15	RB15-15
	Sample Name:	RB15-14 18"	RB15-14 1-3'	RB15-14 42"	RB15-15 0.5'	RB15-15 32"	RB15-15 2-4'	RB15-15 50"
	Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
	Depth Interval (ft):	1.5	1-3	3.5	0.5	2.6	2-4	4.2
Analyte	**Unit**							
Total Cyanide	mg/kg	1,200	540	---	---	---	2.7	---
% Total Solids	%	64.3	64.4	80.2	79.9	77.7	74.4	81.1

NOTES:

TABLE 7-1D SEDIMENT RESULTS FOR GEN CHEM

	Location ID:	RB15-16	RB15-16	RB15-16	RB15-16	RB15-16
	Sample Name:	RB15-16 0.5'	RB15-16 1.5'	RB15-16 3.5'	RB15-16 3.5' Dup	RB15-16 3-4'
	Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
	Depth Interval (ft):	0.5	1.5	3.5	3.5	3-4
Analyte	**Unit**					
Total Cyanide	mg/kg	---	---	---	---	40
% Total Solids	%	79.7	72.2	71.6	70.9	72.9

NOTES:

TABLE 7-1E SEDIMENT RESULTS FOR NITROGEN

	Location ID:	RB15-12	RB15-13	RB15-14	RB15-15	RB15-16
	Sample Name:	RB15-12 1-2'	RB15-13 2.5-3.5'	RB15-14 1-3'	RB15-15 2-4'	RB15-16 3-4'
	Sample Date:	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015
	Depth Interval (ft):	1-2	2.5-3.5	1-3	2-4	3-4
Analyte	**Unit**					
Kjeldahl Nitrogen	mg/kg	4,300	2,600	2,600	760	1,400

NOTES:

mg/kg = milligrams per kilogram

Appendix A

Field Logbooks and Data Collection Forms

A1. Core Processing Logbook

CONTENTS

PAGE	REFERENCE	DATE

Location 10-26-2015 Date

Project / Client Riverbend, EPA Region 5 Detroit, Michigan

Monday 60°F Sunny

07:30 J. Moen and R. Darnton @ EA Brighton office to finish packing supplies

08:00 J. Moen and R. Darnton en route to Ryder truck rental in highland park to get refridgerated truck

09:30 @ Ryder

09:50 Enroute to USACE facility (core processing) @ Historic Fort Wayne to drop off fridge truck

10:20 J. Moen, R. Darnton, and K. Kowalk meet Brian Palys (MATECO) & R. Ellison (EPA) at Lafarge Cement Plant

11:10 J. Moen & K. Kowalk to USACE

J. Moen cont'd

Location Riverbend/Detroit, MI Date 10-26-15

Project / Client EPA Region 5, 6256123

11:15 Unloading supplies at Core processing area

12:00 Break for lunch

12:45 Setting up Core processing area and preparing fridge truck. Temp. set to 38°F

15:45 K. Kowalk & J. Moen meet R. Darnton and MATECO at LaFarge to pick up cores and surface sampler

16:15 Back at USACE to drop of cores and samples and pack for the day

16:30 Offsite enroute to Brighton office

End of Day

JM JM

Jessie K Moen

Location Riverbend/Detroit, MI Date 10-27-15

Project / Client 6256125, EPA Region 5

Tuesday 60°F Sunny
Fridge truck @ 38°F

11:00 J. Moen purchasing supplies

12:00 J. Moen at Core processing to finish set up

13:50 J. Moen to ~~[illegible]~~ JM William G. Milliken State Park to get MATECO personnel. Sonic drill is broken. MATECO has ordered part for repair. MATECO going to try pushing a core but need to get part from vehicle parked at LaFarge. J. Moen picks up MATECO personnel, brings to LaFarge, and then back to William G. Milliken.

15:00 J. Moen & K. Kowalk back at USACE facility.

J. Moen Cont'd

Location Riverbend / Detroit, MI Date 10-27-15

Project / Client EPA Region 5 6256125

15:15 J. Moen processing Surface samples Collected 10-26-15:

RB15-27-Surf
Collected 10-26-15 @ 14:15
1x 2oz, 2x 4oz, 1x 8oz, 1x 16oz

RB15-28-Surf
Collected 10-26-15 @ 12:40
*3x 4oz, 1x 8oz 1x 16oz
SEM/AVS collected in 4oz jar

17:40 R. Darnton at USACE to unload cores and surface samples

18:00 End of day

Jessie K M

Location Riverbend, Detroit MI Date 10-28-15

Project / Client EPA Region 5 6256125

Wednesday 50°F Rain & wind
Friday much 38°F

09:45 M. Gelinas, N. Riley, J. Moen meet K. Kavalle & R. Darnton at Core processing - No core collection today due to weather.

10:00 Site Health and Safety meeting and discuss facility, contacts, and plan for day / week.

10:15 Opening core 5

10:30 Processing Surface Samples from 10-27-2015

HBT15-A-Surf
Collected ~~10-27~~ on 10-27-15 @ 09:40
1x 2oz, 2x 4oz, 1x 8oz, 1x 16oz

J. Moen Cont'd

Location Riverbend / Detroit, MI Date 10/28/15
Project / Client EPA R5 6256125

10:30 Processing surface Samples cont'd

HBT 15-B-Surf
Collected 10-27-15 @ 11:20
2x 2oz, ~~1x 4oz, 1x 8oz, 1x16oz~~ JM
4x4oz, 2x8oz, 2x16oz

~~HBT 15-B-Surf-FD~~ JM
~~Collected 10-27-15 @ 11:20~~
~~1x 2oz, 2x 4oz, 1x 8oz, 1x16oz~~

1130 HBT 15-A- Core logged
Collected Intervals
~~0103~~
~~0305~~
~~0507~~
~~0710~~
~~} 1:8oz 1:16oz each interval~~ JM
~~11:25 0010 1x8oz 1x16oz~~ JM

11:25 0010
11:30 1030
11:35 3050
11:40 5070
11:43 7010
} 1x8oz, 1x16oz for each interval

— J Moen Cont'd —

Location Riverbend, Detroit, MI Date 10-28-15
Project / Client EPA Region 5 6256125

Fridge Truck: 36°F

1230 Lunch

1415 RB15-28
Core logged

RB 15-28 intervals sampled

1430 0010
14:35 1030
} Collected 1x8oz, 1x16oz from each
~~3050~~
~~5070~~ JM

1500 RB15-27
Core logged

15:10; 0010
15:15; 1030
15:20; 3050
15:25; 5065
15:30; 6570
} 1x8 oz; 1x16 oz each interval

Location RIVERBEND, DETROIT MI Date 10/28/15

Project / Client EPA REGION 5

Discussion w/ R. Ellison: Attempting to keep to 2' interval/1' surface interval scheme, but can shift slightly to reduce dilution w/ clean clay/sand and/or contamination of clean material. Try to cut intervals off at obvious points of contamination. Adjusting labels slightly to capture this.

1600 clean up, done for day

1630 Done for day

Location RiverBend, Detroit MI Date 11/2/15

Project / Client EPA R5

0730 Monday, 50°F, Sunny

Fridge Truck: 36°F

M. Gelinas, J. Moen, N. Riley (TEA)
R. Ellison (EPA)
at USACE Core Processing location

0745 Site safety and health meeting

0800 · RB15-07A + RB15-07B opened for logging

· Jess Moen process surface samples

0820 3 Intervals from 07B

0825; 0010 } 1x8 oz
0830; ~~00~~ NSR 1020 } 1x16 oz
0835; 2030
0835, 2030-MS/MSD } — 2x8 oz
Composite 0005 (~~top~~ 6") from reps A, ~~B~~, C for surface analyses
N.2

Location Riverbend, Detroit MI Date 11/2/15
Project / Client EPA R5

0845 RB15-07A-C composite for additional volume
1x 2oz 1x 8oz
2x 4oz 1x16oz (RB15-07-SURF)

09:00 Processing Surface Samples

RB15-10-Surf
collected 11-1-2015 @ 08:15
2x2oz, 4x 4oz, 2x8oz, 2x16oz
Collected double volume lots of shells

RB15-18-Surf
collected 11-1-2015 @ 15:15
1x 2oz, 2x4oz, 1x 8oz, 1x16oz

RB15-09-Surf + Surf FD
collected 11-1-2015 @ 09:30
1x 2oz, 2x 4oz, 1x8oz, 1x16oz X 2

RB15-08-Surf + Surf FD
collected 11-1-2015 @ 10:35
1x 2oz, 2x4oz, 1x8oz, 1x16oz X 2

J Moen Cont'd

Location Riverbend, Detroit MI Date 11/2/15
Project / Client EPA R5

0930 RB15-08 opened + logged

0950 ; 1 Interval for RB15-08
↳ 0010 ; 1x8oz 1x16oz

1000 RB15-09 opened and logged

1020 ; 1 Interval for RB15-09
↳ 0010 ; 1x8oz 1x16oz

1040 RB15-10 opened and logged

1055 ; 1 Interval for RB15-10
↳ 0010 ; 1x8oz 1x16oz
Sample from upper 6"

J Moen Cont'd

Location Riverbend, Detroit, MI Date 11-2-15

Project / Client EPA Region 5 6256125

11:00 Processing Surface Samples

RB15-07-Surf
Collected 11-1-2015 @ 11:45
2x2oz, 4x4oz, 2x8oz, 2x16oz
double volume, shells

RB15-01-Surf
Collected 10-30 @ 16:20
1x2oz, 2x4oz, 1x8oz, 1x16oz

RB15-03-Surf
10-31-2015 @ 10:45
1x2oz, 2x4oz, 1x8oz, 1x16oz

RB15-03-Surf MS & surf MSD
2x2oz, 4x4oz, 2x8oz
10-31-2015 @ 10:45

HBT15-C-Surf + MS + MSD
collected 10-30-2015 @ 13:25
1x2oz, 2x4oz, 1x8, 1x16oz
1x2oz, 2x4oz, 1x4oz X 2

— Sr Moen Cont'd —

Location Riverbend, Detroit, MI Date 11-2-15

Project / Client EPA Region 5 6256125

11:08 Processing Surface Samples cont'd

RB15-04-Surf
collected 10-31-2015 @ 12:30
1x2oz, 2x4oz, 1x8oz, 1x16oz

RB15-05-Surf
Collected 10-31-2015 @ 14:00
1x2oz, 2x4oz, 1x8oz, 1x16oz

RB15-02-Surf + Surf FD
(1x2oz, 2x4oz, 1x8oz, 1x16oz) X 2
Collected 10-31-2015 @ 09:20

RB15-06-Surf
Collected 10-31-2015 @ 15:00
1x2oz, 2x4oz, 1x8oz, 1x16oz

1125 HBT15-A Core opened + logged

Int.
1140; 0010
1145; 1030
1150; 3055
1155; 5560
} 1x8oz
1x16oz

Int.
1150; 3055-FD
↳ 1x8oz
1x16oz

Location Riverbend, Detroit, MI Date 11/2/15
Project / Client EPARS

1230 lunch
K. KOWALK arrives
1330 RB15-03 core opened and logged

1425 ; 0010
1430 ; 0030
1435 ; 3050
1440 ; 5070
1x8oz 1x16oz

1445 HBT15-C Opened and logged

1510 ; 0010
1515 ; 1030
1520 ; 3040
1525 ; 4050
1x8 oz 1x16 oz

1515 ; 1030-FD – 1x8 oz 1x16oz

1600 RB15-18 Core opened & logged

1620 RB15-18-0010 - 1x8oz 1x16 oz

1630 N. Riley leaves for field work
@ in Battle Creek
-meg

Location Riverbend, Detroit, MI Date 11/2/15
Project / Client EPARS

While R. Ellison was onsite, made it clear that she does not want clay sampled - very interested in any impacted sed above it or within it, but if clay extends entire length, [illegible] do not want a sample.

1630 Cleaning up/scanning datasheets
+ notebooks

1715 Help unload barge @ McCoig

1730 unload cores @ USACE

1800 Done for day MEG

Location Riverbend, Detroit, MI Date 11-3-2015

Project / Client EPA Region 5, 6256125

~~0~~ Jm Tuesday Sunny 45°F, high of 71°F.
Fridge truck: 38°F

0700 Gelinas and Moen @ McCaig to meet R. Darnton.

0725 Gelinas and Moen @ USACE facility

0730 Processing surface samples from 11-2-2015

~~RB13-surf~~ Jm RB15-13-Surf @ 14:50
1x2oz, 2x4oz, 1x8oz, 1x16oz

RB15-14-~~30r~~ surf @ 13:45
1x2oz 2x4oz, 1x8oz, 1x16oz

RB13-15-Surf @ 12:25
1x2oz, 2x4oz, 1x8oz, 1x16oz

Jm

Jm

Location Riverbend, Detroit, MI Date 11-3-2015

Project / Client EPA Region 5, 6256125

0730 Processing surface samples cont'd

RB15-15-Surf MS + MSD
2x2oz, 4x4oz, 2x8oz

RB15-16-Surf @ 10:10
2x2oz, ~~2x~~ Jm 4x4oz,
2x8oz, 2x16oz
* Collected double volume for sample; shells & rocks

RB15-17-Surf @ 08:15
1x2oz, 2x4oz, 1x8oz, 2x16oz

RB15-19-Surf @ 16:00
1x2oz, 2x4oz, 1x8oz, 1x16oz

0745 Opening core for RB15-02

0830 RB15-02-0010
1x16oz; 1x8oz

0840 RB15-02-1030; &
1x16oz; 1x8oz

Location Riverbend, Detroit, MI Date 11/3/15
Project / Client EPA Reg. 5 GLNPO

0845 RB15-02-3040
1x16 oz; 1x8oz

0850 Opening Core RB15-04

0910 RB15-04-0010
1x16 oz; 1x8oz

0915 RB15-04-1030
FD Taken
2x16oz; 2x8oz

0920 RB15-04-3040
1X16oz; 1x8oz

0935 Opening Core RB15-05

0945 RB15-05-0010
1x16oz; 1x8oz.

0950 RB15-05-1030
1X16oz; 1x8oz

KK

Location Riverbend, Detroit MI Date 11/3/15
Project / Client EPA Region 5 - GLNPO

1015 Opening RB15-06
1030 RB15-06-0010
1x16oz; 1x8oz.
1040 RB15-06-1030
1x16 oz; 1x8oz

1100 Opening RB15-19
1115 RB15-19-0010
1x16 oz; 1x8oz
1120 RB15-19-1030
1x16 oz; 1x8oz.

1140 Lunch - EA off-site
1230 EA to LRRDC FOR MEASUREMENTS
1250 EA ON-SITE
1330 opening RB15-17
1350 RB15-17-0010
1x16oz; 1x8oz.
1355 RB15-17-1030
1x16oz; 1x8oz.
1410 Opening RB15-01
1420 RB15-01-0001
1x16oz; 1x8oz.

Location Riverbend, Detroit MI Date 11/3/15

Project / Client EPA Region 5 GLNPO

1430 RB15-01-1030
1x16oz; 1x8oz

1440 RB15-01-3050
1x16 oz; 1x 8 oz.

1500 Sampling complete for day
Remaining cores at processing are being split sampled by DEQ & will wait until 11/4/15

1530 Scanning logs and field logbook

Location Riverbend, Detroit, MI Date 11/4/15

Project / Client EPAR5

0700 Meet in hotel lobby,
M. Gelinas
J. Moen
N. Riley

0730 Home depot to buy supplies

0800 USACE Core processing center to meet Rex, R. Ellison,

Fridge Truck: 36°F

0820 RB15-16 2nd attemp opened and logged.
Both attempts opened in case volume needed.

Time	Interval	
0840	0010	1x8 oz 1x16 oz
0845	1030	
0850	3040	
0855	4060	

NSR

Location Riverbend, Detroit, MI Date 11/4/15

Project / Client EPA R5

0910 RB15-15 opened and logged

Time	Interval
0930	0010
0935	1020
0940	2040
0945	4060

1x8oz 1x16oz

2040-FD: 1x8oz 1x16oz.

0915 Processing Surface Samples collected 11-3-2015

RB15-11-Surf
11-3-2015 @ 12:20
2x2oz, 4x4oz, 2x8oz, 1x16oz
* collected double volume

RB15-22-Surf
11-3-2015 @ 15:35
1x2oz, 2x4oz, 1x8oz, 1x16oz

RB15-26-Surf 11-3-2015 @ 08:40
1x2oz, 2x4oz, 1x8oz, 1x16oz

~~RB15-16~~ JM RB15-23-Surf
11-3-15 @ 13:40
1x2oz, 2x4oz, 1x8oz, 1x16oz JM

Location Riverbend, Detroit, MI Date 11-4-2015

Project / Client EPA Region 5

1000 RB15-14 Opened and logged

Time	Interval
1040	0010
1045	1030
1050	3050

1x8 oz 1x16 oz

1055 RB15-13 opened and logged

Time	Interval
1140	0010
1145	1025
1150	2535
1155	3550

1x8 oz
1x16oz

1230 lunch

1300 RB15-26 opened and logged

Time	Interval
1400	0010
1405	1030
1410	3050

1x8 oz
1x16 oz

1030-FD: 1x8oz 1x16oz
3050-MS/MSD: 2x8 oz,

Location Riverbend, Detroit MI Date 11/4/15

Project / Client EPARS

1400 RB15 - 12 opened and logged

Time	Interval	
1425	0010	1x8oz 1x16oz
1430	1020	

1500 Processing Surface Samples Collected morning of 11-4-2015

RB15-20-Surf @ 13:45

RB15-21-Surf @ 11:45

RB15-24-Surf @ 08:55

RB15-25-Surf @ 10:00

1x2oz, 2x4oz, 1x8oz, 1x16oz from each

1500 RB15-11 core opened and logged

Time	Interval	
1520	0010	1x8oz 1x16oz
1525	1030	
	1030-FD :	1x8oz 1x16oz

Location Riverbend, Detroit MI Date 11/4/15

Project / Client EPARS

1535 RB15-11

Time	Interval
1610	0010
1615	1020
1620	2030
1625	3050

165 cleaning up

1700 Done for day

Location Riverbend, Michigan, Detroit Date 11/5/15

Project / Client EPARS

0745 Meet in hotel lobby 55°F Sunny
M. Gelinas
J. Moen
N. Riley

0820 Arrive @ USACE processing facility.
Fridge Truck: 37°F

0830 RB15-20 Core opened + logged

Time	Interval
0850	0010
0855	1020
0900	2040

1 x 8 oz 1 x 16 oz

NSR

~~0840 RB15-24 Core opened and logged~~

~~Time~~	~~Interval~~
~~0920~~	~~0010~~
~~0925~~	~~1030~~
~~0930~~	~~3040~~
~~0935~~	~~4050~~
~~0940~~	~~5070~~

~~1x8 oz~~
~~1x16 oz~~

~~1030 – FD~~
~~→ 1x8 oz 1x16 oz~~

~~5070 – MS/MSD~~
~~→ 2x8 oz~~

Location Riverbend, Detroit, MI Date 11/5/15

Project / Client EPARS

0945 RB15-21 Core opened and logged
Sampled from 1st attempt
2nd + 3rd attempts opened.

Time	Interval
1010	0010
1015	1020

NSR

~~0840 RB15-24 core opened and logged~~

~~Time~~	~~Interval~~
~~1020~~	
~~0920~~	
~~0925~~	
~~0930~~	
~~0935~~	
~~0940~~	

~~1x8 oz~~
~~1x16 oz~~

~~1030 – FD~~
~~→ 1 x 8 oz 1x16 oz~~

~~50~~

0840 RB15-24 core opened and logged

Time	Interval
1020	0010
0920	1020
0925	2040
0930	4050
0935	5060
0940	6080

1x8 oz
1x16 oz

2040 – FD
→ 1x8 oz
1x16 oz

6080 – MS/MSD
→ 2x8 oz.

Location Riverbend, Detroit, MI Date 11/5/15
Project / Client EPA R5

1040 RB15-23 core opened and logged

Time	Interval	
1100	0010	
1105	1030	1x8oz 1x16oz
1110	3050	1030-FD ↳ 1x8oz 1x16oz

1130 RB15-25 core opened and logged.

Time	Interval	
1140	0010	1x8oz 1x16oz

1200 Clean up of USACE core processing facility

1415 TCLP samples taken from waste drum
2x8 oz 1x2 oz RB15-Waste1

1420 2x8oz 1x2oz RB15-Waste2

1425 2x8oz 1x2oz RB15-Waste3

Location Riverbend, Detroit, MI Date 11/5/15
Project / Client ~~River~~ EPA R5

1430 Equipment packed and ready to be loaded

1445 Offsite. End of Field Sampling effort.

JM

JM

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A2. Core Collection Logbook

CONTENTS

PAGE	REFERENCE	DATE

Location Detroit River AOC Date 26 Oct 2015

Project / Client Riverbend / EPA GLNPO

Monday 62°F mostly clear with a few clouds

EA (Jessica Moen, Ryan Darnton, Kevin Kowalk)

1000 - Onsite at Historic Fort Wayne USACE facility. Drop off fridge truck.

1030 - Onsite at McCoig. Meet Rose Ellison (EPA) and Brian Palys (Matezo)

1055 - Sign in at LeFarge Cement.

1120 - Load equipment onto the barge.

1150 - Safety meeting with vessel crew.
Matezo: Zack Martin, Brian Palys, C.J. Stoutyedyler
MTL: Tyler Hanna
Marine Services: Steve Gayton, Joe Gayton
EA: Ryan Darnton

~~1205 - Barge departs dock~~

Discuss communication between crew members, proper PPE, lifevests and avoiding ~~spu~~ the area around the spud cables on the deck.

1205 - Barge departs from the dock.

1215 - Spud down at Location RB28,
- Tyler Hanna of MTL ~~cor~~ on JMM

Location Detroit River AOC Date 26 Oct 2015

Project / Client Riverbend / EPA GLNPO

Monday

the barge deck used a cell phone to communicate with Steve Gayton on the tug to get on location

1240 – Ponar collected at RB15-28

– H_2O depth at RB15-28 is 43 ft

1345 – Core collected at location 28. recovery >90% on a 10ft push. Mostly gray clay. ~~Tu~~

1415 – Spuds up depart RB15-28

1421 – Spud down at RB15-27

1450 – Collect Ponar at RB15-27. Six attempts were required to get sufficient material.

– Mateco ~~use~~ lowers a 4.25 inch hollow stem auger down to the sediment surface. They then lower a 3inch metal barrel down inside the auger. The HDPE core tube is loaded in the bottom 10 ft of the barrel, and ~~so~~ a core catcher is attached to the bottom of the barrel. There is a one-way ball valve inside the ~~barrell~~ barrel just above the

RWD

Location Detroit River AOC Date 26 Oct 2015

Project / Client River bend / EPA GLNPO

Monday

sheen noted when spuds went up and down at RB15-27

core tube, and a few ≈½ diameter holes in the ~~wat~~ wall of the barrel just above the oneway valve. When the barrel reaches the sediment surface ~~it is att~~ the sonic machine is attached to the top by hose and is run while the geoprobe pushes ~~do the~~ down ≈10 ft.

1530 – Core collected at RB15-27 ≈70% recover, but did not encounter clay.

1600 – Barge returns to Lefarge. Offload samples and equipment and ~~trans~~ transport to USACE processing center in the truck

1630 – EA (RWD) offsite

October 26, 2015

Location Detroit River AOC Date 27 Oct 2015
Project / Client ~~RiT~~ Riverbend / EPA GLNPO
Tuesday 48°F mostly cloudy
light W wind ≈ 2 knots

0740 - EA onsite at McCoig. Load equipment onto barge.

0750 - Safety meeting. Discussed potential windy conditions this afternoon. Also discussed ear protection when the sonic ~~is r~~ core is running

0800 - Barge departs McCoig dock bound for Harbortow sampling locations. EA calibrates PID

0930 - Spud down at location HBT1S-A

0940 - Collect ponar at HBT-A.

1010 - First core attempt at HBT-A. Only 50% recovery

1045 - 2nd core attempt at HBT-A. 100% recovery. Encountered refusal at 10 ft

1100 - Raise spuds ~~at at~~ from HBT-A

1110 - Spud down at HBT-B. Location shifted ≈50 ft offshore due to riprap that prevented the barge from getting closing.

1120 - Ponar collected at HBT-B. Three

RWO

Location Detroit River AOC Date 27 Oct 2015
Project / Client Riverbend / EPA GLNPO
Tuesday 56°F cloudy and breezy

attempts required. Lots of mussel shells

1200 - Sonic coring rig broke down during the first push at HB1S-B. <3 ft in the core tube.

- Mateco contacted the sonic rig manufacturer. ~~and arrange~~ It cannot be fixed on location as a new hose is required to connect the motor with the sonic drill head. The new part has been ordered and will be overnighted to the USACE at Fort Wayne.

1320 - Discussed options and weather forcast for the next few days. ~~Plan will~~ The barge can le left at Harbortown overnight.

1400 - ~~Dis~~ CJ of Mateco leaves to get parts. After phone conversations with Kevin Kowalk, who spoke with Rose Ellison of EPA, an attempt will be made to direct push the

RWO

Location Detroit River AOC Date 27 Oct 2015
Project / Client Riverbend / EPA GLNPO
Tuesday

sampling tube with the Geoprobe. This will be attempted when CJ returns. He is being picked up by Jessica Moen (EA) near HarborTown

1455 – CJ (Mateco) returns to the vessel will parts for the direct push attempt

1500 – Begin lowering hollow-stem auger at HBTIS – B.

1540 – 2nd attempt core collected at HBTIS – B, using pneumatic hammer

~~1600~~ 10 ft push but only 5 ft recovery

1600 – Spuds up from HCBIS – B.

1700 – Spud down at McCoig. Unload ~~cores~~ samples, cores and equipment.

October 27, 2015

Location Detroit River AOC Date 30 Oct 2015
Project / Client Riverbend / EPA GLNPO
Friday 45°F mostly cloudy

0740 – EA onsite at McCoig
- ~~Load a~~ Mateco onsite
- Load equipment onto barge

0800 – Barge departs from McCoig bound for Harbortown.

~~0805~~ Crew: Ryan Darnton (EA), CJ Stoutjesdyk (Mateco), Zack Martin (Mateco), Jon O'Brock (MTC) Steve and Joe Gayton (Marine Services.

0805 – Safety meeting. Discuss staying in the center of the barge when it is close to shore, and ear protection when sonic Rig is running.

0830 – EA calibrates PID

0930 – Spuds down at location HBTIS-B for 2nd attempt at coring. Location is 2 ft north and 2 ft west of the first attempt location, slightly closer to shore.

1010 – Core collected at HBTIS-B
- recovery was ≈60 (6 ft from a 10 ft push.

RWD

Location Detroit River AOC Date 30 Oct 2015
Project / Client Riverbend/EPA GLNPO
Friday

1020 - Shift ≈ ½ foot north and 1 ft west (closer to shore) to make another ~~a final~~ core ~~att~~ attempt at HBT15-B.

1050 - Recovery 5ft on a 10 ft push. This was the 3rd overall sonic attempt at HBT15 (2nd attempt today). For each attempt there was a dark black material starting ≈ 2 ft down that was difficult to push through.

1100 - Spuds up from HBT15-B

1110 - Spud down at HBT15-C. Location shifted 22 ft SE due to shoreline riprap and rocks

1155 - Collected Ponar at HBT15-B. 12 attempts were required due to rocky substrate.

1225 - 1st Core attempt. 2 ft penetration and ≈ 3" recovery.
- EA contacted Rose Ellison (EPA) to discuss ~~reloc~~ moving farther away from the planned location.

1235 - Moved 22 ft farther from shore

1305 - 2nd attempt core collected at

RWO

Location Detroit River AOC Date 30 Oct 2015
Project / Client Riverbend/EPA GLNPO
Friday 50°C cloudy

HBT15-C. 10 ft push, 8.9 ft recovery (89%).

1325 - Collect Ponar at ~~HG~~ 2nd attempt location. 4 attempts consolidated into on tray.

1345 - Spuds up. Depart HBT15-C

1415 - Spud down at RB15-01

1435 - Collect 1st attempt Core at RB15-01 9 ~~10~~ ft push, 2.2 ft recovery
- shift 4 ft south/2 ft east

1515 - 2nd attempt, 9 ~~10~~ ft push, 5ft recovery (50%)
- Shifted 3 ft south/ ~~2 ft~~ 2.5 ft east ~~for~~ to make a 3rd attempt

1530 - Joint between Geoprobe and sonic head splits. Mateco attempts to weld it back together.

1545 - Weld completed. Resume 3rd attempt at RB15-01

1601 - ~~3rd~~ Collect 3rd attempt core at RB15-01. 9 ft push, 4ft recovery.

All 3 core attempts were to refusal

RWO

Location Detroit River AOC Date 30 Oct 2015
Project / Client Riverbend / EPA GLNPO
Friday

1620 - Collect Ponar at RB15-01
1630 - Spuds up. Depart RB15-01 for
return trip to McCoig
1700 - Spud down at McCoig.
- Unload samples and equipment

October 30, 2015

Location DETROIT RIVER AOC Date 10/31/15
Project / Client RIVERBEND / EPA GLNPO

SATURDAY
Overcast, 45° wind SSE 3-5mph

0730 EA onsite @ McCoig
meet: M. Gelinas, EA
CJ } Matco
Zach }
John MTC
Steve + Joe - Marine Services

0800 Safety meeting
no issues, discussed time change
tomorrow
Head towards RB15-02

0910 Arrive RBT15-02

0920 RBT15-02-SURF collected
-SURFFD
sheen observed.

0925 Attempt #1 begin

1000 #1 complete

Location DETROIT RIVER AOC Date 10/31/15

Project / Client RIVERBEND/EPA GLNPO

1015 moving to -03

1030 Arrive RB15-03

1045 RB15-03-SURF
-SURF MS
-SURF MSD
collected

1130 RB15-03 complete
moving to -04

1215 Arrive RB15-04

wind has picked up, ~15-20
from SSE. Difficult to
maneuver barge. ~13' off due to
riprap/wind conditions

1230 RB1503-SURF collected

1300 1st Attempt core collected.
Location complete

1315 moving to next location

Location DETROIT RIVER AOC Date 10/31/15

Project / Client RIVERBEND/EPA GLNPO

1345 Arrive RB15-05

1355 ponar collected - ~~all shell~~ 0 recove
~~pieces/whole shells~~. 5 tries, riprap

1400 pivot 20' out from seawall
ponar all whole shell/shell pieces -
Trying for core to determine if
should continue trying ponar.
Probing in moonpool = soft sed,
could get core.

1400 RB15-05-SURF collected

1430 Core collection complete.
Moving to next location.

1445 Arrive RB15-06

1500 Collect RB15-06-SURF
Did not collect FD here due to
high conc. mussel shells. Will
reassign FD

Location DETROIT RIVER AOC Date 10/31/15

Project / Client RIVERBEND/EPA GLNPO

1550 core collection complete

1600 Pulling up spuds, heading back to dock.

1645 Arrive McCoig, unload

1700 McCoig gate is locked, cannot leave.
Mateco gives permission to cut lock + replace w/ own lock

1715 EA unloads cores @ USACE

1800 Done for day

Location DETROIT RIVER AOC Date 11/1/15

Project / Client RIVERBEND/EPA GLNPO

SUNDAY

Partly cloudy, 50°F
wind 15-20 mph, improving through day

Barge deck to wat surf = 5'

0700 M. GELINAS, EA
CJ } Mateco
Zach }
Tyler - MTC
Steve } Marine Services
Joe }

meet @ McCoig

0720 underway to RB15-10

0800 Arrive RB15-10 ~70' south of tgt d/w to pilings/dolphins

0815 collect RB15-10-SURF
collect add'l. volume

0915 moving to next loc.

0920 Arrive RB15-09

Location DETROIT RIVER AOC Date 11/1/15
Project / Client RIVERBEND / EPA GLNPO

0930 RB15-09-SURF collected
+ FD

1020 Hole complete, moving to next location
Wind has increased, steady @ 15-20 Kts. Waves now 1-2'! Going to continue trying w/ drilling. Everyone in agreement to keep going.

1030 Arrive RB15-08

1035 Collect RB15-08-SURF
+ FD

1120 Hole complete. Moving to next location

1130 Arrive RB15-07

1145 collect RB15-07-SURF
All loose shells, collect double volume

Location DETROIT RIVER AOC Date 11/1/15
Project / Client RIVERBEND / EPA GLNPO

1145-1245 RB15-07A, 61%

1245-1325 RB15-07B, 61%

1330-1400 RB15-07C, 61%

1400 Hole complete, moving to next location

1450 Arrive at RB15-18

1515 collect RB15-18-SURF

1600 RB15-18 core collected

1605 Rig secure, heading to dock.

1630 Arrive McCaig

1645 unloaded

1700-1730 EA unloads samples
@ USACE

Location Detroit River AOC Date 02 NOV 2015

Project / Client Riverband / EPA GLNPO

Monday 45°F sunny

0710 - EA (RWD) onsite at McCoig.
~~0722~~ Load equipment onto barge
0725 - Depart McCoig dock
Crew: Ryan Darnton (EA)
CJ. Stoutjesdyk (Mateco)
Tyler Hanna (MTC)
Zack Martin (Mateco)
Steve Gayton (Marine Services)
Joe Gayton (Marine Services)

0730 - Safety Meeting. No new issues to discuss. ~~Con~~ Will continue to be vigilant. Weather forecast is good for today.

0745 - EA Calibrates PID using fresh air and isobutylene

0800 - Arrive at RBIS-17

0815 - Collect Ponar - 3 attempts
0905 - Collect 1st core attempt 10 ft push, 9 ft recovery (90%)
0920 - RBIS-17 completed, Spuds up and depart location

RWD

Location Detroit River AOC Date 02 NOV 2015

Project / Client Riverbend / EPA GLNPO

Monday

0935 - On location at RBIS-16
1010 - Collect Ponar, 9 attempts to get needed volume.
1100 - 1st core attempt, 10 ft push, 6.2 ft recovery (62%)
1135 - 2nd core attempt. 10 ft push, 9.2 ft recovery (92%)
1152 - Collection completed at RBIS-16 spuds up

1200 - On location at RBIS-15
1225 - Collect Ponar. 4 attempts. MS/MSD volume collected
1300 - 1st attempt core collected. 10 ft push, 10 ft recovery (100%)
1310 - Complete location. Spuds up

1530 - On location at RBIS-14
~~Coordin~~ On location based on aerial image, but coordinates are indicating point would be ≈120 ft ~~offshore~~ farther offshore, ~~For~~ EA consults with John Barkach who indicates that the location

Location Detroit River AOC Date 02 NOV 2015

Project / Client Riverbend / EPA GLNPO

Monday

John Bartach observed collections at locations 13 & 14 should be close to the ~~w~~ seawall, and advises EA to proceed at the current location based on ~~visuet~~ visual landmarks

1345 – Collect Ponar, 3 attempts

1420 – Collect 1st attempt core
10 ft push, 10 ft recovery (100%)

1430 – Location completed. Spuds up
Locations was 16′ south and 26′ east of the point

1435 – On location at RBIS-13

1450 – Collect Ponar, 3 attempts consolidated into one tray

1510 – 1st attempt core collected
10 ft push, 11 ft recovery (110%)

1525 – Location completed, Spuds up
Location was 9′ ft south and 23′ east of the point

1555 – On location at RBIS-19
riprap and wood pilings near the shore. Location

Location Detroit River AOC Date 02 NOV 2015

Project / Client Riverbend / EPA GLNPO

Monday

shifted ≈ 75 ft due south

1600 – Collect Ponar

1635 – Collect 1st attempt core. 10 ft push,
2.6 ft recovery (26%)

1705 – Collect 2nd attempt core
10 ft push, 10.5 recovery (105%)

1715 – Location completed. Spuds up

1730 – Spud down at McCaig. Unload gear, and samples

~~02 N~~ November 2, 2015

Location Detroit River AOC Date 03 Nov 2015

Project / Client Riverbend / EPA GLNPO

Tuesday 50°F sunny

0700 - EA onsite at McCoig. Load equipment onto barge.

0715 - Safety meeting. Discuss not rushing ~~at the~~ and staying vigilant at the end of the day.

0720 - Spuds up. Depart McCoig dock.
Crew: Ryan Darnton (EA)
CJ. Stoutjesdyk (Mateco)
Zack Martin (Mateco)
Tyler Hanna (MTC)
Steve Gayton (Marine Services)
Joe Gayton (Marine Services)

0740 - On location at RB15-26

0840 - Collect Ponar, ~~at~~ 10 attempts produced mostly gravel. Jarred what ~~we~~ sediment there was.

0905 - Collect 1st attempt core.
10 ft push, 10 ft recovery (100%)

0920 - Location completed. Spuds up. Samples collected within 10 ft of the coordinates

RWD

Location Detroit River AOC Date 03 Nov 2015

Project / Client Riverbend / EPA GLNPO

Tuesday

1000 - On location at RB15-12

1020 - 5 attempts with the Ponar yielded no recovery
- Location is 20 ft south of the point due to the seawall.

1040 - 1st attempt core. 10 ft push, 2.2 ft recovery (22%). Sheen and strong odor from black ~~slime~~ material. Shift barge for 2nd attempt

1105 - 2nd attempt core. Encountered refusal at 4.8 ft, <1 ft recovery. mostly rocks

1120 - shift barge for 3rd attempt
- refusal at 3.1 ft, recovery ≈ 1 ft of rock and brick fragments

1150 - No recovery for ponar or core
- Spuds up depart location RB15-12

~~1155 - Spuds down~~

1155 Spuds down at RB15-11
15 ft south and 20 ft east of the point

1220 - Collect Ponar. 2 attempts

RWD

Location Detroit River AOC Date 03 NOV 2015

Project / Client Riverbend / EPA GLNPO

Tuesday 74°F sunny

1245 - Collect 1st attempt core
10 ft push, 11 ft recovery (110%)

1305 - Location completed, Spuds up
and depart from RB15-11
- Rex Johnson of MDEQ observed
collection activities at both
RB15-11 and RB15-12, including
location adjustments

1330 - On location at RB15-23
- Location shifted 6 ft west and ≈50 ft
south due to shoreline riprap

1340 - Collect Ponar. One attempt

1400 - 1st Core attempt. Encountered
refusal at 8.4 ft
- shifted 4 ft SW for 2nd attempt

1430 - 2nd core attempt. Refusal at 7.1 ft
and 0 ft recovery
- Shifted SE ≈10 ft for 3rd attempt

1505 - 3rd attempt. 10 ft push
5 ft recovery (50%)

1515 - Spuds up. Depart from RB15-23

Location Detroit River AOC Date 03 NOV 2015

Project / Client Riverbend/EPA GLNPO

Tuesday

1525 - On location at RB15-22

1535 - Collect Ponar. Three attempts

1555 - 1st Core attempt. 10 ft push,
2.1 ft recovery (21%). shift

1620 - 2nd Core attempt. Refusal
at 7.3 ft recovery, recovery
2.9 ft
- shift ≈ 5 ft WSW for 3rd attempt

1650 - 3rd core attempt. refusal at
5.5 ft, 4.7 ft recovery (85%)

1655 - Spuds up. Depart RB15-22

1710 - Spud down at McCoig. Unload
equipment and samples

1730 - EA leaves McCoig for USACE
facility

Ryan Wildbe Dant
November 3, 2015

Location Detroit River AOC Date 04 NOV 2015

Project / Client Riverbend / EPA GLNPO

Wednesday

0735 – EA onsite at McCoig. Load equipment.

0745 – Safety meeting. Discuss ensuring that all drilling and spud activities remain at least 200' away from utilities at all times.

0750 – Depart McCoig.

Crew: Ryan Darnton (EA)
CJ Stoutjesdyk (Mateco)
Zack Martin (Mateco)
Tyler Hanna (MTC)
Steve Gayton (Marine Services)
Joe Gayton (Marine Services)

– EA contacts Lori Deaton (Kinder-Morgan) and Mike Gaetz (Plains). Lori will be onsite first. KM pipeline is ~~the~~ upstream of Plains pipeline. Decision made to spin the barge around and attempt RB15-24 first with the spuds upstream of the moon pool.

0820 – Lori Deaton (KM) onsite to spot as barge approaches RB15-24

RWD

Location Detroit River AOC Date 04 NOV 2015

Project / Client Riverbend / EPA GLNPO

Wednesday 70°F sunny

0835 – Mike Gaetz (Plainwell) onsite

~~0840~~

0840 – On location at RB15-24

– Lori Deaton (KM) confirms that location is well clear of the pipeline

0855 – Collect Ponar – one attempt

0920 – 1st Core attempt. 10 ft push 11 ft recovery (110%)

0930 – Location RB15-24 completed spuds up.

– EA calls Mike Gaetz (Plainwell) to ~~let hi~~ discuss approaching RB15-25.

0945 – On location at RB15-25

– Confirm with Mike Gaetz that location is clear of the ~~pipeline~~ Plains pipeline.

1030 – 1st Core attempt. 10 ft push, 8.6 ft recovery (86%)

1040 – Location completed. Spuds up

RWD

Location Detroit River AOC Date 04 NOV 2015

Project / Client Riverbend / EPA GLNPO

Wednesday 70°F sunny

1100 – On location at RB15-21

1145 – Collect Ponar. 12 attempts required

1210 – 1st core attempt. refusal at 4.2 ft, recovery 2.0 ft (48%)

– Shift for 2nd attempt

1240 – 2nd core attempt. refusal at 6.1 ft, recovery 1.5 ft (≈25%)

– Shift for 3rd attempt.

1305 – 3rd core attempt. 10 ft push recovery 1 ft (10%)

1315 – Spuds up, depart RB15-21

1335 – On location at RB15-20

1345 – Collect Ponar. One attempt

1415 – 1st Core attempt, 10 ft push, recovery 9.2 ft (92%)

1430 – Location completed, Spuds up

– Travel to the area around locations RB15-07, 08, 09, 10, 11 with Rose Ellison (EPA) onboard.

1530 – Spud down at McCoig. Unload equipment.

Wilder

November 4, 2015

Location Date

Project / Client

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A3. Field Data Collection Forms

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RBIS-01	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256125	CORE COLLECTION INFO 8 Start Date/Time: 30OCT2015/1415 Stop Date/Time: 30OCT2015/1630	
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/[✓ Northing]/Grid 1st attempt 303118.2	9 Sed Surface Elevation 566.1 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 8.1	
3 Operator Name *(License # If Required)* LJ Stoutjesdyk	7 Longitude/Easting/Grid 1st attempt 13478776.7	12 Weather (Temp, circle conditions, wind direction) 50°F Sunny/[✓ Cloudy]/Rain —	

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft) 2nd attempt	15 % Recovery 2nd attempt
9 ft	4.8	53%

16 Location Notes
2 ft south 6 ft west of point

Interval *(Depth)*	Description of Materials Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	Sample ID	USCS *Code*
Grab Sample (~0-0.5 ft)	1600 brown silt with a few pieces of woody organic debris. mild sewage ~~sme~~ odor	RBIS-01-surf	

Other:

deck elevation 579.3 ft

deck to sediment 13.1 ft

1435 1st attempt core - recovery poor, metal junk caught in the bottom of the core. 9 ft push, 2.2 ft recovery (23%)

1515 2nd attempt coordinates 4 ft south/2 ft east of 1st attempt
northing 303114.7
easting 13478778.6
9ft push, 5 ft recovery (58%) rock jammed in the core catcher
deck elevation 579.1 ft, 13.6 deck to sediment

1600 3rd attempt
13.3 ft deck to sediment, deck elevation 579.4
northing 303111.8
easting 13478781.2 } shifted 3 ft south, 2.5 ft east
9 ft push, 4 ft recovery
all 3 attemps were to refusal

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-01	Sheet 1 of 1	
1 Geologist Name/Signature M. Gelinas	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Date/Time Collected** 10/30/15 1630	**Date/Time Processed** 11/3/15 1415
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/Northing/Grid ~~303118.~~ 303114.7	9 Sed Surface Elevation ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end)	
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid 13478778.6	12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ___ -ft barrel ___ -in diameter Manual Push/Vibracore

☐ Grab Sample: ___ -ft x ___ -ft x ___ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
9'	4.6'	51%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-3"	d gray	silt, trace clay, little vf sand	RB15-01-0010 (0-12")		
3-7"	Black- ~15%	d. gray silty clay, organics ~30%, vf sand	RB15-01-1030 (12-36")		
7"-21"	d gray	~~silty clay~~ clayey silt, black streaking, slight petroleum odor.			
21-42"	Black	silty clay, petroleum odor, organics 20% @35-36" interbedded w/ gray silty clay	RB15-01(3055) (36-55")		
42-55"	d. gray-	@39-41" " " black silty boulders/pebbles.			
		Chunks of asphalt(?); c sand/gravel 5% angular			

Sed ele: 579.23-32'

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-02	Sheet 1 of 1

1 Geologist Name/Signature

5 Project Number 6256125

CORE COLLECTION INFO

8 **Start Date/Time** 10/31/15 0925

Stop Date/Time 10/31/15 1000

2 Drilling Subcontractor/Equipment Operator MATECO

6 Latitude/Northing/Grid 302804.1

9 Sed Surface Elevation 547.23' ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)* CJ/Mateco

7 Longitude/Easting/Grid 1347831.5

12 Weather (Temp, circle conditions, wind direction) Sunny/[✓ Cloudy/Rain]

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	11'	110%

16 Location Notes

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	Brown f-m sand, sheen visible, clam shells up to 3" across to frags, wood debris ~1" (30%)	RB15-02-SURF + FD	

Other:

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Riverbend**	Location/Boring Name RB15-02	Sheet 1 of 1

1 Geologist Name/Signature **M. Gelinas**	5 Project Number **6256125**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 10/31/15 **Date/Time Processed** 11/3/15 0800
2 Drilling Subcontractor/Equipment Operator **MATECO**	6 Latitude/Northing/Grid	9 Sed Surface Elevation ft 10 Coordinate System H **NAD83** V **NAVD88** 11 Depth of Water, ft (start/end)
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid	12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	11'	110%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-18"		Black m sand w/ clay, strong petr. odor, woody debris, shell hash ~15%. In top 2" aluminum can top, plastic wrapper.	RB15-02-0010 (0-12")		
18-20		Black soft clay, strong petr. odor	RB15-02-1030 (12-39")		
~~20-39"~~		~~Black m sand w/ clay~~			
20-25"		black ~~m sar~~ f-m sand w/ clay, organics ~20%	RB15-02-3040		
20-35"		Black silty clay w/ dense organic material (leaves, twigs)	(39"-52")		
35-39"		same as 20-25"			
39-53"		gray fat clay			
53-60"		Black f-m sand within gray clay, HC odor - likely sluff c 5' of push.			
60-11'		Gray fat clay, trace gravel			

HC odor

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name RB15-03

Sheet 1 of 1

1 Geologist Name/Signature

5 Project Number 6256125

CORE COLLECTION INFO

8 **Start Date/Time** 10/31/15 1030

Stop Date/Time 10/31/15 1130

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid ~~305~~ 302542.34
my

9 Sed Surface Elevation 561.8' ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)* CJ

7 Longitude/Easting/Grid 13477154.36

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter
☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft) 10'

14 Recovery (ft) 11'

15 % Recovery 110%

16 Location Notes

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	v soft brown-gray silt/silty clay. v fine-fine sand 10-20%	RB15-03-SURF +MS +MSD	

Other:

579.41' deck elev
18.8' deck to sed

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-03	Sheet 1 of 1
1 Geologist Name/Signature M. Gelinas	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Date/Time Collected** 10/31/15	**Date/Time Processed** 11/2/15 1400
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/Northing/Grid	9 Sed Surface Elevation ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end)	
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid	12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	11'	110%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-50"		Black silty clay, strong petroleum odor, trace gravel, trace f sand, trace organics	RB15-03-0010 (0-12")		
50-53"		Black-d. gray organic-rich silty clay	RB15-03-1030 (12-36")		
53-54"		well-rounded c-sand/gravel, 10% black silt			
54-59"		organic rich black silty sand (vf-f), trace well-rounded gravel	RB15-03-3050 (36-59")		
59"-118"		Gray fat clay, trace red streaking trace well-rounded gravel → black draw down visible to 7.5' on outside of core.	RB15-03-5070 (5-7')		

Sed ele. 579.301-27' =

EA
LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-04

Sheet 1 of 1

1 Geologist Name/Signature

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 10/31/15 1230

Stop Date/Time 10/31/15 1300

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid
301389.25

9 Sed Surface Elevation 552.301' *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*
CJ S.

7 Longitude/Easting/Grid
13475078.86

12 Weather (Temp, circle conditions, wind direction)
Sunny/[✓ Cloudy]/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ______ -ft barrel ______ -in diameter

☐ Core: ______ -ft barrel ______ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ______ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	9.6'	96%

16 Location Notes

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	brown sand w/ riprap, gravel/pebbles, slight sheen/brick/shell hash crayfish - live but moving slowly	RB15-04-SURF	

Other:

~13' off of target due to riprap + increased wind
close enough to talk to fishermen - mentioned submerged car in vicinity of target

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: **GLAES** **Riverbend**

Location/Boring Name: RB15-04

Sheet 1 of 1

1 Geologist Name/Signature: **M. Gelinas**

5 Project Number: **6256125**

CORE COLLECTION INFO

8 Date/Time Collected: 10/31/15

Date/Time Processed: 11/3/15 0900

2 Drilling Subcontractor/Equipment Operator: **MATECO**

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H **NAD83** V **NAVD88**

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 9.4'

15 % Recovery: 94%

16 Location Notes:

HC odor

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-5"		Black f-m sand. clay ~10%, whole shells up to 2.5" across, fragments ~10%	RB15-04-0010 (0-12")		
5-10"		Black silty clay, f-vf sand 10%	RB15-04-1030 (12-39")		
10-16"		Black gravel - pebble sized pieces in black silty clay, f sand ~20%	RB15-04-3040		
16-29		tan-gray f-m sand, silt 1%, wood debris 2% little odor	(39-51")		
29-39"		Black f-m sand (same as 16-29") silt 20% slight HC odor			
39-9.4'		Gray fat clay, trace gravel			

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-05

Sheet
1 of 1

1 Geologist Name/Signature
M. GELINAS Mllingelinas

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time**
10/31/15 1400

Stop Date/Time
10/31/15 1430

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid
300277.726

9 Sed Surface Elevation 571.185 - 24.1 = 565.185' ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*
CJ

7 Longitude/Easting/Grid
1347376.44

12 Weather (Temp, circle conditions, wind direction)
Sunny/[✓ Cloudy]/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)
10'

14 Recovery (ft)
9.2'

15 % Recovery
92%

16 Location Notes

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	Trace silt, whole mussel shells. Loose, unconsolidated.	RB15-05-SURF	

Other:

not sure if can get analytical sample data out of sample. very little fine material. can see shells in top 6" of core, too

1st setup: N 300288.33
E 1347358.59
EL: 571.23

0% recovery in ponar, 5 tries
riprap visible.
Pivoted out towards channel, away from shore/RR bridge. core ponar successfully collected here, coord. in boxes 6+7 above.

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-05

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Date/Time Collected** 10/31/15

Date/Time Processed 11/3/15 0945

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 9.5'

15 % Recovery: 95%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-3"		Gray silt w/ mussel shells (shells ~70%)	RB15-05-0010 (0-12")		
3-4" 4"-9.5'		Black clay w/ f-vf sand gray fat clay	RB15-05-1030 (12-36")		
		want to be sure to analyze all soft sed and R. Ellison is not onsite to give OK on only 0-1'.			

Sed elev: 574.213 - 34.7' =

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-06	Sheet 1 of 1
1 Geologist Name/Signature	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Start Date/Time** 10/31/15 1500 **Stop Date/Time** 10/31/15 1550	
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/Northing/Grid 300122.59	9 Sed Surface Elevation ~~545.293~~ 544.59 ft 3' 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end)	
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid 13473589.269	12 Weather (Temp, circle conditions, wind direction) Sunny/[✓ Cloudy/Rain]	

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ______ -ft barrel ______ -in diameter

☐ Core: ______ -ft barrel ______ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ______ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	10.3'	103%

16 Location Notes

Interval *(Depth)*	Description of Materials Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	Sample ID	USCS *Code*
Grab Sample (~0-0.5 ft)	gray-d. gray silt w/ f sand + uncons. whole mussel shells/hash Did not take FD here due to mussel shells, will reassign	RB15-06-SURF	

Other:

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name: RB15-06

Sheet **1** of ***1***

1 Geologist Name/Signature: **M. Gelinas** MGelinas

5 Project Number: **6256125**

CORE COLLECTION INFO

8 **Date/Time Collected**: 10/31/15

Date/Time Processed: 11/3/15

2 Drilling Subcontractor/Equipment Operator: **MATECO**

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H **NAD83** V **NAVD88**

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
☐ Grab Sample: _____ -ft x _____ -ft x _____ -ft Box/Ponar/Van Veen/Other
☐ Other:
Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	10.5'	105%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-1" 1-2"		Gray silty clay, f-vf sand w/ mussel shells (70%) Black f-m sandy clay	RB15-06-0010 (0-12")		
2"- 10.5'		gray fat clay	RB15-06-1030 (12-36")		

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-07

Sheet 1 of 1

1 Geologist Name/Signature: Mirnayelias

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 11/1/15 ~~12~~ 1145

Stop Date/Time: 11/1/15 1325

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid: ~~299392.5~~ 299895.3

9 Sed Surface Elevation: 541.2' ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*: CJ S

7 Longitude/Easting/Grid: ~~13473271.3~~ 13473274.8

12 Weather (Temp, circle conditions, wind direction): [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 10"

14 Recovery (ft): 6.5'

15 % Recovery: 65%

16 Location Notes:

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	unconsolidated mussel shells ~80% lt grey silt/vf sand ~20% collected double volume	RB15-07-Surf	

Other:

~~deck elev: 578.8~~ mg

to Sed:

A: ~~5.8~~ 6.1' unsettled deck elev: 578.8 1145-1240
1145-1245 299392.5N; 13473271.3W

process for best rec.

*B: ~~5.7~~ 6.5' unsettled 1245-1325
deck to Sed. 37'
299895.3N; 13473274.8W
deck elev: 578.2'

C: 1330-1400
deck to Sed. 38.4'
6.1'
1330-1400

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-07B

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Date/Time Collected:** 11/1/15

Date/Time Processed: 11/2/15 0830

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 6'

15 % Recovery: 60%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-6"		d. gray silt w/ mussel shells (40%), pebbles, gravel ~20% (SM)	RB15-07-0010 (0-1')		
6"-2'		Black gravel w/ pebbles ~30%, coarse sand, gray silt 10% (GW)	RB15-07-1020 (0-2')		
2-6'		Gray clay, fat clay (CH)	RB15-07-2030 (2-3')		
		Interval archived by R. Ellison, on-site for processing			

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-08	Sheet 1 of 1

1 Geologist Name/Signature

5 Project Number 6256125

CORE COLLECTION INFO

8 **Start Date/Time** 11/1/15 1035

Stop Date/Time 11/1/15 1120

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid: ~~299536.3~~ mg 219725.5

9 Sed Surface Elevation 551.3' ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*: CJ S

7 Longitude/Easting/Grid: 13472951.8

12 Weather (Temp, circle conditions, wind direction) [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	9.4'	94%

16 Location Notes

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	Brown f-m sand, small shells ½" across ~15%	RB15-08-SURF + FD	

Other:

~70' S of location due to submerged pilings along seawall.

578.8 deck elev
- 27.5 deck to sed
551.3

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-08	Sheet 1 of 1
1 Geologist Name/Signature M. Gelinas Meg Gelinas	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Date/Time Collected** 11/1/15 **Date/Time Processed** 11/2/15 0950	
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/Northing/Grid	9 Sed Surface Elevation *ft* 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end)	
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid	12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	9.5'	95%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-7"		Gray semi-firm clay and gray f-m sand, ~25% wood debris ~10% large rock ~3x3", cobbles 10%	RB15-07-0010		
7"-9.5'		Gray semi firm clay w/ trace gravel	(from 0-12")		
		no other samples taken after consult w/ K. Ellison, on-site PM processing			

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-09

Sheet 1 of 1

1 Geologist Name/Signature: Tracy Collins

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 11/1/15 0930

Stop Date/Time: 11/1/15 1015

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid: 299651.3

9 Sed Surface Elevation: ~~541.4~~ ~~551~~ 551.4 ft 541.4

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*: CJ

7 Longitude/Easting/Grid: 13472911.6

12 Weather (Temp, circle conditions, wind direction): [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 11'

15 % Recovery: 110%

16 Location Notes:

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	dk gray sandy silt (sand vf-f) mussel shells 30-40%	RB15-09-SURF- +FD	

Other:

~13' x 10' off due to riprap/submerged pilings along seawall.

37.4' to sed

110% due to high clay conc in core - expanding

579.5' deck elev
- ~~37.4'~~ deck to sed = 37.4
~~551.4~~
541.4

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-09

Sheet
1 of 1

1 Geologist Name/Signature
M. Gelinas

5 Project Number
6256125

CORE COLLECTION INFO

8 **Date/Time Collected** 11/1/15

Date/Time Processed 11/2/15 1015

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft) 10'

14 Recovery (ft) 10.9'

15 % Recovery 109%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-6'		black coarse sand/gravel, shell debris, d-gray silt ~20%, cobbles (of asphalt?) ~1%	RB15-09-0010 (0-9")		
6"-8" 8"=9"		gray fat clay coarse sand-gravel, ~~silt~~ some trace black-d.gray			
9"-10.9'		Gray fat clay, streaks of red, trace gravel (clt)			

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-10	Sheet 1 of 1

1 Geologist Name/Signature

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**	**Stop Date/Time**
11/1/15 0815	11/1/15 0910

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid: 299536.3

9 Sed Surface Elevation: 574.2' ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*: CJ S.

7 Longitude/Easting/Grid: 13472730.9

12 Weather (Temp, circle conditions, wind direction): [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

- ☐ Rotosonic: ____ -ft barrel ____ -in diameter
- ☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- ☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
- ☐ Other:
- ☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	11'	110%

16 Location Notes

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	d. gray silt w/ whole mussel shells ~50-60%, vf sand 25%	RB15-10-SURF	

Other:

31.4' to sed.

1st Attempt

N: 299536.3 – 70' S due to pilings/old dolphins – 70' is approx. on shore

E: 13472730.9

CG: 578.6
− 31.4
547.2

→110% rec. clay expanding. core ~90% clay.

collected double volume due to high conc. mussel shells

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-10

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Date/Time Collected**: 11/1/15

Date/Time Processed: 11/2/15 1050

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	10.9'	109%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0 - 7"		Black f-m sand, trace clay, wood debris, pebbles, shell hash, gravel	RB15-10-0010 (0-7")		
7" - 10.9'		Gray fat clay, trace gravel (CH)			

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-11

Sheet
1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 03NOV2015/1155

Stop Date/Time 03NOV2015/

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid
299328.8

9 Sed Surface Elevation 546.6 *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
27.3

3 Operator Name *(License # If Required)*
C.J. Stoutjesdyk

7 Longitude/[✓ Easting]/Grid
13472465.0

12 Weather (Temp, circle conditions, wind direction)
73.0°F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	11	110%

16 Location Notes
15 south and 20 east of the point due to seawall

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	lots of mussel shells with brown sand/silt mix, some gravel and some woody organic debris 2 attempts consolidated into one tray extra volume collected due to large quantity of mussel shells → 10 jars total	RB15-11-surf	

Other:

deck elevation 578.9 ft
deck to sediment 32.3 ft
1245 1st core attempt.
push to 4.8, add 5 ft barrel, push 5.2
10 ft push, 11 ft recovery

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-11

Sheet
1 of 1

1 Geologist Name/Signature
M. Gelinas

5 Project Number
6256125

CORE COLLECTION INFO

8 Date/Time Collected	Date/Time Processed
11/3/15	11/4/15 1515

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	11'	110%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-3"		d gray - black sandy (f-m) clay silt 10%, mussel shells in top 1", shell hash 25%, gravel 20%, slight HC odor	RB15-11-0010 (0-12")		
3"-10.5'		gray fat clay, gravel 5%, red streaking	RB15-11-1030 (12-36")		

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-12

Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 03NOV2015/1000

Stop Date/Time: 03NOV2015/1150

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: ~~299~~ 299090.2 1st attempt

9 Sed Surface Elevation: ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*: CJ Stoutjesdyk

7 Longitude/Easting/Grid: 1st attempt 13472136.4

12 Weather (Temp, circle conditions, wind direction): 63°F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft):

14 Recovery (ft):

15 % Recovery:

16 Location Notes: 20 ft south of the point 1st attempt due to sea wall

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	1020 5 attempts → no recovery		

Other:

deck elevation 579.2 ft
deck to sediment 19.0 ft
1040 1st attempt core. push 5 ft, added a 5ft barrel and pushed ~~5 more~~ 5 ft more. 10 ft push, 2.2 ft recovery (22%)
visible black material with strong fuel smell ~~at~~ ~~and~~ at the bottom of the core. sheen ~~dete~~ noted.
1105 2nd attempt northing 299095.3 easting 13472156.4 } ≃ 15 ft south and 20 ft east of the point
deck elevation 579.1 ft
deck to sediment 16.2 ft
pushed 4 ft, then added 5 ft barrel, pushed 0.8 to refusal
encountered something hard in the first 4 ft
encountered refusal at 4.8 ft, <1 ft recovery, mostly rocks and what looked like pieces of brick
3rd attempt northing 299094.6 easting 13472143.6 } 7 ft east, 16 ft south of the point
deck elevation 579.0 ft, deck to sediment 15.5 ft
refusal at 3.1 ft

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-12

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas

5 Project Number: 6256125

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

CORE COLLECTION INFO

8 **Date/Time Collected**: 11/3/15

Date/Time Processed: 11/4/15 1430

9 Sed Surface Elevation: *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 2.2'

15 % Recovery: 22%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
		As opened core, had PID @ opening- 39ppm. can see orange stain on core liner.			
0-9"		Black silty sandy gravel/pebbles; shell hash + organics ~20%, brick frags 10%	RB15-12-0010 (0-12")		
9-11"		Black clayey sand w/ ~~cobbles~~ pebbles of brick	RB15-12-1020		
12-13"		Black sticky sand, free product/NAPL, organic material ~35%.	(12-23")		
13-15"		Black sticky NAPL, vf sandy clay, organics 20%			
15"-23"		same as 12-13"			
23-26"		gray soft clay			

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-13

Sheet
1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 02NOV2015/1435

Stop Date/Time 02NOV2015/1525

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid
298768.8

9 Sed Surface Elevation 551.9 *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
22.2

3 Operator Name *(License # If Required)*
CJ Stoutjesdyk

7 Longitude/[✓ Easting]/Grid
13471722.1

12 Weather (Temp, circle conditions, wind direction)
68°F [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	11	110 %

16 Location Notes
location shifted 9 ft south and 23 ft east due to seawall

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	brown sand silt mix with some gravel and mussel shells 3 attempts consolidated into one tray	RB15-13	

Other:

deck elevation ~~578~~ 579.1 ft

deck to sediment 27.2 ft

1510 1st ~~Ponar~~ core attempt. 10 ft push, 11 ft recovery 110%

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-13	Sheet 1 of 2
1 Geologist Name/Signature M. Gelinas - MMGelinas	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Date/Time Collected**	**Date/Time Processed**
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/Northing/Grid	9 Sed Surface Elevation ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end)	
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid	12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	10.9'	109%

16 Location Notes

HC odor thru out

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-7"		Black clayey sand (m-c), gravel 30%, twig, shell/brick fragments ~25%	RB15-13-0010 (0-12")		
7-11" 11-13"		d gray silty clay, vf sand 10% d gray ~~silt~~ sandy silt (sand f)	RB15-13-1025 (12"-29")		
13-15" 15-16"		black silty sand, organics (twigs, roots) ~30% same as 11-13"			
16-21 21-22		same as 7-11" black sandy clay (sand f), organics ~30%			
22-24 24-28		d gray-black clayey sand (sand f) same as 21-22"			
A 28-29 B 29-32		d gray silty clay, vf sand ~ ~~[illegible]~~ 10% d gray/black sandy clay (sand f-c), organics	RB15-13-2535 29-43"		
A 32-33		~25-30%, gravel ~5%			
B 33-3442 ~~34-42~~		@ 36-38" glass pieces 2x2" ~~d gray-black sandy clay (sand f-c), gravel ~5%~~			

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15 13	Sheet 2 of 2

1 Geologist Name/Signature: M. Gelinas

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Date/Time Collected** | **Date/Time Processed**

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	10.9'	109%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
42-43"	black	silty sand (m)			
43-10.9'	gray	fat clay boulders @ 7'	RB15-13-~~360~~ 3550 (43-60)		
		draw-down visible on outside of clay			

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-14	Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 02NOV2015/1530

Stop Date/Time: 02NOV2015/1430

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: 298710.1

9 Sed Surface Elevation 552.2 *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 22.0

3 Operator Name *(License # If Required)*: CJ Stoutjesdyk

7 Longitude/[✓ Easting]/Grid: 1347678.2

12 Weather (Temp, circle conditions, wind direction): 68°F [✓ Sunny]/Cloudy/Rain S 3 knots

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	10	100

16 Location Notes: on location based on aerial photo and intended point, ~~but~~ ~~≈120 ft NW of the given coordinates~~ ★

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	brown sand silt mix with some gravel, mussel shells and fishing line. A few pieces of SAV. 3 attempts consolidated into one tray	RB15-14-surf	

Other:

deck elevation 579.2 ft

deck to sediment 27.0 ft

1420 1st attempt core

★ location note

16' south and east of the point due to seawall

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: **GLAES** **Riverbend**

Location/Boring Name: RB15-14

Sheet 1 of 1

1 Geologist Name/Signature: **M. Gelinas**

5 Project Number: **6256125**

CORE COLLECTION INFO

8 **Date/Time Collected**

Date/Time Processed 11/4/15 1020

2 Drilling Subcontractor/Equipment Operator: **MATECO**

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H **NAD83** V **NAVD88**

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	9.6'	96%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-10"		Black silty sand, strong HC odor, sand f-m. mussel shells in top 2"; brick frags	RB15-14-0010 (0-12")		
10-27"		Black sandy clay, soft, sand f-m, organics 25% strong HC odor	PID: 5-7ppm RB15-14-1030 (12"-33")		
27-33"		d gray-gray clayey sand, coarse-f gravel	RB15-14-3060 (33"-60")		
33"-10'		gray fat clay, c sand/gravel 20% in 33-44" @ 44-45" large piece of metal - can?			

HC odor

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-15

Sheet
1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time**
02NOV2015/1200

Stop Date/Time
02NOV2015/1310

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid
298580.9

9 Sed Surface Elevation 550.7 *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
23.3

3 Operator Name *(License # If Required)*
C.J. Stoutjesdyk

7 Longitude/[✓ Easting]/Grid
13471561.4

12 Weather (Temp, circle conditions, wind direction)
68 °F [✓ Sunny]/Cloudy/Rain SE 4 knots

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter
☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	10	100

16 Location Notes
within 10 ft of coordinates

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	brown sand silt mix with lots of mussel shells. ~~1 bottle~~ 1 metal bottle cap 4 attempts ~~homog~~ consolidated into one tray MS/MSD → 13 jars total	RB15-15-surf	

Other:

1300 1st attempt core collected
100% recovery, 10 ft push
clay at the bottom of the core

deck to sediment 28.3 ft

deck elevation 579.0

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-15

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas

5 Project Number: 6256125

CORE COLLECTION INFO

8 Date/Time Collected: 11/2/15

Date/Time Processed: 11/4/15 0930

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 10'

15 % Recovery: 100%

16 Location Notes:

Interval *(Depth)*	Recovery *(ft & %)*	Description of Materials Munsell Color; Moisture; Density; Consistency (Other Remarks)	Sample ID Sample Interval	PID *(ppm)*	USCS Code
~~Bla~~ 0-4"		Black ~~a sand~~ sandy(coarse) sand-gravel, silt ~20%, pebbles/cobbles shell frags/brick frags ~15%, organics 1%	RB15-15-0010 (0-12") PID: 5-6 ppm		
4-12"		sandy (f-vf) clay, black, organics ~5%			
12-26"		gray fat clay, trace gravel	RB15-15-1020 (12-26")		
26-35"		clayey sand, black (sand f), pieces of orange-sheen gravel (slag?)	RB15-15-2040 (26-51")		
35-38"		~~sandy (f~~ black/dgray clay, vf sand ~10%			
38-~~43~~ 51" ~~43-~~		same as 26-35" @ 44-45" dense organics (woody debris)			
		@ 46-47" " "			
51-10'		gray fat clay, trace gravel	RB15-15-4060 (51-72")		

HC odor

HC odor

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RBIS-16	Sheet 1 of 1

1 Geologist Name/Signature Ryan Downton	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Start Date/Time** 02NOV2015/0935 **Stop Date/Time** 02NOV2015/1152
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/[✓ Northing]/Grid 1st attempt 298411.6	9 Sed Surface Elevation 550 *ft* 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 24.4
3 Operator Name *(License # If Required)* CJ Stoutjesdyk	7 Longitude/Easting/Grid 1st attempt 13471416.7	12 Weather (Temp, circle conditions, wind direction) 60 °F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	9.2	92%

16 Location Notes
within 10 ft, slightly SW of the point for 1st attempt

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	1010 mostly mussel shells with some sand, ~~and~~ trash and woody ~~snag~~ organic debris 9 attempts consolidated into one tray ~~double~~ extra volume collected, 10 jars total	RBIS-16-Surf	

Other:

deck elevation 579.3 ft

deck to sediment 28.9 ft

1100 1st core attempt. 10 ft push 6.2 ft recovery (62%)

1133 2nd core attempt. Sheen and brown/black globs observed. ~~coal~~ tar odor detected

deck to sediment 29.4 ft

11 ft south location.

northing 298407.0

1347142-0.3

deck elevation 579.4 ft

push 10 ft, recover 9.2 ft (92%

2nd attempt

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-16

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas Mgelinas

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Date/Time Collected**

Date/Time Processed ~~11/3/15~~ 11/4/15 0830

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 8.6'

15 % Recovery: 86%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-12'		Black m-f sand, gravel, pebbles/cobbles, strong petr. odor, shell hash ~10%	RB15-16-0010 (0-12") PID: 5-7 ppm		
12"-50"		Black sandy clay, sand=f, organics (rootlets) ~20%, large brick piece	RB15-16-1030 (12"-30") RB15-16-3040 (30-50")		
50"-106"		gray fat clay, trace gravel	RB15-16-~~3050~~ 4060 (50-72")		
Strong petr. odor. Sheen, orange tint on core liner Some possible free product					

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-17

Sheet
1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256126

CORE COLLECTION INFO

8 **Start Date/Time** 02NOV2015/0800
Stop Date/Time 02NOV2015/0920

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid international ft
297738.7

9 Sed Surface Elevation 542.4 ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
31.8

3 Operator Name *(License # If Required)*
C.J. Stoutjesdyk

7 Longitude/Easting/Grid
13470835.9

12 Weather (Temp, circle conditions, wind direction)
50°F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)
☐ Rotosonic: ____ -ft barrel ____ -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	9	90%

16 Location Notes
shifted 5 ft west and 60 ft south due to concrete seawall

Interval *(Depth)*	Description of Materials Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	Sample ID	USCS *Code*
Grab Sample (~0-0.5 ft)	gray clay, a small amount of gravel, and a few mussel shells → 5 jars * consolidated 3 grab attempts into one tray	RB15-17-surf	

Other:

deck elevation 579.2 ft

deck to sediment 36.8 ft

0905 collect 1st core attempt

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-17	Sheet 1 of 1

1 Geologist Name/Signature M. Gelinas	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Date/Time Collected** 11/2/15 **Date/Time Processed** 11/3/15 1345
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/Northing/Grid	9 Sed Surface Elevation *ft* 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end)
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid	12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	8.6'	86%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-3'		well rounded pebbles/cobbles, HC odor	~~RB~~ RB15-17-0010 (0-12")*		
3-5' 5"-8.6'		black silt w/ coarse sand, gravel, HC odor gray fat clay, semi-firm to firm trace gravel.	RB15-17-1030		
			*= not enough impacted		
			material for a sample. needed to incl-		
			clay.		

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-18	Sheet 1 of 1

1 Geologist Name/Signature

5 Project Number 6256125

CORE COLLECTION INFO

8 **Start Date/Time** 11/1/15 1545 **Stop Date/Time** 11/1/15 1600

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid: 295803.2

9 Sed Surface Elevation 543.7 *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*: CJ

7 Longitude/Easting/Grid: 13469497.0

12 Weather (Temp, circle conditions, wind direction) [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	7.2'	72%

16 Location Notes

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	Highly variable lithology based on 4 ponar grabs - gray clay w/ mussel shells @ surface, gray sand (f-m) w/ pebbles + cobbles. Campbell's Soup can, wood debris.	RB15-19-SURF	

Other:

A: 578.7 deck el.
35' deck to sed
543.7

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-18

Sheet 1 of 1

1 Geologist Name/Signature
M. Gelinas

5 Project Number
6256125

CORE COLLECTION INFO

8 **Date/Time Collected** 11/1/15

Date/Time Processed 11/2/15 1615

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation *ft*

10 Coordinate System H **NAD83** V **NAVD88**

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	7.3'	73%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-10"		Black silty clay w/ m-c sand + f gravel, shell hash 5%, well-rounded pebbles-cobbles	RB15-18-0010 (0-10")		
10"-88"		gray fat clay, trace gravel/pebbles.			
		No further samples collected as based on precedent set by R. Ellison during earlier sampling - no clay samples.			

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-19	Sheet 1 of 1

1 Geologist Name/Signature: Ryan Parnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 02NOV2015/1555 — **Stop Date/Time**: 02NOV2015/1715

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid 1st attempt: 294204.7

9 Sed Surface Elevation 546.9 ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 27.0

3 Operator Name *(License # If Required)*: G.J. Stoutjesdyk

7 Longitude/[✓ Easting]/Grid 1st attempt: 13468393.1

12 Weather (Temp, circle conditions, wind direction): 65 °F [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	10.5	105%

16 Location Notes: Location shifted ≈75 ft due south due to riprap and wood pilings near the shore

Interval *(Depth)*	Description of Materials Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	Sample ID	USCS *Code*
Grab Sample (~0-0.5 ft)	1600 brown sand/silt mix with ~~some~~ mussel shells, and gravel 8 attempts consolidated into one tray → 5 Jars total	RB15-19-surf	

Other:

deck elevation 579.0 ft

~~16~~35 1st core attempt
10 ft push, 2.6 ft recovery (26%)

1705 2nd core attempt
10 ft push, 10.5 ft (105%)
northing 294194.3
easting 13468398.5

deck elevation 578.9 ft

deck to sediment 32.0 ft

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-19

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas MMGelinas

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Date/Time Collected:** 11/2/15

Date/Time Processed: 11/3/15 1111

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 10.5

15 % Recovery: 105%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-10"		Black m-c sand, gravel, pebbles, cobbles, shell frags ~10%, silt ~15%. HC odor	RB15-19-0010 (0-10")		
10"-	10.5'	Gray fat clay, trace gravel. semi firm-firm	RB15-19-1030 (10-30")		

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-20	Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 04NOV2015/1535

Stop Date/Time: 04NOV2015/1430

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: 293665.6

9 Sed Surface Elevation: 553.3 ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 20.6

3 Operator Name *(License # If Required)*: CJ Stoutjesdyk

7 Longitude/[✓ Easting]/Grid: 13467984.8

12 Weather (Temp, circle conditions, wind direction): 75 °F [✓ Sunny]/Cloudy/Rain ——

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	9.2	92

16 Location Notes: within 10 ft of point

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	1345 brown silt. sheen and fuel odor detected. a few pieces of woody organic debris	RB15-20-surf	

Other: deck elevation 578.9 ft

25.6 ft deck to sediment

THIS 1st attempt – push 5 ft, add barrel, push another 5 ft

10 ft push, recovery 9.2 ft (92%)

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-20

Sheet
1 of 1

1 Geologist Name/Signature
M. GEZIMAS

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time**

Stop Date/Time
11/5/15 0845

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter
☒ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)
10

14 Recovery (ft)
9.2

15 % Recovery
92%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-22"		d gray silty clay, petr. odor, organics ~15% (rootlets)	RB15-20-0010 (0-12")		
			RB15-20-1020 (12-22")		
22-9.2'		gray clay, semi firm trace gravel @ 30-31" Black clayey sand(m), petr.	RB15-20-2040 (22-50")		
		odor @7.5-8.5' cobbles + pebbles 40% in clay			

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-21

Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 04NOV2015/1100

Stop Date/Time: 04NOV2015/1315

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: 293515.9 1st attempt

9 Sed Surface Elevation: 555.3 1st attempt ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 1st attempt 18.6

3 Operator Name *(License # If Required)*: C.J. Stoutjesdyk

7 Longitude/[✓ Easting]/Grid: 13467927.7 1st attempt

12 Weather (Temp, circle conditions, wind direction): 70°F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
1st attempt 4.2	1st attempt 2.0	1st attempt 48%

16 Location Notes: *1st attempt shifted 10 ft south and 8 ft east due to shoreline riprap

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	1145 sand with some silt, mussel shells and woody organic debris 12 attempts consolidated into one tray → 5 jars total	RB15-21-Surf	

Other:

deck elevation 578.9 ft
deck to sediment 23.6 ft
1210 1st attempt refusal encountered at 4.2 ft, recover 2.0 ft rock jammed in the core catcher (48%)

1240 2nd attempt
26.6 ft deck to sediment
northing 293509.9 ft
easting 13467939.1 ft
deck elevation 578.9 ft

pushed 5.4, add barrel, pushed 0.7 to refusal.
refusal at 6.1, recovery 1.5, (22.5%)

1305 3rd attempt
northing 293498.2 ft
easting 13467940.4 ft
deck elevation 578.9 ft
deck to sediment 26.6 ft

pushed to 4.5, added barrel and pushed to 10 ft. Encountered something hard at 3 ft and 7 ft but were able to push through it.
pushed 10 ft, recovery 1 ft (10%)

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-21

Sheet 1 of 1

1 Geologist Name/Signature: M. GELINAS

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**:

Stop Date/Time: 11/5/15 1000

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☒ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 4.2

14 Recovery (ft): 20

15 % Recovery: 48%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-6"		d gray clayey sand, sand f-c, gravel 30%, pebbles-cobbles of brick, shell frags ~20%			
6-14"		d gray clayey sand, cobbles to boulders 20% HC odor	RB15-21-0010		
14-18"		d gray silt w/ cobbles-boulders 40%, gravel 60%	RB15-21-1020		
18-24"		d gray silty clay, organics 20%, angular gravel 20%	(12-24")		

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-22

Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 03NOV2015/1525

Stop Date/Time: 03NOV2015/1655

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: 292856.1 3rd attempt

9 Sed Surface Elevation: 550.4 ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 23.6

3 Operator Name *(License # If Required)*: C.J. Stoutjesdyk

7 Longitude/[✓ Easting]/Grid: 13467469.5 3rd attempt

12 Weather (Temp, circle conditions, wind direction): 68 [✓ Sunny]/Cloudy/Rain W 2 knots

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 3rd attempt 5.5

14 Recovery (ft): 3rd attempt 4.7

15 % Recovery: 85

16 Location Notes: 1st attempt 30 ft south and 10 ft west of point due to shoreline riprap

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	1535 brown sand silt mix with lots of SAV 3 attempts consolidated in one tray	RB15-22-surf	

Other:

deck to sediment 17.5 ft

1555 1st attempt
northing 292861.9 ft
easting 13467458.0 ft

push to 4.5, then 5.5 to 10 total
recovery 2.1 ft (21%)

1620 2nd attempt
25.3 ft deck to sediment
northing 292857.6 ft
easting 13467464.5 ft
deckelevation 579.2 ft

push 4 ft, then 3.3 until refusal
encountered at 7.3

1650 3rd attempt
northing 292856.1 ft
easting 13467469.5 ft
deckelevation 579.1 ft, 28.6 ft deck to sediment
refusal at 5.5 ft, recovery 4.7 (85%

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-22

Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas Megan Gelinas

5 Project Number: 6256125

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

CORE COLLECTION INFO

8 **Date/Time Collected:** 11/3/15 1650

Date/Time Processed: 11/4/15 1545

9 Sed Surface Elevation: ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

13 Boring Depth (ft): 5.5'

14 Recovery (ft): 4.7'

15 % Recovery: 85%

16 Location Notes:

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method: HC odor throughout

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
~~0-7~~ 0-3"		Gray/d gray silty clay w/ 35% f sand, shell fragments ~15%	RB15-22-0010 (0-2")		
3-7"		brown/gray clay w/ d gray sandy silty clay			
7-13"		Black sandy clay/[illegible]-sand f ~40%, trace gravel	RB15-22-1020 (12-24")		
13-17"		well-graded sand f-m, brick pieces, sand-sized black/d. gray			
17-18"		NAPL sheen, possible product, orange stain on core liner sandy (vf-f) clay			
18-23		same as 7-13" 23-27" d gray soft clay, trace sand/brick frags			
27-39"		sandy(m-c) d gray clay w/ 30% gravel 20% cobbles	RB15-22-2030 24-39"		
39-43"		Black organic-rich silty clay			

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name RB15-23	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Start Date/Time** 03NOV2015/1330 **Stop Date/Time** 03NOV2015/1515	
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/[✓ Northing]/Grid 292330.9	9 Sed Surface Elevation 546.4 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 27.6	
3 Operator Name *(License # If Required)* C J Stautjesdyk	7 Longitude/Easting/Grid 13467074.8	12 Weather (Temp, circle conditions, wind direction) 72 °F [✓ Sunny]/Cloudy/Rain —	

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10 3rd attempt	5 3rd attempt	50 3rd attempt

16 Location Notes
6 ft west and 250 ft south of the point due to shoreline rocks/riprap

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	Sample ID	USCS *Code*
Grab Sample (~0-0.5 ft)	brown sand/silt mix with some gravel, organic woody debris, mussel shells and a few pieces of SAV	RB15-23-surf	

Other:

1340 deck elevation 579.1 ft
~~depth to~~ deck to sediment 21.9 ft

1400 1st attempt. pushed 5 ft, added 5ft barrel, pushed until refusal encountered at 8.4 ft, recovered 1.2 ft
shifted 2.4 ft SW for 2nd attempt

1430 2nd attempt
deck to sediment 25.8 ft
northing 292327.3
easting 13467071.7
deck elevation 579.0 ft

pushed 4.5, added 5 ft barrel, pushed to refusal at 7.1 ft. orange rock or brick piece in core catcher and 0 ft recovery

3rd attempt
northing 292321.7 ft
easting 13467079.4 ft

1505 deck elevation 579.0, 32.6 deck to sediment
push 4.1 ft add ~~5ft barrel~~ 2x2ft barrels and pushed 5.9 ft
10 ft push, 5 ft recovery

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15 23

Sheet 1 of 1

1 Geologist Name/Signature
M-GELINAS

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 11/3/15 1505
Stop Date/Time 11/5/15 1055

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)
☒ Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	5'	50%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-3"	Black	c sand/gravel in silt, shell hash 10%, gravel (subangular) brick pieces, twigs 1%	RB15-23 (0-12") 0010		
A 3-5"	Black	sand (F) w/ 30% clay	~~RB15-23(12-~~ RB15-23-1030		
A 5-36"	D gray	silty clay, organics 10%	(12-36")		
B 30-40 40-44" A		~~same as 3-5"~~ A d gray silty clay w/ 45% org.	RB15-23-3050 (36-60")		
44-56 B, d gray to black 56-120" A					
		HC odor			
		throughout			

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-24

Sheet
1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 04NOV2015/0840 **Stop Date/Time** 04NOV2015/0930

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid international ft
291288.9
~~13466240.3~~

9 Sed Surface Elevation 549.1 *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
26.0

3 Operator Name *(License # If Required)*
CJ Stoutjesdyk

7 Longitude/[✓ Easting]/Grid
13466240.3

12 Weather (Temp, circle conditions, wind direction)
55°F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	11	110

16 Location Notes
60 ft east, 80 ft south of revised point due to seawall

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	0855 brown silt with just a few pieces of woody organic debris one attempt → 5 jars total	RB15-24-surf	

Other:

deck elevation 579.1 ft
deck to sediment 31.0 ft
0920 1st attempt. push 5 ft, add barrel, push 5 ft
10 ft push, 11 ft recovery (110%)

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-24

Sheet 1 of 2

1 Geologist Name/Signature: M. GELINAS

5 Project Number: 6256125

CORE COLLECTION INFO

8 Start Date/Time:

Stop Date/Time: 11/5/15 0915

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction): Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

Sample Collection Method:

13 Boring Depth (ft): 10'

14 Recovery (ft): 10'

15 % Recovery: 100%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
A 0-21"		Black clay w/ f-m sand, gravel-pebble sized pieces of aggregate/asphalt ~30%, petr. odor	RB15-24-0010 (0-12")		
B 21-27"		Black clay, silt 1%, organics 10%, HC odor	RB15-24-1030 (12-32")		
27-32 A ~~32~~-40"		B ~~Black clay, organics 28 20%, HC odor, twigs~~			
46-47"		Black sandy clay (sand vf-f)	RB15-24-3040 (32-47")		
47-50"		Gray clay inclusions in gray m sand, well graded	RB15-24-4050 (47-56")		
50"-56"		Black sandy clay/clayey sand (sand f-m, 45%), shell hash @55"			
C 56-69" D 69-70"		Gray sandy (f, 35%) clay, firm Gray fat clay, semi firm			
70-86 C 86-91 D					

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-24

Sheet 2 of 2

1 Geologist Name/Signature: M. GELINAS

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**:

Stop Date/Time:

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
91-94" C 94-97 D			RB15-24-5070 (50-84")		
97-101 C 101-120 D					
		All previous measurements need to be			
Actual		shifted 1' deeper.			
0-6"		dk gray silty clay, trace gravel			
6-12"		same as 0-21" described above, pieces of slag			

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-25

Sheet 1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 04NOV2015/0945

Stop Date/Time 04NOV2015/1040

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid
290945.1

9 Sed Surface Elevation 536.2 ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
37.6

3 Operator Name *(License # If Required)*
C.J. Stoutjesdyk

7 Longitude/[✓ Easting]/Grid
13465982.9

12 Weather (Temp, circle conditions, wind direction)
60°F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	8.6	86

16 Location Notes
60 ft south, 10 ft east of the revised location due to seawall

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	1000 ~~sand~~ 100% sand one attempt → 5 jars total	RB15-25	

Other:

deck elevation 578.8 ft

deck to sediment 42.6 ft

1030 1st attempt - push 5 ft, add barrel, push 5 ft. Encountered something hard around 6.5-7.0 ft but able to push through it. 10 ft total push, recovery 8.6 ft (86%)

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-25

Sheet
1 of 1

1 Geologist Name/Signature
M. GELINAS Mgelinas

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time**

Stop Date/Time
11/5/15 1130

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☒ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)
10'

14 Recovery (ft)
8.5'

15 % Recovery
85%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-6'		gray sand, trace clay no odor	RB15-25-0010 (0-12")		
6'-6.2'		Gray fat clay, semi-firm			
6.2-8.5'		Grey sandy clay, sand f, 30-40%			

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name: RB15-26

Sheet 1 of 1

1 Geologist Name/Signature: Ryan Dernton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 03NOV2015/0740

Stop Date/Time: 03NOV2015/0920

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: 290473.8

9 Sed Surface Elevation: 535.7 *ft*

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 38.4

3 Operator Name *(License # If Required)*: CJ Stoutjesdyk

7 Longitude/[✓ Easting]/Grid: 13465708.2

12 Weather (Temp, circle conditions, wind direction): 50°F [✓ Sunny]/[✓ Cloudy]/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft): 10

14 Recovery (ft): 10

15 % Recovery: 100%

16 Location Notes: 8 ft south of the point.

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	0840 Mostly gravel with some brown clay and silt. A few mussel shells 10 attempts produced mostly gravel. jarred the ~~[illegible]~~ sediment that was recovered, but lots of rocks	RB15-26-surf	

Other:

deck elevation 579.1 ft

deck to sediment 43.4 ft

1st attempt core. pushed 5.4 ft, then another 4.6 after adding a 5ft barr

lots of fine sand in the core

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-26

Sheet
1 of 1

1 Geologist Name/Signature
M. Gelinas

5 Project Number
6256125

CORE COLLECTION INFO

8 **Date/Time Collected**

Date/Time Processed
11/4/15 1320

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

X Rotosonic: 10 -ft barrel 3 -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)
10'

14 Recovery (ft)
10'

15 % Recovery
100%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-13"		soft gray clay, vf sand 15% water vis. in core	RB15-26-0010 (0-12")		
13-40"		Gray sandy clay - sand vf-f, 30%			
40-96" 96-103"		Gray clayey sand, sand f, clay 45% Gray fat clay vf sand ~5%			
103-110"		Gray sandy clay, sand vf-f, 30%			

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-27

Sheet
1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time**
26Oct2015/1425

Stop Date/Time
26Oct2015/1530

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid
289920.05 ft

9 Sed Surface Elevation 533.6 ft ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
33.6 ft

3 Operator Name *(License # If Required)*
ZJ / Brian

7 Longitude/[✓ Easting]/Grid
13465465.4 ft

12 Weather (Temp, circle conditions, wind direction)
63°F [✓ Sunny]/Cloudy/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10 ft	7.2	72

16 Location Notes
within 10 ft of the point

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	Sand with gravel and black stone/coal, (slag) mussel shells and one ~~larger~~ 2 inch stone, slight sheen noted from ponar	RB15-27	

Other:

572.2 ft deck elevation

38.6 ft deck to sediment surface

~~Ponar~~

Six attempts with the ponar were required and material from all six attempts was consolidated into on tray.

1530 1st core attempt ~~was pa~~ did not hit clay. Still sandy material at the bottom. Recovery 72%. Sheet noted on core.

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-27

Sheet 1 of 2

1 Geologist Name/Signature: M. GELINAS

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**: 10/28/15 1500

Stop Date/Time:

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

9 Sed Surface Elevation: ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

12 Weather (Temp, circle conditions, wind direction): Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter
☒ Core: 10 -ft barrel 3 -in diameter Manual Push/~~Vibracore~~ sonic
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	7'	70%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-2"		rounded- well rounded gravel, 15% coarse gray sand, unconsolidated			
2-12"		Black mud-c. sand, 15% gravel, 1% pebbles, trace silt. , petr. odor	RB15-27-0010		
12-19"		d. gray silty clay, strong HC odor, 1% organics			
19-20"		d. gray silty clay, 40% well-rounded gravel c. sand, strong HC odor	RB15-27-1030		
20-30"		same as 12-19", trace well-rounded gravel		1.9ppm	
30-42"		light gray silty clay interbedded w/ d. gray silty soft clay and fine gravel (30%), HC odor, org. 20%			
42-44"		d. gray coarse sand, HC odor, silt ~10%		~30-50=14ppm Strongest HC odor	
44-46"		light gray ~~d. gray~~ silty soft clay, org. 20%			
46-48		d. gray silty clay, organics ~30%, f sand ~15%			
48-49"		f-m sand, trace silt			
49-53"		light gray silty clay, vf sand 10%, fibrous organics			

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: RB15-27

Sheet 2 of 2

1 Geologist Name/Signature:

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time**

Stop Date/Time

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☒ Core: 10 -ft barrel 3 -in diameter Manual Push/Vibracore [✓ sonic]

☐ Grab Sample: ____ -ft x _____ -ft x ___ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method: STRONG HC odor throughout

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10	7'	70%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
53-59		light gray silty clay, coarse sand, angular gravel ~20% strong HC odor	-3050	14 ppm	
59-66"		d. gray silty clay, f sand 10%, organics 20%			
66-67		saa but organics 50%	-5065		
67-70"		Black f. sand, organics (non small wood chips) 20%, clay ~10% @ 73-70 gum-like consistency blebs, coal tar? 2-3 mollusk shells whole 2" across			
70-84"		tan sand, clay 1%	-6570		

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB-28

Sheet
1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 26Oct2015/1215
Stop Date/Time 26Oct2015/1415

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid
289557.2 International ft

9 Sed Surface Elevation 530.9 ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
43.3 ft

3 Operator Name *(License # If Required)*
CJ - Mateco

7 Longitude/Easting/Grid
1346353.4 International ft MSP south

12 Weather (Temp, circle conditions, wind direction)
62°F [✓ Sunny]/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter
☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
☒ Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10 ft	9 ft	90%

16 Location Notes
≈8 ft west and 2 ft north of the target location

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	gray silt with a small ~~abou~~ amount of sand and a few gravel size stones	RB15-28-surf	

Other:

H_2O 579.19 ft deck elevation
48.3 ft deck to sediment
5.0 ft deck to water

11" section was at the bottom of the core

core collected at 1745
3 tubes: 04 ft, 4-9 ft, 9-10 ft

SEM/AVS was in a 4 oz clear jar instead of a 2 oz jar, ~~but s~~

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
RB15-28

Sheet
1 of 1

1 Geologist Name/Signature
M. GELINAS

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time**
10/28/15 1430

Stop Date/Time

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ____ -ft barrel ____ -in diameter
☒ Core: 10 -ft barrel 3 -in diameter Manual Push/~~Vibracore~~ Sonic. MEG
☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)

14 Recovery (ft)
10'

15 % Recovery

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-4"		Gray silty clay, coarse sand 10%, gravel 10%			
4-8" 8-11"		Black silt, coarse sand/gravel 30% gray fat clay CH	RB15-28-0010		
~~9-13"~~ 11-15"		Black silt coarse sand/gravel			
15"-10'		Gray fat clay, coarse sand/gravel 2%	15" - ~~8'~~ 40" = RB15-28-1030		

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: H8T15-A-~~surf~~

Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time:** 27OcT2015/0930

Stop Date/Time: 27Oct2015/1100

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: 306146.0 International

9 Sed Surface Elevation: 564.25 *ft*

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 10.4

3 Operator Name *(License # If Required)*: CJ / Brian

7 Longitude/[✓ Easting]/Grid: 13485695.4

12 Weather (Temp, circle conditions, wind direction): 51 °F Sunny/[✓ Cloudy]/Rain 2 knots south

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter

☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10 ft	10 ft	100 %

16 Location Notes: moved ≈2 ft between 1st and 2nd core attemps

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	gray / brown silt. slight fuel odor	H8T15-A-surf	

Other:

PID 0.0 ppm

1st attempt

deck elevation 579.65

15.4 ft from deck to sediment surface

1010 1st attempt was a 10 ft push, but only 5 ft recovery.

1045 2nd attempt – encountered refusal right at 10 ft. ~~1010~~ Bottom of core is hard black clay with a fuel odor. PID of the bottom of the core was 1.5 ppm

~~kept~~

2nd attempt

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name
HBT15 - 1A

Sheet
1 of 1

1 Geologist Name/Signature
M. GELINAS

5 Project Number
6256125

CORE COLLECTION INFO

8 ~~Start Date/Time~~ collected
10/28/15 1100

~~Stop Date/Time~~ Processed

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/Northing/Grid

9 Sed Surface Elevation ft

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)

3 Operator Name *(License # If Required)*

7 Longitude/Easting/Grid

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter
☒ Core: 10 -ft barrel 3 -in diameter Manual Push/[✓ Vibracore] sonic meg
☐ Grab Sample: _____ -ft x _____ -ft x _____ -ft Box/Ponar/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	10'	100%

16 Location Notes

Interval (Depth)	Recovery (ft & %)	Description of Materials Munsell Color; Moisture; Density; Consistency (Other Remarks)	Sample ID Sample Interval	PID (ppm)	USCS Code
	0-6"	Gray silty clay		0.9	
	6-21"	Gray sand, clay ~15%, gravel 10%, cobbles up to 1.5x1.5" 1%	HBT15-1A-0010		
	21-28"	silt (gray), black bands, fine sand 5% petr. odor	HBT15-1A-1030 (12-33")		
	28-33"	silt (gray) black bands, f-m sand 30%, angular gravel 10%, petr. odor			
	33-41"	gray fat clay, gravel 1%			
	41-43"	black silt			
	43-7.8'	Gray fat clay, black streaking @ 50-57", coarse sand/fine gravel 1%			
	7.8-9.1'	Gray/D.gray/black clay w/ gravel-sized brick pieces (15%), cobbles 1%, gravel 10%, wood pieces			
	9.1-10'	black clay, petr. odor, dry - CH @ 9.5-9.6' black sand w/ 20% clay (SC)			

EA LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name: GLAES Riverbend

Location/Boring Name: HBT13-B

Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton

5 Project Number: 6256125

CORE COLLECTION INFO

8 **Start Date/Time:** 17Oct2015/1110

Stop Date/Time: ~~17Oct2015/~~

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/[✓ Northing]/Grid: 305882.1

9 Sed Surface Elevation: 555.0 ft

10 Coordinate System: H NAD83 V NAVD88

11 Depth of Water, ft (start/end): 19.6

3 Operator Name *(License # If Required)*: CJ/Brian

7 Longitude/Easting/Grid: 1348567 3.2

12 Weather (Temp, circle conditions, wind direction): 56°F Sunny/[✓ Cloudy]/Rain SE 10.0

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ______ -ft barrel ______ -in diameter

☐ Core: ______ -ft barrel ______ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ______ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft):

14 Recovery (ft):

15 % Recovery:

16 Location Notes: shifted location ≈ 50 ft offshore due to riprap

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	sand and gravel with lots of mussel shells. three ponar attempts were consolidated into one aluminum tray	HBT15-B-surf	

Other:

PID of ponar 0.0 ppm

deck to sediment 24.6 ft

deck elevation 579.6 ft

1200 1st attempt core, sonic rig broke down during collection

1340 2nd attempt core using pneumatic hammer. 10 ft push but only 5 ft recovery

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Riverbend

Location/Boring Name HBT15-B 2nd attempt

Sheet 1 of 1

1 Geologist Name/Signature
Ryan Darnton

5 Project Number
6256125

CORE COLLECTION INFO

8 **Start Date/Time** 30Oct2015/0930

Stop Date/Time 30Oct2015/1100

2 Drilling Subcontractor/Equipment Operator
MATECO

6 Latitude/[✓ Northing]/Grid international ft
1st attempt
305884.4

9 Sed Surface Elevation 555.5 *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end)
~~23.6~~ 18.6

3 Operator Name *(License # If Required)*
CJ Stoutjesdijk

7 Longitude/Easting/Grid
1348567.0.7

12 Weather (Temp, circle conditions, wind direction)
45° F Sunny/[✓ Cloudy]/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: _____ -ft barrel _____ -in diameter
☐ Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
☒ Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other
☐ Other:
☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10 ft	6 ft	60%

16 Location Notes
2 ft north and 2 ft west of ~~first~~ location from 10/27

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	Collected ponar with first core ~~att~~ attempt		

Other:

deck elevation 579.1 ft
H_2O elevation 574.1 ft

1010 1st attempt (for today) yielded 6 ft recovery with a 10 ft push (≈60% recovery)

1050 2nd attempt
northing 305885.1
easting 1348669.8 } shift 0.7 ft north and 0.9 ft west (closer to shore)
yielded 5 ft recovery with a 10 ft push (≈50% recovery)

~~1050~~ this makes 3 total attempts with the sonic at this location. Use the first attempt from today (2nd sonic attempt overall) as it was the best recovery (≈60%).

EA **LITHOLOGIC LOG** *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name HBT15-B	Sheet 1 of 1

1 Geologist Name/Signature: M. Gelinas

5 Project Number: 6256125

2 Drilling Subcontractor/Equipment Operator: MATECO

6 Latitude/Northing/Grid:

3 Operator Name *(License # If Required)*:

7 Longitude/Easting/Grid:

CORE COLLECTION INFO

8 **Date/Time Collected**: 10/30/15 1010

Date/Time Processed:

9 Sed Surface Elevation: *ft*

10 Coordinate System H NAD83 V NAVD88

11 Depth of Water, ft (start/end):

12 Weather (Temp, circle conditions, wind direction)
Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ______ -ft barrel ______ -in diameter Manual Push/Vibracore

☐ Grab Sample: _____ -ft x ______ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	6'	60%

16 Location Notes:

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** Code
0-3"		mussel shells w/ little gray silt, pebbles 3"-39" gray-d. gray sandy (f-vf) clay, soft,	HBT15-B-0010 (0-12") HBT15-B-1030		
		gravel + coarse sand 10%	(12-39") HBT15-B-3055		
39-65"		Black sand (m), gravel 15%, organics 1%, Petroleum odor, shell frags ~10%	(39-65") HBT15-B-5560		
65-72"		Gray fat clay - drawdown of black sand above	(65-70")		

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name HBT15-C	Sheet 1 of 1

1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256125	**CORE COLLECTION INFO**
		8 **Start Date/Time** 30OCT2015/1110 **Stop Date/Time** 30OCT2015/1345
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/[✓ Northing]/Grid 1st attempt 305794.1	9 Sed Surface Elevation 552.0 *ft*
		10 Coordinate System H NAD83 V NAVD88
3 Operator Name *(License # If Required)* CJ Stoutjesdyk	7 Longitude/Easting/Grid 1st attempt 1348549O.4	11 Depth of Water, ft (start/end) 14.6 1st 22.4 2nd
		12 Weather (Temp, circle conditions, wind direction) 50 °F Sunny/[✓ Cloudy]/Rain —

4 Sampling Equipment and Methodology (Check One)

☐ Rotosonic: ______ -ft barrel ______ -in diameter

☐ Core: ______ -ft barrel ______ -in diameter Manual Push/Vibracore

☒ Grab Sample: 0 -ft x ______ -ft x 0.5 -ft Box/[✓ Ponar]/Van Veen/Other

☐ Other:

Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10 ft	8.9	89%

16 Location Notes
≈22 ft SE of the ~~act~~ point due to rocks and shoreline riprap A

Interval *(Depth)*	**Description of Materials** Major Sediment type, color, presence of SAV/rock/wood, odor/sheen, other inclusions	**Sample ID**	**USCS** *Code*
Grab Sample (~0-0.5 ft)	gravel and sand with lots of mussel shells. Plastic debris and fishing line. some woody and leaf organic debris 12 ponar drops were required to get sufficient material A 1325 2nd attempt location ponar sand and gravel mix, lots of mussel shells, some woody organic debris and bits of broken glass 4 ponars consolidated into one tray	HBT15-C-Surf	

Other:

19.6 ~~depth~~ from deck to sediment

deck elevation 579.3 ft

1225 - 1st core attempt. 2 ft penetration, ≈3" recovery

A After consult with EPA, shifted location an additional 22 ft away from the riprap wall.

10 27.4 ft from deck to sediment at 2nd attemp location

northing 305773.3
easting 13485495.5 } 2nd attempt location

deck elevation 579.4 ft

1305 - 2nd attempt core collected, 10 ft push, 8.9 ft recovery (89%) will use this

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Riverbend	Location/Boring Name HBT15-C	Sheet 1 of 1
1 Geologist Name/Signature M. Gelinas	5 Project Number 6256125	**CORE COLLECTION INFO** 8 **Date/Time Collected** 10/30/15 1305	**Date/Time Processed** 11/2/15 1515
2 Drilling Subcontractor/Equipment Operator MATECO	6 Latitude/Northing/Grid	9 Sed Surface Elevation ft 10 Coordinate System H NAD83 V NAVD88	
3 Operator Name *(License # If Required)*	7 Longitude/Easting/Grid	11 Depth of Water, ft (start/end) 12 Weather (Temp, circle conditions, wind direction) Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

☒ Rotosonic: 10 -ft barrel 3 -in diameter

☐ Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore

☐ Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other

☐ Other:

☐ Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10'	8.9'	89%

16 Location Notes

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**PID** *(ppm)*	**USCS** *Code*
0-4"		Black silty clay w/ mussel shells (40%), gravel 20%, brown c sand	~~HBT15~~ HBT15-C-0010 (0-13")		
4-13"		Brown sand w/ black silty clay; well-rounded gravel/pebbles, slight petroleum odor, brick pieces, glass shard)	HBT15-C-1030 (13-36") HBT15-C-3040 (36-51")		
13-31"		gray-d gray clay, black streaking, trace gravel, trace woody debris	HBT15-C-4052 (51-60")		
mf 50" 31-49"		d gray sandy clay, trace gravel, little woody debris. Sand m-f, pebbles 10%			
50-60"		gray fat clay			
60-63"		black ~~silty clay~~ sandy clay; petr. odor, trace gravel, trace organic debris (this is likely sluff)			
63-105"		Gray fat clay, trace gravel			

Appendix B

Lithologic Core Logs

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING HBT15-A

PROJECT NAME Riverbend
DATE COLLECTED 10/27/2015 10:45:00 AM
DATE LOGGED 10/28/2015 11:00:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 306146.46
EASTING* 13485699.17
ELEVATION (Sediment Surface) 564.2 ft (NAVD 88)
RECOVERY 100 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
0	12	Composite	HBT15-A-0010
-1	21	Composite	HBT15-A-1030
	27	Composite	HBT15-A-3050
-5	24	Composite	HBT15-A-5070
-7	36	Composite	HBT15-A-7010
-10			

USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
ML-CL	SILTY CLAY: gray silty clay.	0.5
SC	CLAYEY SAND: gray sand, little clay, trace gravel, trace cobbles up to 1.5"x1.5"	1.8
ML	SILT: gray silt with black bands, trace f sand. Hydrocarbon odor.	2.3
ML	SILT: gray silt with black bands, some f-m sand, trace gravel. Hydrocarbon odor.	2.8
CH	CLAY: gray fat clay, trace gravel.	3.4
ML	SILT: black silt.	3.6
CH	CLAY: gray fat clay, trace c sand/ f gravel. Black streaking @4.6-4.7'	7.8
CL	CLAY: gray to dark gray to black clay with gravel-sized pieces of brick, little gravel and wood pieces, trace cobbles.	9.1
CL	CLAY: black clay. Hydrocarbon odor. @9.5-9.6' black sand with little clay	9.5
SC	CLAYEY SAND: black clayey sand.	9.6
CL	CLAY: black clay. Hydrocarbon odor. @9.5-9.6' black sand with little clay	10.0
	End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING HBT15-B

PROJECT NAME Riverbend
DATE COLLECTED 10/30/2015 10:10:00 AM
DATE LOGGED 10/30/2015 10:10:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 305884.38
EASTING* 13485670.72
ELEVATION (Sediment Surface) 555.0 ft (NAVD 88)
RECOVERY 60 %

DEPTH BELOW MUDLINE (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	Composite	HBT15-B-0010		SHELLS	SHELLS: mussel shells with little gray silt, pebbles.	0.3
-1 -2 -3	27	Composite	HBT15-B-1030		SC-CL	SANDY CLAY: gray to dark gray f-vf sandy soft clay, trace gravel and c sand.	3.3
-4 -5	26	Composite	HBT15-B-3055	⋯	SP	SAND: black m sand, little gravel, trace organics, trace shell fragments. Hydrocarbon odor.	5.4
	5	Composite	HBT15-B-5560	▨	CH	CLAY: gray fat clay.	6.0
-6 -7 -8 -9 -10 -11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

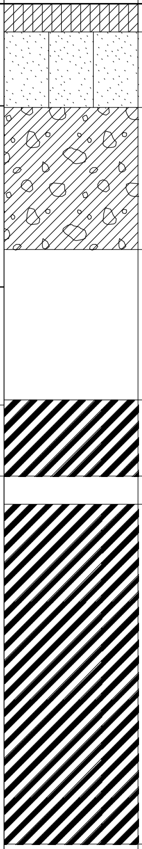
"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING HBT15-C

PROJECT NAME Riverbend
DATE COLLECTED 10/30/2015 1:05:00 PM
DATE LOGGED 11/2/2015 3:15:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 305773.34
EASTING* 13485495.49
ELEVATION (Sediment Surface) 552.0 ft (NAVD 88)
RECOVERY 89 %



DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	13	Composite	HBT15-C-0010		ML-CL	SILTY CLAY: black silty clay and mussel shells with little gravel/brown c sand.	0.3
-1					SM	SILTY SAND: brown sand with black silty clay, well-rounded gravel/pebbles, brick pieces, glass shards. Slight hydrocarbon odor.	1.1
-2	23	Composite	HBT15-C-1030		CL	CLAY: gray to dark gray clay, black streaking, trace gravel, trace woody debris.	2.6
-3 -4	15	Composite	HBT15-C-3040		SC-CL	SANDY CLAY: dark gray m-f sandy clay, little woody debris, trace gravel/pebbles.	4.2
-5	9	Composite	HBT15-C-4050		CH	CLAY: gray fat clay.	5.0
					SC-CL	SANDY CLAY: black sandy clay, trace gravel, trace organic debris. Hydrocarbon odor.	5.3
-6 -7 -8 -9					CH	CLAY: gray fat clay, trace gravel.	8.9
-10 -11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

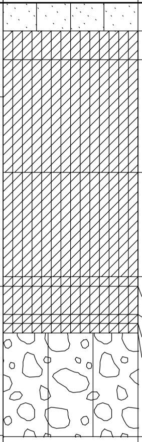
EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-01

PROJECT NAME Riverbend
DATE COLLECTED 10/30/2015 3:15:00 PM
DATE LOGGED 11/3/2015 3:15:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 303114.73
EASTING* 13478778.61
ELEVATION (Sediment Surface) 565.5 ft (NAVD 88)
RECOVERY 51 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
0 to -1	12	Composite	RB15-01-0010
-1 to -3	24	Composite	RB15-01-1030
-3 to -4.6	19	Composite	RB15-01-3050



USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
ML	SILT: dark gray silt, little vf sand, trace clay	0.3
ML-CL	SILTY CLAY: black to dark gray silty clay, some organics, little vf sand.	0.6
CL-ML	CLAYEY SILT: dark gray clayey silt, black streaking, slight hydrocarbon odor.	1.8
ML-CL	SILTY CLAY: black silty clay, little organics, little vf sand.	2.9
ML-CL	SILTY CLAY: black silty clay, little organics, little vf sand interbedded with gray silty clay.	3.0
ML-CL	SILTY CLAY: black silty clay, little organics, little vf sand.	3.3
ML-CL	SILTY CLAY: black silty clay, little organics, little vf sand interbedded with gray silty clay.	3.4
ML-CL	SILTY CLAY: black silty clay, little organics, little vf sand.	3.5
GM	GRAVEL AND PEBBLES: dark gray to black silty pebbles, chunks of asphalt, little c sand and angular gravel.	4.6

End of Boring at 9 ft.

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-02

PROJECT NAME Riverbend
DATE COLLECTED 10/31/2015 9:25:00 AM
DATE LOGGED 11/3/2015 8:00:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 302804.1
EASTING* 13478311.5
ELEVATION (Sediment Surface) 547.3 ft (NAVD 88)
RECOVERY 110 %

DEPTH BELOW MUDLINE (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	Composite	RB15-02-0010	░	SC	CLAYEY SAND: black m sand with clay, little shell hash and woody debris. Strong Hydrocarbon odor. In top 2" of core, aluminum can top and plastic wrapper.	1.5
-1	27	Composite	RB15-02-1030	▤	CL	CLAY: black soft clay, strong hydrocarbon odor.	1.7
-2				░	SC	SAND: black f-m sand with clay, little organics, strong hydrocarbon odor.	2.2
				▥	ML-CL	SILTY CLAY: black silty clay with dense organic material (leaves/twigs). Strong hydrocarbon odor.	2.9
-3				░	SC	SAND: black f-m sand with clay, little organics, strong hydrocarbon odor.	3.3
-4	13	Composite	RB15-02-3040	▨	CH	CLAY: gray fat clay.	4.4
-5					SC-CL	SANDY CLAY: black f-m sandy clay, little organics, strong hydrocarbon odor.	5.0
-6 -7 -8 -9 -10				▨	CH	CLAY: gray fat clay, trace gravel.	11.0
-11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-03

PROJECT NAME Riverbend
DATE COLLECTED 10/31/2015 10:30:00 AM
DATE LOGGED 11/2/2015 2:00:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 302542.34
EASTING* 13477154.36
ELEVATION (Sediment Surface) 560.6 ft (NAVD 88)
RECOVERY 110 %

DEPTH BELOW MUDLINE (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	Composite	RB15-03-0010	▨			
-1				▨			
-2	24	Composite	RB15-03-1030	▨	ML-CL	SILTY CLAY: black silty clay, trace gravel, trace f sand, trace organics. Strong hydrocarbon odor.	
-3				▨			
-4	23	Composite	RB15-03-3050	▨			
				▨	ML-CL	SILTY CLAY: black to dark gray organic-rich silty clay.	4.2
				○	GM	GRAVEL: well-rounded c sand/gravel, trace silt.	4.4
				⁘	SM	SILTY SAND: organic rich black silty vf-f sand, trace well-rounded gravel.	4.5
-5				▨			4.9
-6	25	Composite	RB15-03-5070	▨			
-7				▨			
-8				▨	CH	CLAY: gray fat clay, trace red streaking, trace well-rounded gravel. Black draw-down visible up to 7.5' on outside of core.	
-9				▨			
-10				▨			
-11						End of Boring at 10 ft.	11.0
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-04

PROJECT NAME Riverbend
DATE COLLECTED 10/31/2015 12:30:00 PM
DATE LOGGED 11/3/2015 9:00:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 301389.25
EASTING* 13475078.56
ELEVATION (Sediment Surface) 552.3 ft (NAVD 88)
RECOVERY 94 %

DEPTH BELOW MUDLINE (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	Composite	RB15-04-0010		SC		0.4
					ML-CL		0.8
					GM	GRAVEL: black gravel-pebble sized pieces in black silty clay, little f sand. Hydrocarbon odor.	1.3
-1	27	Composite	RB15-04-1030		SM	SAND: tan to gray f-m sand, trace silt, trace wood debris.	2.4
-2							
-3					SM	SAND: tan to gray f-m sand, some silt, trace wood debris. Slight hydrocarbon odor.	3.3
	12	Composite	RB15-04-3040		CH	CLAY: gray fat clay, trace well-rounded gravel.	9.4
-4							
-5							
-6							
-7							
-8							
-9							
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-05

PROJECT NAME Riverbend
DATE COLLECTED 10/31/2015 2:00:00 PM
DATE LOGGED 11/3/2015 9:45:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 300277.73
EASTING* 13473696.44
ELEVATION (Sediment Surface) 555.1 ft (NAVD 88)
RECOVERY 95 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0					ML	SILT: gray silt and mussel shells.	0.3
	12	Composite	RB15-05-0010		SC-CL	SANDY CLAY: black clay with f-vf sand	0.4
-1							
-2	24	Composite	RB15-05-1030				
-3							
-4							
-5					CH	CLAY: gray fat clay with trace well-rounded gravel.	
-6							
-7							
-8							
-9							9.5
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-06

PROJECT NAME Riverbend
DATE COLLECTED 10/31/2015 3:00:00 PM
DATE LOGGED 11/3/2015 10:00:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 300122.59
EASTING* 13473589.27
ELEVATION (Sediment Surface) 544.6 ft (NAVD 88)
RECOVERY 105 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0				▨	ML-CL	SILTY CLAY: gray silty clay and mussel shells with little f-vf sand.	0.1
				▨	SC-CL	SANDY CLAY: Black f-m sandy clay.	0.2
	12	Composite	RB15-06-0010	▨			
-1				▨			
-2	24	Composite	RB15-06-1030	▨			
-3				▨			
-4				▨			
-5				▨	CH	CLAY: gray fat clay.	
-6				▨			
-7				▨			
-8				▨			
-9				▨			
-10				▨			
							10.5
-11						End of Boring at 10 ft.	
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-07

PROJECT NAME Riverbend
DATE COLLECTED 11/1/2015 12:45:00 PM
DATE LOGGED 11/2/2015 8:30:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 299895.29
EASTING* 13473274.78
ELEVATION (Sediment Surface) 541.2 ft (NAVD 88)
RECOVERY 60 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	10	Composite	RB15-07-0010	░	ML	SILT: gray silt and mussel shells, little pebbles and gravel	0.5
-1	10	Composite	RB15-07-1020	●	GW	GRAVEL: black gravel with some pebbles, little coarse sand, and trace gray silt.	2.0
-2	16	Composite	RB15-07-2030	▨	CH	CLAY: gray fat clay.	6.0
-3							
-4							
-5							
-6							
-7							
-8							
-9							
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-08

PROJECT NAME Riverbend
DATE COLLECTED 11/1/2015 10:35:00 AM
DATE LOGGED 11/2/2015 9:50:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 299725.55
EASTING* 13472951.82
ELEVATION (Sediment Surface) 551.3 ft (NAVD 88)
RECOVERY 95 %

DEPTH BELOW MUDLINE (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	Composite	RB15-08-0010		SC-CL	SANDY CLAY: gray semi-firm clay and gray f-m sand, trace wood debris, trace cobbles, large rock 3"x3".	0.6
-1 -2 -3 -4 -5 -6 -7 -8 -9				▨	CH	CLAY: gray fat clay with trace well-rounded gravel.	9.5
-10 -11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-09

PROJECT NAME Riverbend
DATE COLLECTED 11/1/2015 9:30:00 AM
DATE LOGGED 11/2/2015 10:15:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 299651.35
EASTING* 13472911.57
ELEVATION (Sediment Surface) 541.4 ft (NAVD 88)
RECOVERY 109 %

DEPTH BELOW MUDLINE (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	Composite	RB15-09-0010		GP	GRAVEL: gravel and black c sand, little shell debris, little dark gray silt, trace cobble-sized pieces of asphalt.	0.5
					CH	CLAY: gray fat clay.	0.7
					GP	GRAVEL: gravel and black c sand, little shell debris, little dark gray silt, trace cobble-sized pieces of asphalt.	0.8
-1							
-2							
-3							
-4							
-5							
-6					CH	CLAY: gray fat clay, trace streaks of red, trace well-rounded gravel.	
-7							
-8							
-9							
-10							
-11							10.9
						End of Boring at 10 ft.	
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING RB15-10

PROJECT NAME Riverbend
DATE COLLECTED 11/1/2015 8:15:00 AM
DATE LOGGED 11/2/2015 10:50:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 299536.3
EASTING* 13472730.89
ELEVATION (Sediment Surface) 547.2 ft (NAVD 88)
RECOVERY 109 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	7	Composite	RB15-10-0010	≋	SC	SAND: black f-m sand, trace clay, wood debris, pebbles, shell hash, and gravel.	0.6
-1 -2 -3 -4 -5 -6 -7 -8 -9 -10				▨	CH	CLAY: gray fat clay.	10.9
-11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-11

PROJECT NAME Riverbend

DATE COLLECTED 11/3/2015 11:55:00 AM

DATE LOGGED 11/4/2015 3:15:00 PM

DRILLING CONTRACTOR Mateco

DRILLING METHOD Sonic Coring

LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25

LOCATION Detroit, MI

NORTHING* 299326.76

EASTING* 13472464.99

ELEVATION (Sediment Surface) 546.6 ft (NAVD 88)

RECOVERY 105 %

DEPTH BELOW MUDLINE (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	Composite	RB15-11-0010		SC-CL	SANDY CLAY: dark gray to black f-m sandy clay, little shell hash, little gravel, trace silt. Mussel shells in top 1" of core. Slight hydrocarbon odor.	0.3
-1	24	Composite	RB15-11-1030	▨	CH	CLAY: gray fat clay, red streaking, trace well-rounded gravel.	
-2				▨			
-3				▨			
-4				▨			
-5				▨			
-6				▨			
-7				▨			
-8				▨			
-9				▨			
-10				▨			10.5
-11						End of Boring at 10 ft.	
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

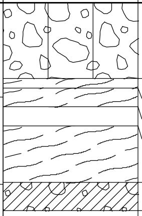
"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-12

PROJECT NAME Riverbend
DATE COLLECTED 11/3/2015 10:40:00 AM
DATE LOGGED 11/4/2015 2:30:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 299090.24
EASTING* 13472136.39
ELEVATION (Sediment Surface) 560.2 ft (NAVD 88)
RECOVERY 22 %



DEPTH BELOW MUDLINE (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	Composite	RB15-12-0010		GM	SILTY GRAVEL: black silty sandy gravel and pebbles, little shell hash and organics, trace brig fragments. PID 89 PPM, orange staining on core liner. Extremely strong Hydrocarbon odor.	0.8
					SC	CLAYEY SAND: black clayey sand with pebble-sized pieces of brick.	0.9
-1	11	Composite	RB15-12-1030		SC	SAND AND NAPL: black, sticky sand, free product/NAPL, some organic material.	1.1
					SC-CL	NAPL: black sticky vf sandy clay with NAPL, little organics.	1.3
					SC	SAND AND NAPL: black, sticky sand, free product/NAPL, some organic material.	1.9
-2					CL	CLAY: gray soft clay.	2.2
-3							
-4							
-5							
-6							
-7							
-8							
-9							
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING RB15-13

PROJECT NAME Riverbend

DATE COLLECTED 11/2/2015 3:10:00 PM

DATE LOGGED 11/4/2015 11:00:00 AM

DRILLING CONTRACTOR Mateco

DRILLING METHOD Sonic Coring

LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25

LOCATION Detroit, MI

NORTHING* 298768.77

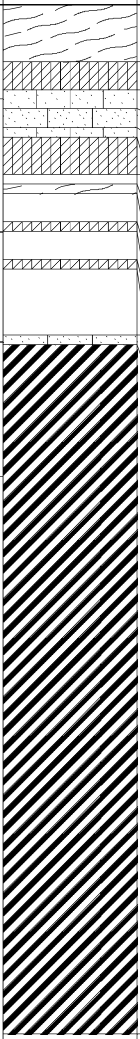
EASTING* 13471722.11

ELEVATION (Sediment Surface) 551.9 ft (NAVD 88)

RECOVERY 109 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
0	12	Composite	RB15-13-0010
-1	17	Composite	RB15-13-1025
-2			
-3	14	Composite	RB15-13-2535
-4	17	Composite	RB15-13-3550
-5			
-6			
-7			
-8			
-9			
-10			
-11			
-12			

GRAPHIC LOG



USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
SC	CLAYEY SAND: black clayey m-c sand with some gravel, little twig, shell/brick fragments. Hydrocarbon odor.	0.6
ML-CL	SILTY CLAY: dark gray silty clay, trace vf sand. Hydrocarbon odor.	0.9
ML	SANDY SILT: dark gray f sandy silt. Hydrocarbon odor.	1.1
SM	SILTY SAND: black silty sand, little organics (twigs, roots). Hydrocarbon odor.	1.3
ML	SANDY SILT: dark gray f sandy silt. Hydrocarbon odor.	1.4
ML-CL	SILTY CLAY: dark gray silty clay, trace vf sand. Hydrocarbon odor.	1.8
SC-CL	SANDY CLAY: black f sandy clay, little organics. Hydrocarbon odor.	1.9
SC	CLAYEY SAND: dark gray to black clayey f sand. Hydrocarbon odor.	2.0
SC-CL	SANDY CLAY: black f sandy clay, little organics. Hydrocarbon odor.	2.3
ML-CL	SILTY CLAY: dark gray silty clay, trace vf sand. Hydrocarbon odor.	2.4
SC-CL	SANDY CLAY: dark gray to black f-m sandy clay, little organics, trace gravel. Hydrocarbon odor.	2.7
ML-CL	SILTY CLAY: dark gray silty clay, trace vf sand. Hydrocarbon odor.	2.8
SC-CL	SANDY CLAY: dark gray to black f-m sandy clay, little organics, trace gravel. Hydrocarbon odor.	3.5
SM	SILTY SAND: black silty m sand.	3.6
CH	CLAY: gray fat clay. Boulders @7'. Draw-down visible on outside of clay.	10.9
	End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-14

PROJECT NAME Riverbend
DATE COLLECTED 11/2/2015 2:20:00 PM
DATE LOGGED 11/4/2015 10:20:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 298710.13
EASTING* 13471679.19
ELEVATION (Sediment Surface) 552.2 ft (NAVD 88)
RECOVERY 100 %

DEPTH BELOW MUDLINE (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	Composite	RB15-14-0010	░	SM	SILTY SAND: black silty f-m sand, mussel shells in top 2", brick fragments. Strong Hydrocarbon odor.	0.8
-1 -2	21	Composite	RB15-14-1030		SC-CL	SANDY CLAY: black f-m sandy clay, soft, little organics. Strong Hydrocarbon odor.	2.3
				≈	SC	CLAYEY SAND: dark gray to gray clayey sand, little c-f gravel	2.8
-3 -4	27	Composite	RB15-14-3050	▨	CH	CLAY: gray fat clay, little c sand/gravel @2.8-3.7'. @3.7-3.8' large piece of metal	
-5 -6 -7 -8 -9 -10				▨			10.0
-11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-15

PROJECT NAME Riverbend

DATE COLLECTED 11/2/2015 1:00:00 PM

DATE LOGGED 11/4/2015 9:30:00 AM

DRILLING CONTRACTOR Mateco

DRILLING METHOD Sonic Coring

LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25

LOCATION Detroit, MI

NORTHING* 298580.9

EASTING* 13471561.38

ELEVATION (Sediment Surface) 550.7 ft (NAVD 88)

RECOVERY 100 %

DEPTH BELOW MUDLINE (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	Composite	RB15-15-0010		GM	SANDY GRAVEL: black c sandy gravel, little silt, little pebbles/cobbles, shell/brick fragments, trace organics. Hydrocarbon odor.	0.3
					SC-CL	SANDY CLAY: black f-vf sandy clay, trace organics. Hydrocarbon odor.	1.0
-1 -2	14	Composite	RB15-15-1020		CH	CLAY: gray fat clay, trace gravel.	2.2
-3	25	Composite	RB15-15-2040		SC	CLAYEY SAND: black clayey f sand, gravel-sized pieces of slag, orange sheen. Hydrocarbon odor.	2.9
					CL	CLAY: black to dark gray clay, trace vf sand. Hydrocarbon odor.	3.2
-4					SC	CLAYEY SAND: black clayey f sand, gravel-sized pieces of slag, orange sheen. Hydrocarbon odor. @3.6-3.7' and 3.8-3.9': dense organics (woody debris)	4.3
-5 -6	21	Composite	RB15-15-4060				
-7 -8 -9 -10					CH	CLAY: gray fat clay, trace gravel.	10.0
-11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING RB15-16

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NAME Riverbend
DATE COLLECTED 11/2/2015 11:35:00 AM
DATE LOGGED 11/4/2015 8:30:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 298407.02
EASTING* 13471420.29
ELEVATION (Sediment Surface) 550.0 ft (NAVD 88)
RECOVERY 88 %

DEPTH BELOW MUDLINE (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	Composite	RB15-16-0010	░	SP	SAND: black m-f sand, gravel, pebbles/cobbles, trace shell hash. Strong Hydrocarbon odor. Sheen and orange tint on core liner. Possible free product.	
-1							1.0
-2	24	Composite	RB15-16-1030				
					SC-CL	SANDY CLAY: black f sandy clay, little organics, large brick piece. Hydrocarbon odor. Sheen and orange tint on core liner. Possible free product.	
-3							
	14	Composite	RB15-16-3040				
-4							4.2
-5	22	Composite	RB15-16-4060	▨			
-6				▨			
				▨	CH	CLAY: gray fat clay, trace gravel.	
-7				▨			
-8				▨			
							8.8
-9							
-10							
						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

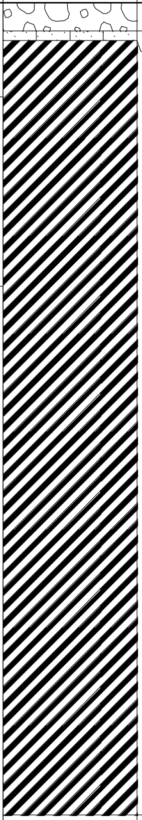
"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-17

PROJECT NAME Riverbend
DATE COLLECTED 11/2/2015 9:05:00 AM
DATE LOGGED 11/3/2015 1:45:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 297738.73
EASTING* 13470835.87
ELEVATION (Sediment Surface) 542.4 ft (NAVD 88)
RECOVERY 86 %

DEPTH BELOW MUDLINE (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	Composite	RB15-17-0010		GP	GRAVEL AND PEBBLES: well-rounded gravel and pebbles. Hydrocarbon odor.	0.3
					ML	SILT: black silt with c sand, gravel, Hydrocarbon odor.	0.4
-1							
-2	24	Composite	RB15-17-1030				
-3							
-4							
-5					CH	CLAY: gray fat clay, trace gravel.	8.6
-6							
-7							
-8							
-9							
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-18

PROJECT NAME Riverbend

DATE COLLECTED 11/1/2015 3:15:00 PM

DATE LOGGED 11/2/2015 4:15:00 PM

DRILLING CONTRACTOR Mateco

DRILLING METHOD Sonic Coring

LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25

LOCATION Detroit, MI

NORTHING* 295808.17

EASTING* 13469497.04

ELEVATION (Sediment Surface) 543.7 ft (NAVD 88)

RECOVERY 73 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	10	Composite	RB15-18-0010	▨	ML-CL	SILTY CLAY: black silty clay with m-c sand ad f gravel, trace shell hash and well-rounded cobbles-pebbles.	0.8
-1				▨			
-2				▨			
-3				▨			
-4				▨	CH	CLAY: gray fat clay, trace gravel/pebbles.	
-5				▨			
-6				▨			
-7				▨			7.3
-8							
-9							
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-19

PROJECT NAME Riverbend
DATE COLLECTED 11/2/2015 5:05:00 PM
DATE LOGGED 11/3/2015 11:11:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 294194.33
EASTING* 13468398.52
ELEVATION (Sediment Surface) 546.9 ft (NAVD 88)
RECOVERY 105 %

DEPTH BELOW MUDLINE (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	Composite	RB15-19-0010	░	SP	SAND: black m-c sand with gravel, pebbles, cobbles, trace shell hash, trace silt. Hydrocarbon odor.	0.8
-1				▨			
-2	24	Composite	RB15-19-1030	▨			
-3				▨			
-4				▨			
-5				▨	CH	CLAY: gray fat clay, trace gravel.	
-6				▨			
-7				▨			
-8				▨			
-9				▨			
-10				▨			10.5
-11						End of Boring at 10 ft.	
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

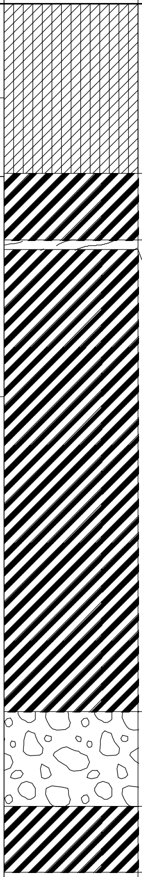
"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-20

PROJECT NAME Riverbend
DATE COLLECTED 11/4/2015 2:15:00 PM
DATE LOGGED 11/5/2015 8:45:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 293665.6
EASTING* 13467984.83
ELEVATION (Sediment Surface) 553.3 ft (NAVD 88)
RECOVERY 92 %



DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	Composite	RB15-20-0010	ML-CL	SILTY CLAY: dark gray silty clay, trace organics. Hydrocarbon odor.	
-1	10	Composite	RB15-20-1020			
-2				CH	CLAY: gray fat clay, semi-firm, trace gravel.	1.8
				SC	CLAYEY SAND: black clayey m sand, Hydrocarbon odor.	2.5
-3	28	Composite	RB15-20-2040	CH	CLAY: gray fat clay, semi-firm, trace gravel.	2.6
-4						
-5						
-6						
-7						
-8				GP	CLAYEY GRAVEL: gravel, cobbles, and pebbles in gray clay.	7.5
-9				CH	CLAY: gray fat clay, semi-firm, trace gravel.	8.5
-10					End of Boring at 10 ft.	9.2
-11						
-12						

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

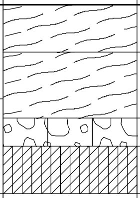
"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-21

PROJECT NAME Riverbend
DATE COLLECTED 11/4/2015 12:40:00 PM
DATE LOGGED 11/5/2015 10:00:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 293509.86
EASTING* 13467939.09
ELEVATION (Sediment Surface) 552.3 ft (NAVD 88)
RECOVERY 48 %

DEPTH BELOW MUDLINE (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	Composite	RB15-21-0010		SC	CLAYEY SAND: dark gray clayey f-c sand, some gravel, little shell fragments, pebble-cobble-sized pieces of brick.	0.5
					SC	CLAYEY SAND: dark gray clayey sand, little cobbles to boulders. Hydrocarbon odor.	1.2
-1	12	Composite	RB15-21-1020		GM	SILTY GRAVEL: dark gray gravel and silt with cobbles and boulders.	1.5
					ML-CL	SILTY CLAY: dark gray silty clay, little organics, little angular gravel.	2.0
-2							
-3							
-4						End of Boring at 4.2 ft.	
-5							
-6							
-7							
-8							
-9							
-10							
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-22

PROJECT NAME Riverbend
DATE COLLECTED 11/3/2015 4:50:00 PM
DATE LOGGED 11/4/2015 3:45:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 292856.1
EASTING* 13467469.49
ELEVATION (Sediment Surface) 550.5 ft (NAVD 88)
RECOVERY 87 %

SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
12	Composite	RB15-22-0010
12	Composite	RB15-22-1020
15	Composite	RB15-22-2030
19	Composite	RB15-22-3050

USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
ML-CL	SILTY CLAY: gray to dark gray silty clay with some f sand, little shell fragments.	0.3
CL	CLAY: brown/gray clay with dark gray sandy silty clay.	0.6
SC-CL	SANDY CLAY: black sandy clay and f sand, trace gravel.	1.1
SW	SAND: well-graded black to dark gray f-m sand, sand-sized brick pieces.	1.4
SC-CL	SANDY CLAY: vf-f sandy clay, NAPL sheen, possible product, orange stain on core liner. Strong Hydrocarbon odor.	1.5
SC-CL	SANDY CLAY: black sandy clay and f sand, trace gravel.	1.9
CL	CLAY: dark gray soft clay, trace sand/brick fragments.	2.3
SC-CL	SANDY CLAY: gray m-c sandy clay with some gravel, little cobble.	3.3
ML-CL	SILTY CLAY: black organic-rich silty clay.	3.6
CL	CLAY: black semi-firm clay.	4.1
SC-CL	SANDY CLAY: dark gray to black f sandy clay. Brick chunk in bottom.	4.8

End of Boring at 5.5 ft.

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-23

PROJECT NAME Riverbend
DATE COLLECTED 11/3/2015 3:05:00 PM
DATE LOGGED 11/5/2015 10:55:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 292321.71
EASTING* 13467079.36
ELEVATION (Sediment Surface) 546.4 ft (NAVD 88)
RECOVERY 50 %

DEPTH BELOW MUDLINE (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	Composite	RB15-23-0010		SM	SILTY SAND: black c sand and subangular gravel in silt, trace shell hash and brick pieces, trace twigs. Hydrocarbon odor.	0.3
					SC	CLAYEY SAND: black clayey f sand. Hydrocarbon odor.	0.4
-1							
-2	24	Composite	RB15-23-1030		ML-CL	SILTY CLAY: dark gray silty clay, trace organics. Hydrocarbon odor.	3.0
-3					ML-CL	SILTY CLAY: dark gray silty clay and organics. Hydrocarbon odor.	3.3
					ML-CL	SILTY CLAY: dark gray silty clay, trace organics. Hydrocarbon odor.	3.7
-4	24	Composite	RB15-23-3050		ML-CL	SILTY CLAY: dark gray to black silty clay and organics. Hydrocarbon odor.	4.7
					ML-CL	SILTY CLAY: dark gray silty clay, trace organics. Hydrocarbon odor.	5.0
-5							
-6							
-7							
-8							
-9							
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

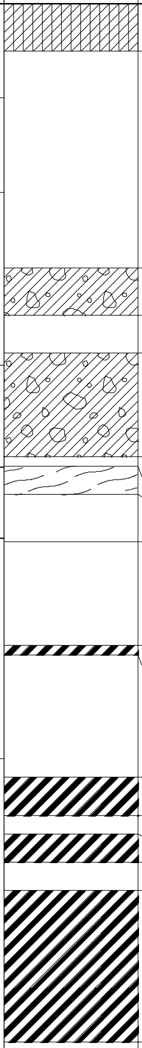
SEDIMENT BORING RB15-24

PROJECT NAME Riverbend
DATE COLLECTED 11/4/2015 9:20:00 AM
DATE LOGGED 11/5/2015 9:15:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 291288.86
EASTING* 13466240.31
ELEVATION (Sediment Surface) 548.1 ft (NAVD 88)
RECOVERY 110 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
0 to -1	12	Composite	RB15-24-0010
-1 to -2	12	Composite	RB15-24-1020
-2 to -3.8	22	Composite	RB15-24-2040
-3.8 to -4.9	13	Composite	RB15-24-4050
-4.9 to -5.7	9	Composite	RB15-24-5060
-5.7 to -8	28	Composite	RB15-24-6080

GRAPHIC LOG



USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
ML-CL	SILTY CLAY: dark gray silty clay, trace gravel.	0.5
SC-CL	SANDY CLAY: black clay with f-m sand, some gravel-pebble-sized pieces of asphalt. Hydrocarbon odor.	2.8
CL	CLAY: black clay, trace organics, trace silt. Hydrocarbon odor.	3.3
SC-CL	SANDY CLAY: black clay with f-m sand, some gravel-pebble-sized pieces of asphalt. Hydrocarbon odor.	3.7
CL	CLAY: black clay, trace organics, trace silt. Hydrocarbon odor.	4.8
SC-CL	SANDY CLAY: black vf-f sandy clay.	4.9
SC	CLAYEY SAND: gray clay inclusion in gray m sand, well-graded.	5.2
SC-CL	SANDY CLAY: black f-m sandy clay, shell hash @4.6'	5.7
SC-CL	SANDY CLAY: gray f sandy firm clay	6.8
CH	CLAY: gray fat clay, semi-firm.	6.9
SC-CL	SANDY CLAY: gray f sandy firm clay	8.2
CH	CLAY: gray fat clay, semi-firm.	8.6
SC-CL	SANDY CLAY: gray f sandy firm clay	8.8
CH	CLAY: gray fat clay, semi-firm.	9.1
SC-CL	SANDY CLAY: gray f sandy firm clay	9.4
CH	CLAY: gray fat clay, semi-firm.	11.0
	End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-25

PROJECT NAME Riverbend
DATE COLLECTED 11/4/2015 10:30:00 AM
DATE LOGGED 11/5/2015 11:30:00 AM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 290945.1
EASTING* 13465982.89
ELEVATION (Sediment Surface) 536.2 ft (NAVD 88)
RECOVERY 82 %

DEPTH BELOW MUDLINE (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	Composite	RB15-25-0010	≈	SC	SAND: gray sand, trace clay.	0.5
-1 -2 -3 -4 -5 -6				▨	CH	CLAY: gray fat clay, semi-firm.	6.2
-7 -8					SC-CL	SANDY CLAY: gray f sandy clay.	8.2
-9 -10 -11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-26

PROJECT NAME Riverbend
DATE COLLECTED 11/3/2015 8:00:00 AM
DATE LOGGED 11/4/2015 1:20:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 290473.79
EASTING* 13465708.22
ELEVATION (Sediment Surface) 535.7 ft (NAVD 88)
RECOVERY 92 %

DEPTH BELOW MUDLINE (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	Composite	RB15-26-0010		CL	CLAY: gray soft clay, trace vf sand.	1.1
-2 -3	24	Composite	RB15-26-1030		SC-CL	SANDY CLAY: gray vf-f sandy clay.	3.3
-4 -5 -6 -7	24	Composite	RB15-26-3050		SC	CLAYEY SAND: gray clayey f sand.	8.0
-8					CH	CLAY: gray fat clay, trace vf sand.	8.6
-9					SC-CL	SANDY CLAY: gray vf-f sandy clay.	9.2
-10 -11 -12						End of Boring at 10 ft.	

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING RB15-27

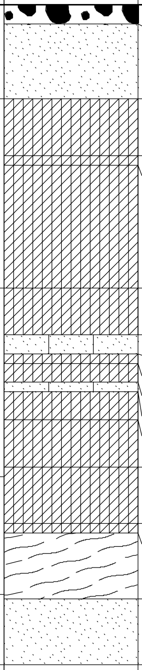
PROJECT NAME Riverbend
DATE COLLECTED 10/26/2015 3:30:00 PM
DATE LOGGED 10/28/2015 3:00:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 289920.05
EASTING* 13465465.44
ELEVATION (Sediment Surface) 533.6 ft (NAVD 88)
RECOVERY 70 %

DEPTH BELOW MUDLINE (ft): 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12

SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)
12	Composite	RB15-27-0010
24	Composite	RB15-27-1030
24	Composite	RB15-27-3050
15	Composite	RB15-27-5065
9	Composite	RB15-27-6570

GRAPHIC LOG



USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
GW	GRAVEL: rounded-well-rounded gravel, trace c gray sand.	0.2
SP	SAND: black m-c sand, trace gravel, trace pebbles, trace silt. Hydrocarbon odor.	1.0
ML-CL	SILTY CLAY: dark gray silty clay, trace organics. Hydrocarbon odor.	1.6
ML-CL	SILTY CLAY: gray silty clay and well-rounded gravel/c sand. Strong hyrdocarbon odor.	1.7
ML-CL	SILTY CLAY: dark gray silty clay, trace organics, trace well-rounded gravel. Hydrocarbon odor.	3.0
ML-CL	SILTY CLAY: light gray silty clay interbedded with dark gray silty soft clay and little fine gravel, little organics. Hydrocarbon odor.	3.5
SM	SAND: dark gray c sand, trace silt. Hydrocarbon odor.	3.7
ML-CL	SILTY CLAY: light gray silty soft clay, little organics. Hydrocarbon odor.	3.8
ML-CL	SILTY CLAY: dark gray silty clay, some organics, trace f sand. Hydrocarbon odor.	4.0
SM	SAND: f-m sand, trace silt.	4.1
ML-CL	SILTY CLAY: light gray silty clay, trace vf sand, fibrous organics.	4.4
ML-CL	SILTY CLAY: light gray silty clay, little c sand/angular gravel. Strong hydrocarbon odor.	4.9
ML-CL	SILTY CLAY: dark gray silty clay, little organics, trace f sand.	5.5
ML-CL	SILTY CLAY: dark gray silty clay and organics, trace f sand.	5.6
SC	CLAYEY SAND: black f sand, little organics (roots, small wood chips), trace clay. @ 6.1-6.3' gum-like consistency, possibly coal tar.	6.3
SP	SAND: tan sand, trace clay.	7.0

End of Boring at 10 ft.

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING RB15-28

PROJECT NAME Riverbend
DATE COLLECTED 10/26/2015 1:45:00 PM
DATE LOGGED 10/28/2015 2:30:00 PM
DRILLING CONTRACTOR Mateco
DRILLING METHOD Sonic Coring
LOGGED BY M. Gelinas

PROJECT NUMBER 62561.25
LOCATION Detroit, MI
NORTHING* 289557.24
EASTING* 13465353.43
ELEVATION (Sediment Surface) 530.9 ft (NAVD 88)
RECOVERY 100 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0				▨	ML-CL	SILTY CLAY: gray silty clay, trace c sand and gravel.	0.3
	12	Composite	RB15-28-0010	⁘	ML	SILT: black silt, some c sand/gravel.	0.7
				▨	CH	CLAY: gray fat clay.	0.9
-1				⁘	ML	SILT: black silt, some c sand/gravel.	1.3
-2	24	Composite	RB15-28-1030	▨	CH	CLAY: gray fat clay, trace sand/gravel.	10.0
-3							
-4							
-5							
-6							
-7							
-8							
-9							
-10						End of Boring at 10 ft.	
-11							
-12							

NOTES:
* Coordinates in Michigan State Plane South (US Survey foot)

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

APPENDIX C:

PHOTOGRAPHIC RECORD

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Photographic Record

Sample location: RB15-01

RB15-01-SURF

RB15-01-3050

RB15-01-0010

RB15-01-1030

Photographic Record

Sample location: RB15-02

RB15-02-SURF

RB15-02-3040

RB15-02-0010

RB15-02-sluff

RB15-02-1030

Photographic Record

Sample location: RB15-03

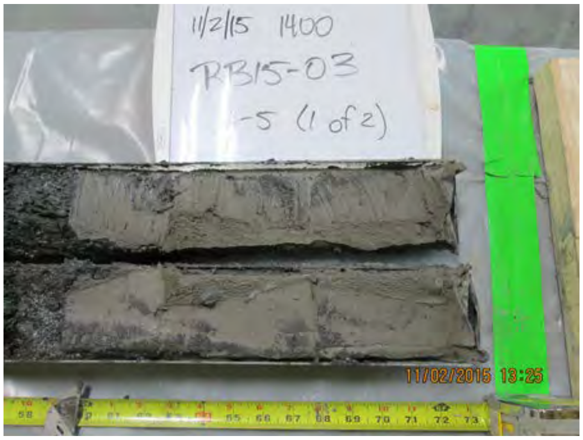
RB15-03-SURF

RB15-03-0010

RB15-03-1030

RB15-03-1030

RB15-03-3050



RB15-03-3050

Photographic Record

Sample location: RB15-04

RB15-04-SURF

No photo taken.

RB15-04-0010

RB15-04-1030

RB15-04-3040

Photographic Record

Sample location: RB15-05

RB15-05-SURF

RB15-05-0010

RB15-05-1030

Photographic Record

Sample location: RB15-06

RB15-06-SURF

No Photo taken.

RB15-06-0010

RB15-06-1030

Photographic Record

Sample location: RB15-07

RB15-07-SURF

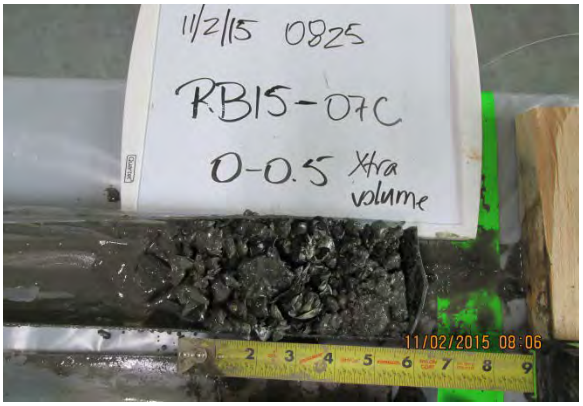
RB15-07A-0005

RB15-07B-0010

RB15-07B-1020

RB15-07B-2030

RB15-07C-0005



Photographic Record

Sample location: RB15-08

RB15-08-SURF

RB15-08-0010

Photographic Record

Sample location: RB15-09

RB15-09-SURF

RB15-09-0010

Photographic Record

Sample location: RB15-10

RB15-10-SURF

RB15-10-0010

Photographic Record

Sample location: RB15-11

RB15-11-SURF

RB15-11-0010

RB15-11-1030

Photographic Record

Sample location: RB15-12

RB15-12-SURF

No photo taken; no recovery.

RB15-12-0010

RB15-12-1020

RB15-12 material in core catcher

Photographic Record

Sample location: RB15-13

RB15-13-SURF

RB15-13-2535

RB15-13-0010

RB15-13-3550

RB15-13-1025

Photographic Record

Sample location: RB15-14

RB15-14-SURF

RB15-14-3050

RB15-14-0010

RB15-14-1030

Photographic Record

Sample location: RB15-15

RB15-15-SURF

RB15-15-2040

RB15-15-0010

RB15-15-4060

RB15-15-1020

RB15-15-4060

Photographic Record

Sample location: RB15-16

RB15-16-SURF

RB15-16-3040

RB15-16-0010

RB15-16-3040

RB15-16-1030

RB15-16-4060

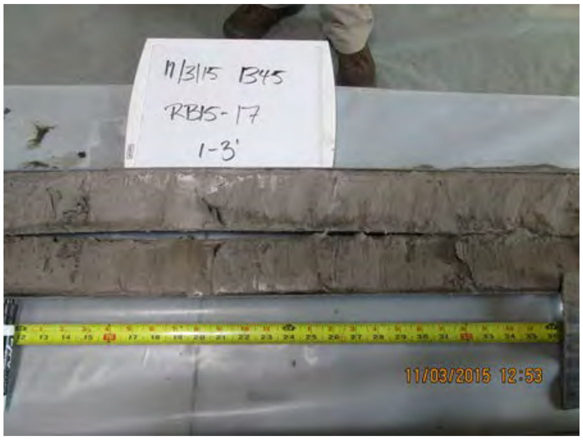
Photographic Record

Sample location: RB15-17

RB15-17-SURF

RB15-17-0010

RB15-17-1030



Photographic Record

Sample location: RB15-18

RB15-18-SURF

RB15-18-0010

Photographic Record

Sample location: RB15-19

RB15-19-SURF

RB15-19-0010

RB15-19-1030

Photographic Record

Sample location: RB15-20

RB15-20-SURF

RB15-20-2040

RB15-20-0010

RB15-20-1020

Photographic Record

Sample location: RB15-21

RB15-21-SURF

RB15-21-0010

RB15-21-1020

Photographic Record

Sample location: RB15-22

RB15-22-SURF

RB15-22-0010

RB15-22-1020

RB15-22-2030

RB15-22-3050

Photographic Record

Sample location: RB15-23

RB15-23-SURF

RB15-23-3050

RB15-23-0010

RB15-23-1030

Photographic Record

Sample location: RB15-24

RB15-24-SURF

RB15-24-0010

RB15-24-1020

RB15-24-2040

RB15-24-4050

RB15-24-5060

RB15-24-6080

Photographic Record

Sample location: RB15-25

RB15-25-SURF

RB15-25-0010

Photographic Record

Sample location: RB15-26

RB15-26-SURF

RB15-26-3050

RB15-26-0010

RB15-26-1030

Photographic Record

Sample location: RB15-27

RB15-27-SURF

RB15-27-0010

RB15-27-1030

RB15-27-1030

RB15-27-3050

RB15-27-5065

RB15-27-6570

Photographic Record

Sample location: RB15-28

RB15-28-SURF

RB15-28-0010

RB15-28-1030

Photographic Record

Sample location: HBT15-A

HBT15-A-SURF

HBT15-A-0010

HBT15-A-1030

HBT15-A-3050

HBT15-A-5070

HBT15-A-7010

HBT15-A-7010

Photographic Record

Sample location: HBT15-B

HBT15-B-SURF

HBT15-B-0010

HBT15-B-1030

HBT15-B-3055

HBT15-B-5560

Photographic Record

Sample location: HBT15-C

HBT15-C-SURF

HBT15-C-3040

HBT15-C-0010

HBT15-C-3040

HBT15-C-1030

HBT15-C-4050

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Appendix D

Particle Size Graphs

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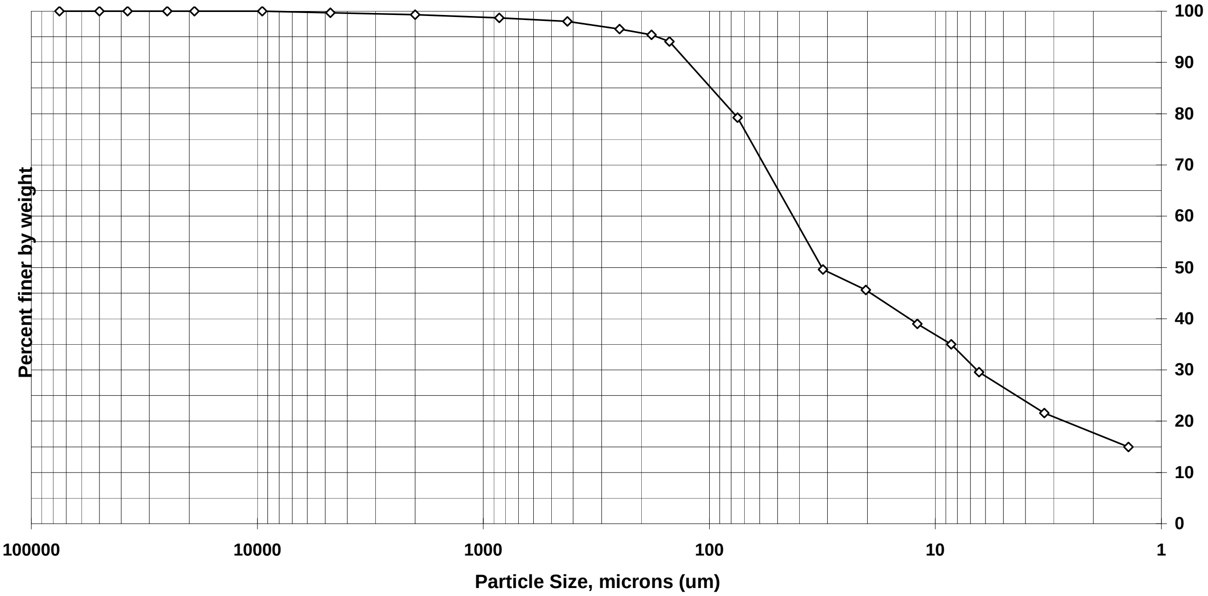
Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-01-SURF	**Percent Solids:**	43.4%	**Start Date:**	11/18/2015
Lab ID:	200-30555-E-8	**Specific Gravity:**	2.650	**End Date:**	11/25/2015

Shape (> #10): subrounded

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	100.0	0.0
#4	4750	99.7	0.3
#10	2000	99.3	0.4
#20	850	98.7	0.6
#40	425	98.0	0.7
#60	250	96.5	1.5
#80	180	95.4	1.1
#100	150	94.1	1.3
#200	75	79.2	14.9
Hyd1	31.4	49.6	29.6
Hyd2	20.3	45.6	4.0
Hyd3	12	39.0	6.6
Hyd4	8.5	35.0	4.0
Hyd5	6.4	29.6	5.4
Hyd6	3.3	21.6	8.0
Hyd7	1.4	15.0	6.6

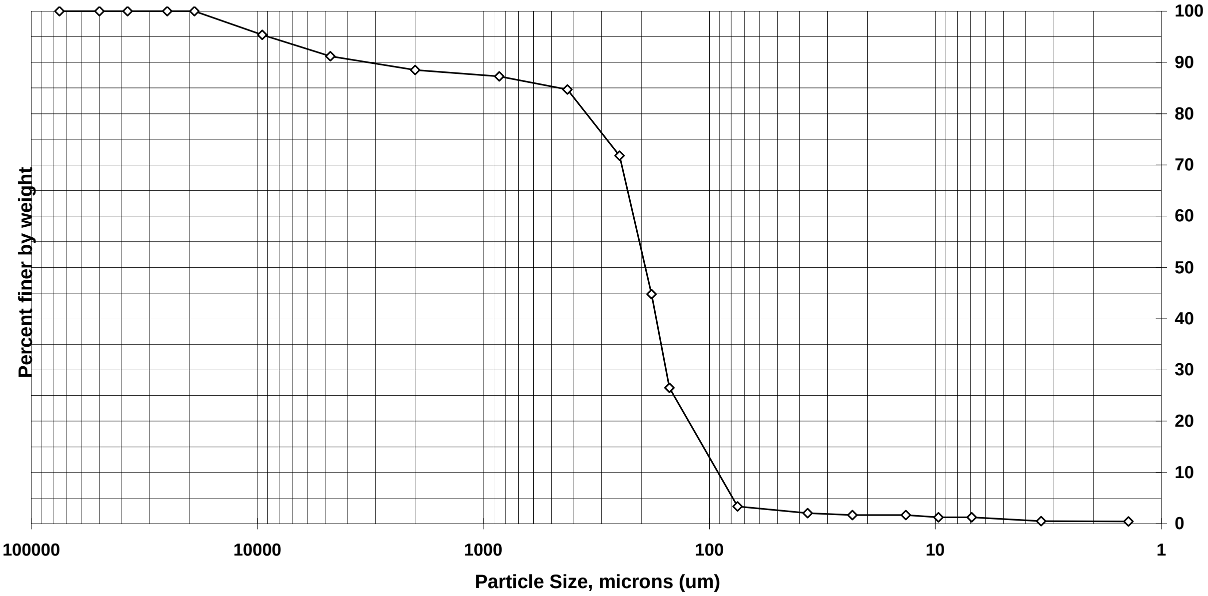
Soil Classification	Percent of sample
Gravel	0.3
Sand	20.5
Coarse Sand	0.4
Medium Sand	1.3
Fine Sand	18.8
Silt	49.6
Clay	29.6

Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-02-SURF	**Percent Solids:**	71.9%	**Start Date:**	11/23/2015
Lab ID:	200-30555-E-10	**Specific Gravity:**	2.650	**End Date:**	11/27/2015

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	95.4	4.6
#4	4750	91.2	4.2
#10	2000	88.5	2.7
#20	850	87.3	1.2
#40	425	84.7	2.6
#60	250	71.8	12.9
#80	180	44.8	27.0
#100	150	26.5	18.3
#200	75	3.4	23.1
Hyd1	36.7	2.1	1.3
Hyd2	23.3	1.7	0.4
Hyd3	13.5	1.7	0.0
Hyd4	9.7	1.2	0.4
Hyd5	6.9	1.2	0.0
Hyd6	3.4	0.5	0.7
Hyd7	1.4	0.4	0.1

Soil Classification	Percent of sample
Gravel	8.8
Sand	87.8
Coarse Sand	2.7
Medium Sand	3.8
Fine Sand	81.3
Silt	2.1
Clay	1.2

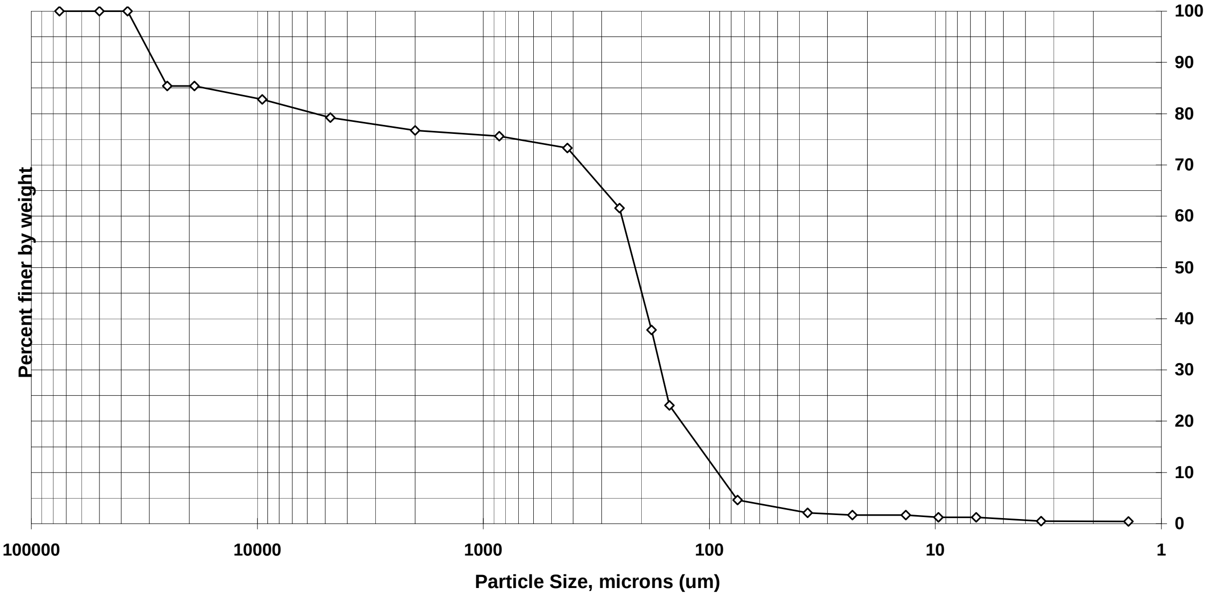
Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-02-SURFFD	**Percent Solids:**	71.5%	**Start Date:**	11/23/2015
Lab ID:	200-30555-E-11	**Specific Gravity:**	2.650	**End Date:**	11/27/2015

Shape (> #10): subangular

Non-soil material: shell,slag

Hardness (> #10): hard



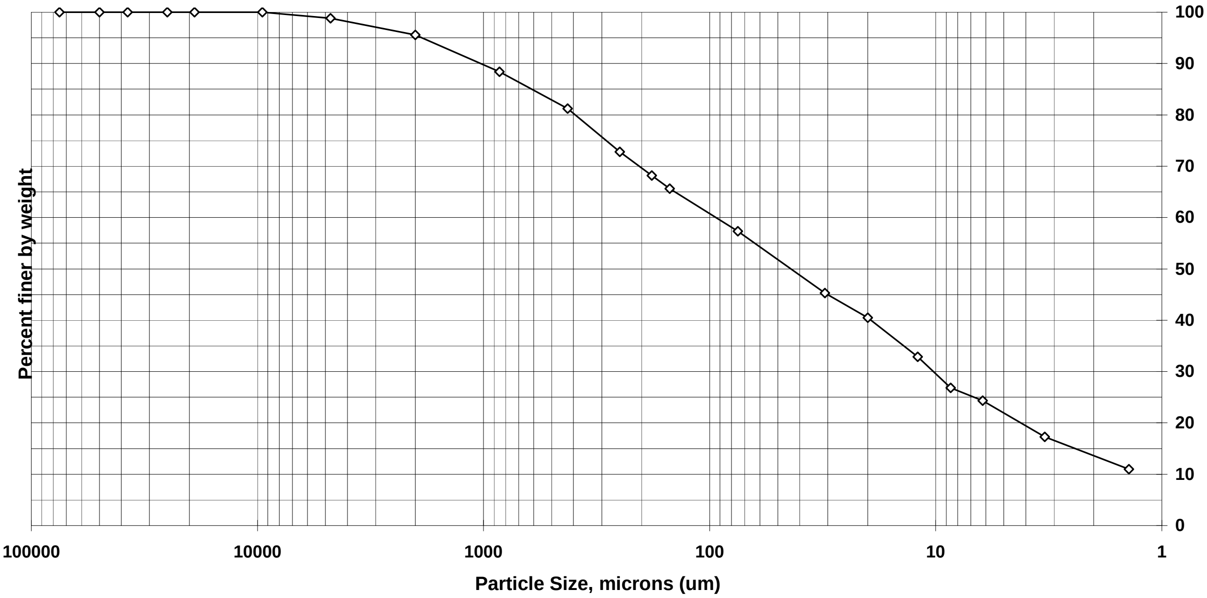
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	85.4	14.6
3/4 inch	19000	85.4	0.0
3/8 inch	9500	82.8	2.6
#4	4750	79.2	3.6
#10	2000	76.7	2.5
#20	850	75.6	1.1
#40	425	73.3	2.3
#60	250	61.6	11.7
#80	180	37.8	23.8
#100	150	23.1	14.7
#200	75	4.6	18.5
Hyd1	36.7	2.1	2.5
Hyd2	23.3	1.7	0.4
Hyd3	13.5	1.7	0.0
Hyd4	9.7	1.3	0.4
Hyd5	6.6	1.3	0.0
Hyd6	3.4	0.5	0.7
Hyd7	1.4	0.4	0.1

Soil Classification	Percent of sample
Gravel	20.8
Sand	74.6
Coarse Sand	2.5
Medium Sand	3.4
Fine Sand	68.7
Silt	3.3
Clay	1.3

Particle Size of Soils by ASTM D422

Date Received: 11/3/2015
Sample ID: RB15-03-SURF **Percent Solids:** 45.1% **Start Date:** 11/23/2015
Lab ID: 200-30555-E-12 **Specific Gravity:** 2.650 **End Date:** 11/27/2015

Shape (> #10): subrounded **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	100.0	0.0
#4	4750	98.8	1.2
#10	2000	95.6	3.2
#20	850	88.4	7.2
#40	425	81.2	7.2
#60	250	72.8	8.4
#80	180	68.2	4.6
#100	150	65.6	2.6
#200	75	57.3	8.3
Hyd1	30.9	45.3	12.0
Hyd2	20	40.5	4.8
Hyd3	12	32.9	7.6
Hyd4	8.6	26.8	6.1
Hyd5	6.2	24.3	2.5
Hyd6	3.3	17.3	7.0
Hyd7	1.4	11.0	6.3

Soil Classification	Percent of sample
Gravel	1.2
Sand	41.5
Coarse Sand	3.2
Medium Sand	14.4
Fine Sand	23.9
Silt	33.0
Clay	24.3

Particle Size of Soils by ASTM D422

Date Received: 11/3/2015

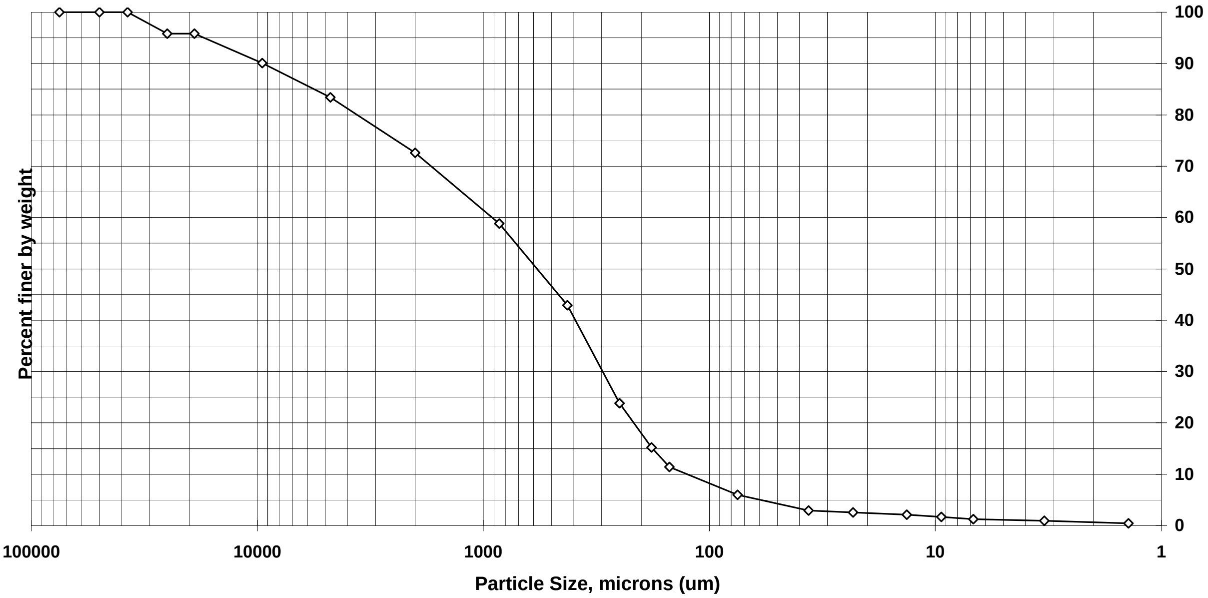
Sample ID: RB15-04-SURF
Lab ID: 200-30555-E-13

Percent Solids: 72.2%
Specific Gravity: 2.650

Start Date: 11/23/2015
End Date: 11/27/2015

Shape (> #10): subangular

Non-soil material: shell,slag
Hardness (> #10): hard



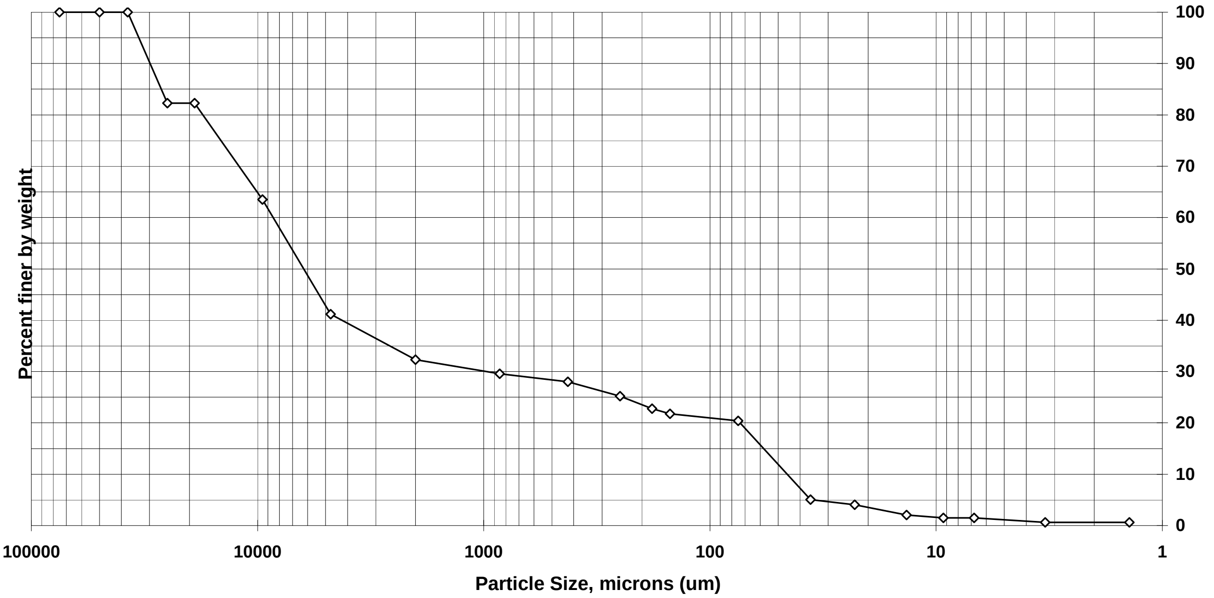
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	95.8	4.2
3/4 inch	19000	95.8	0.0
3/8 inch	9500	90.1	5.7
#4	4750	83.4	6.7
#10	2000	72.6	10.8
#20	850	58.8	13.8
#40	425	42.9	15.9
#60	250	23.8	19.1
#80	180	15.2	8.6
#100	150	11.4	3.8
#200	75	6.0	5.4
Hyd1	36.4	3.0	3.1
Hyd2	23.1	2.5	0.4
Hyd3	13.4	2.1	0.4
Hyd4	9.4	1.7	0.4
Hyd5	6.8	1.3	0.4
Hyd6	3.3	1.0	0.3
Hyd7	1.4	0.4	0.5

Soil Classification	Percent of sample
Gravel	16.6
Sand	77.4
Coarse Sand	10.8
Medium Sand	29.7
Fine Sand	36.9
Silt	4.7
Clay	1.3

Particle Size of Soils by ASTM D422

Date Received: 11/3/2015
Sample ID: RB15-05-SURF **Percent Solids:** 76.1% **Start Date:** 11/23/2015
Lab ID: 200-30555-E-14 **Specific Gravity:** 2.650 **End Date:** 11/27/2015

Shape (> #10): subangular **Non-soil material:** shell,slag
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	82.3	17.7
3/4 inch	19000	82.3	0.0
3/8 inch	9500	63.5	18.8
#4	4750	41.2	22.3
#10	2000	32.3	8.9
#20	850	29.6	2.7
#40	425	28.0	1.6
#60	250	25.2	2.8
#80	180	22.8	2.4
#100	150	21.8	1.0
#200	75	20.4	1.4
Hyd1	35.9	5.1	15.3
Hyd2	22.9	4.1	1.0
Hyd3	13.5	2.0	2.0
Hyd4	9.3	1.5	0.5
Hyd5	6.8	1.5	0.0
Hyd6	3.3	0.6	0.9
Hyd7	1.4	0.6	0.0

Soil Classification	Percent of sample
Gravel	58.8
Sand	20.8
Coarse Sand	8.9
Medium Sand	4.3
Fine Sand	7.6
Silt	18.9
Clay	1.5

Particle Size of Soils by ASTM D422

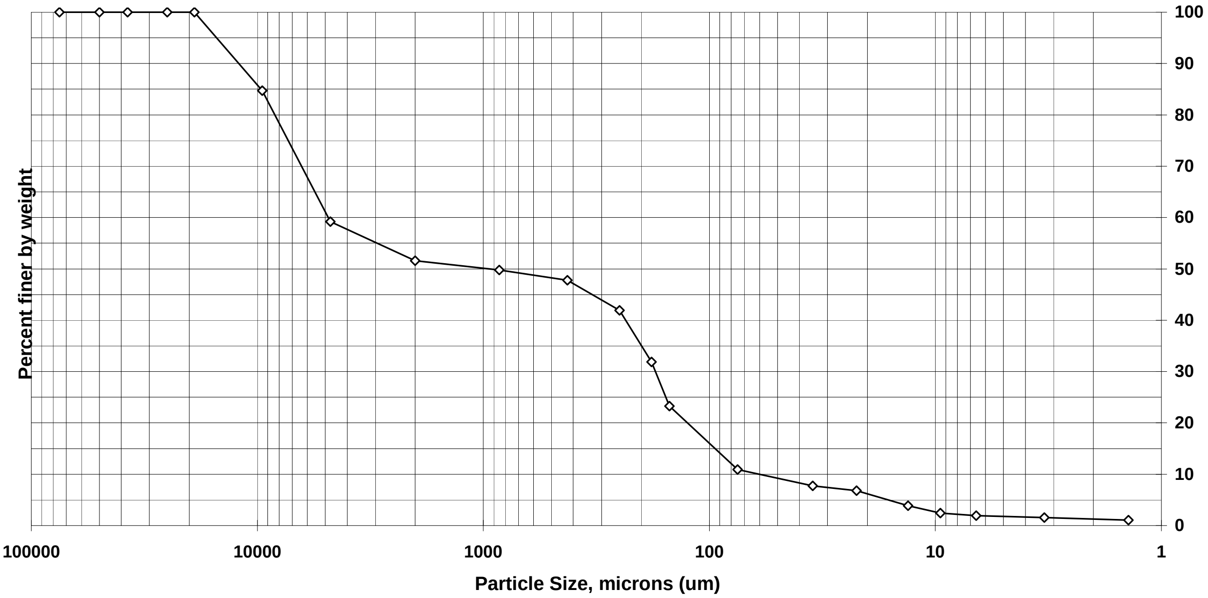
Date Received: 11/3/2015

Sample ID: RB15-06-SURF **Percent Solids:** 58.6% **Start Date:** 11/23/2015

Lab ID: 200-30555-E-15 **Specific Gravity:** 2.650 **End Date:** 11/27/2015

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	84.7	15.3
#4	4750	59.2	25.5
#10	2000	51.6	7.6
#20	850	49.8	1.8
#40	425	47.8	2.0
#60	250	41.9	5.9
#80	180	31.9	10.0
#100	150	23.3	8.6
#200	75	10.9	12.4
Hyd1	34.9	7.7	3.2
Hyd2	22.3	6.8	1.0
Hyd3	13.2	3.9	2.9
Hyd4	9.5	2.4	1.5
Hyd5	6.6	1.9	0.5
Hyd6	3.3	1.6	0.4
Hyd7	1.4	1.1	0.5

Soil Classification	Percent of sample
Gravel	40.8
Sand	48.3
Coarse Sand	7.6
Medium Sand	3.8
Fine Sand	36.9
Silt	9.0
Clay	1.9

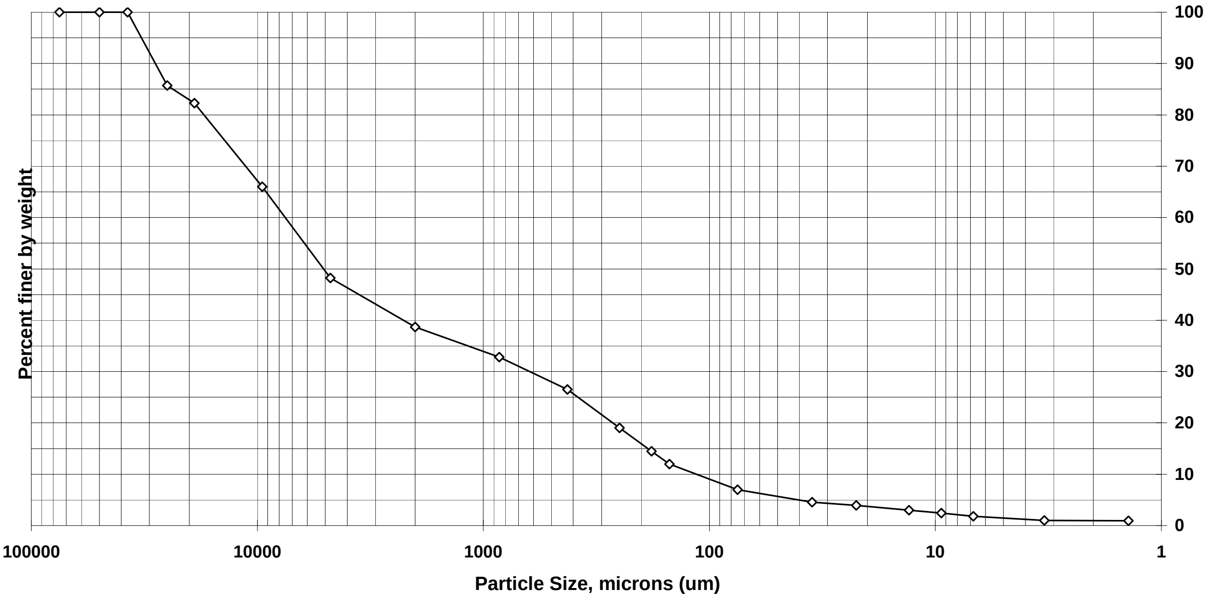
Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-07-SURF	**Percent Solids:**	76.6%	**Start Date:**	11/23/2015
Lab ID:	200-30555-N-9	**Specific Gravity:**	2.650	**End Date:**	11/27/2015

Shape (> #10): subangular

Non-soil material: shell,slag

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	85.7	14.3
3/4 inch	19000	82.3	3.4
3/8 inch	9500	66.0	16.3
#4	4750	48.2	17.8
#10	2000	38.7	9.5
#20	850	32.8	5.9
#40	425	26.5	6.3
#60	250	19.0	7.5
#80	180	14.5	4.5
#100	150	12.0	2.5
#200	75	7.0	5.0
Hyd1	35.1	4.5	2.4
Hyd2	22.4	3.9	0.6
Hyd3	13.1	3.0	0.9
Hyd4	9.4	2.4	0.6
Hyd5	6.8	1.8	0.6
Hyd6	3.3	1.0	0.8
Hyd7	1.4	0.9	0.1

Soil Classification	Percent of sample
Gravel	51.8
Sand	41.2
Coarse Sand	9.5
Medium Sand	12.2
Fine Sand	19.5
Silt	5.1
Clay	1.8

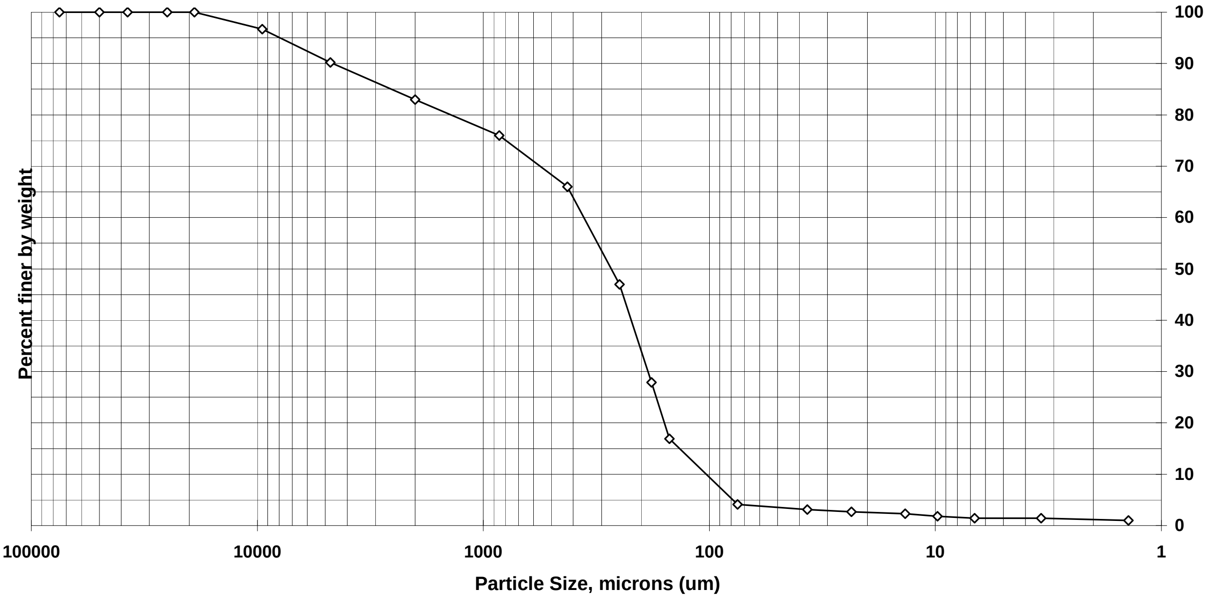
Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-08-SURF	**Percent Solids:**	77.2%	**Start Date:**	11/18/2015
Lab ID:	200-30555-E-1	**Specific Gravity:**	2.650	**End Date:**	11/25/2015

Shape (> #10): subrounded

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	96.7	3.3
#4	4750	90.2	6.5
#10	2000	83.0	7.2
#20	850	76.0	7.0
#40	425	66.0	10.0
#60	250	47.0	19.0
#80	180	27.9	19.1
#100	150	16.9	11.0
#200	75	4.1	12.8
Hyd1	36.9	3.2	1.0
Hyd2	23.5	2.7	0.4
Hyd3	13.6	2.3	0.4
Hyd4	9.8	1.8	0.4
Hyd5	6.7	1.4	0.4
Hyd6	3.4	1.4	0.0
Hyd7	1.4	1.0	0.4

Soil Classification	Percent of sample
Gravel	9.8
Sand	86.1
Coarse Sand	7.2
Medium Sand	17.0
Fine Sand	61.9
Silt	2.7
Clay	1.4

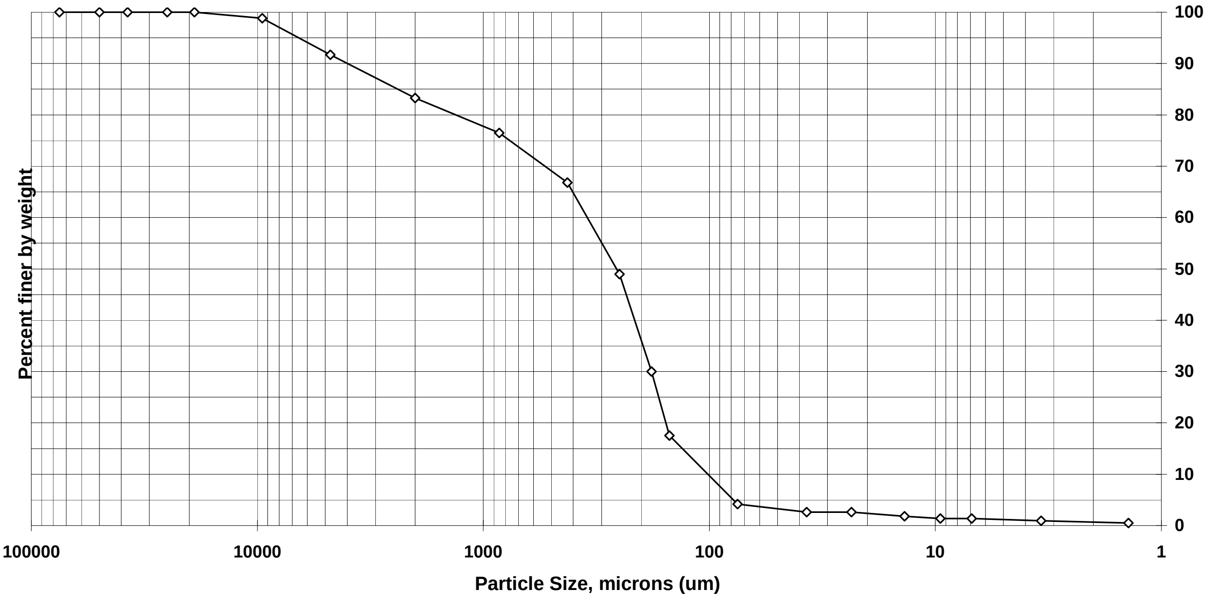
Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-08-SURFFD	**Percent Solids:**	78.7%	**Start Date:**	11/18/2015
Lab ID:	200-30555-E-2	**Specific Gravity:**	2.650	**End Date:**	11/25/2015

Shape (> #10): subrounded

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	98.8	1.2
#4	4750	91.7	7.1
#10	2000	83.3	8.4
#20	850	76.5	6.8
#40	425	66.8	9.7
#60	250	49.0	17.8
#80	180	30.0	19.0
#100	150	17.5	12.5
#200	75	4.2	13.3
Hyd1	37.1	2.6	1.6
Hyd2	23.5	2.6	0.0
Hyd3	13.7	1.8	0.8
Hyd4	9.5	1.4	0.4
Hyd5	6.9	1.4	0.0
Hyd6	3.4	0.9	0.4
Hyd7	1.4	0.5	0.4

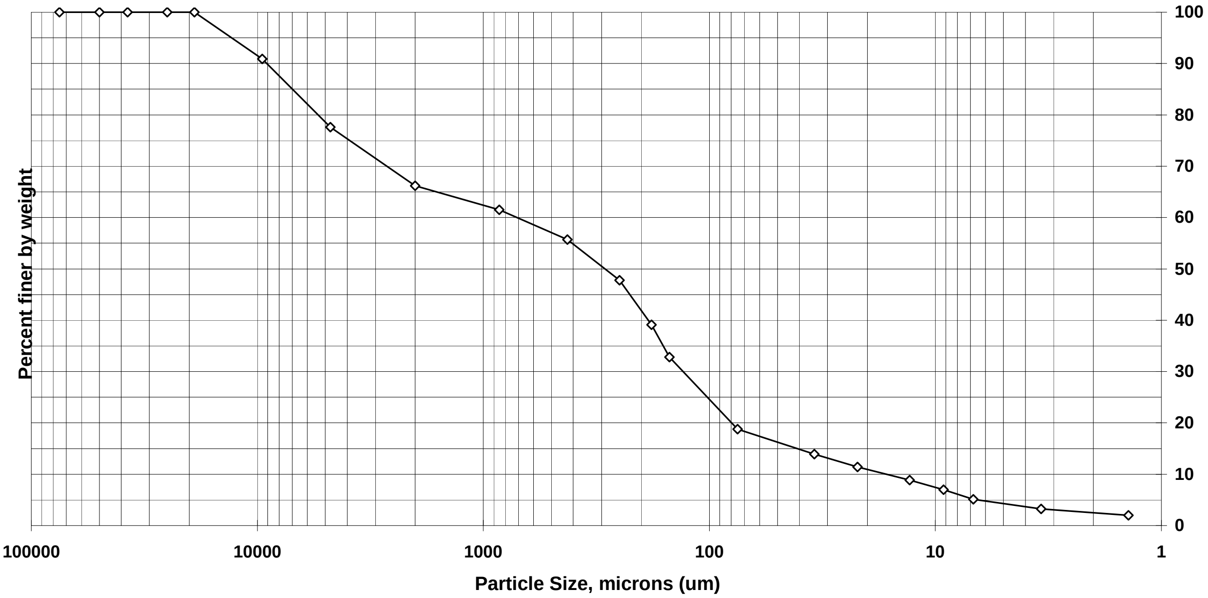
Soil Classification	Percent of sample
Gravel	8.3
Sand	87.5
Coarse Sand	8.4
Medium Sand	16.5
Fine Sand	62.6
Silt	2.8
Clay	1.4

Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-09-SURF	**Percent Solids:**	59.1%	**Start Date:**	11/18/2015
Lab ID:	200-30555-E-3	**Specific Gravity:**	2.650	**End Date:**	11/25/2015

Shape (> #10): subrounded

Non-soil material: shell
Hardness (> #10): hard



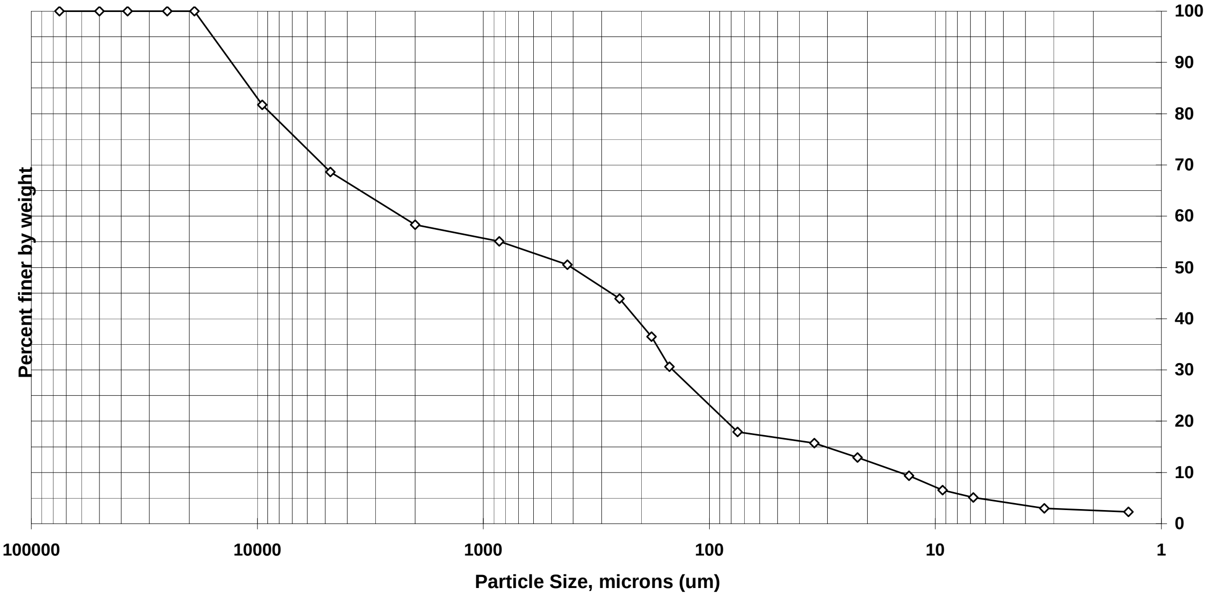
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	90.9	9.1
#4	4750	77.6	13.3
#10	2000	66.2	11.4
#20	850	61.5	4.7
#40	425	55.7	5.8
#60	250	47.8	7.9
#80	180	39.1	8.7
#100	150	32.8	6.3
#200	75	18.8	14.0
Hyd1	34.3	13.9	4.9
Hyd2	22.1	11.4	2.5
Hyd3	13	8.9	2.5
Hyd4	9.2	7.0	1.9
Hyd5	6.8	5.1	1.9
Hyd6	3.4	3.3	1.9
Hyd7	1.4	2.0	1.3

Soil Classification	Percent of sample
Gravel	22.4
Sand	58.8
Coarse Sand	11.4
Medium Sand	10.5
Fine Sand	36.9
Silt	13.7
Clay	5.1

Particle Size of Soils by ASTM D422

Date Received: 11/3/2015
Sample ID: RB15-09-SURFFD
Percent Solids: 55.7%
Start Date: 11/18/2015
Lab ID: 200-30555-E-4
Specific Gravity: 2.650
End Date: 11/25/2015

Shape (> #10): subrounded
Non-soil material: shell
Hardness (> #10): hard



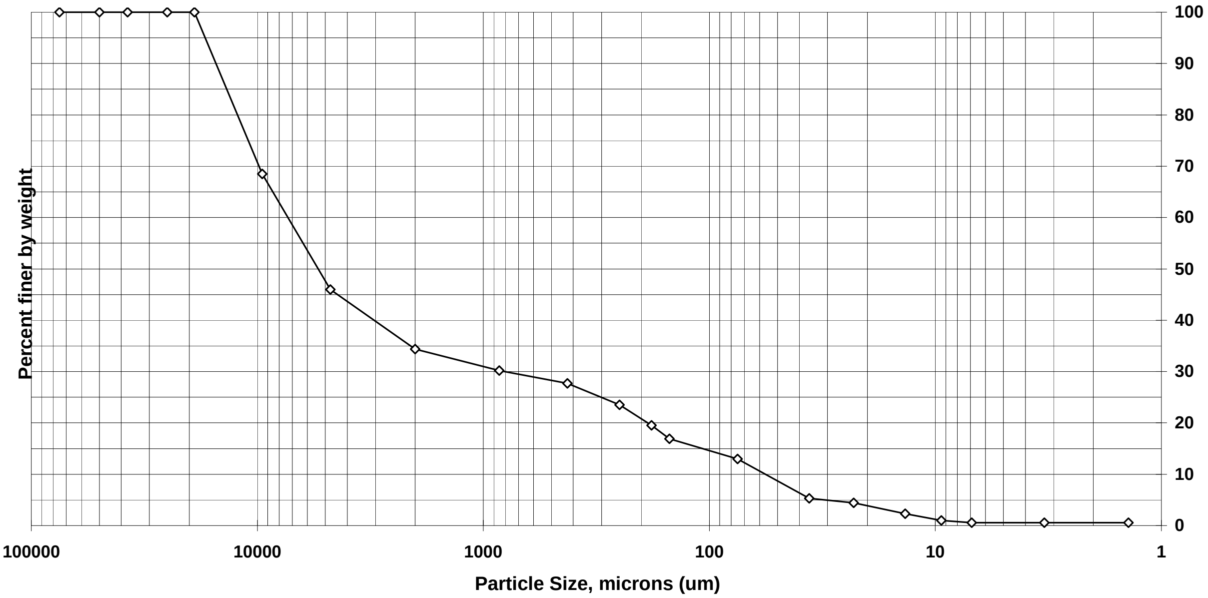
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	81.7	18.3
#4	4750	68.6	13.1
#10	2000	58.3	10.3
#20	850	55.1	3.2
#40	425	50.5	4.6
#60	250	43.9	6.6
#80	180	36.5	7.4
#100	150	30.6	5.9
#200	75	17.9	12.7
Hyd1	34.3	15.7	2.2
Hyd2	22.1	12.9	2.8
Hyd3	13.1	9.3	3.6
Hyd4	9.3	6.5	2.8
Hyd5	6.8	5.1	1.4
Hyd6	3.3	3.0	2.1
Hyd7	1.4	2.3	0.7

Soil Classification	Percent of sample
Gravel	31.4
Sand	50.7
Coarse Sand	10.3
Medium Sand	7.8
Fine Sand	32.6
Silt	12.8
Clay	5.1

Particle Size of Soils by ASTM D422

Date Received: 11/3/2015
Sample ID: RB15-10-SURF
Percent Solids: 66.3%
Start Date: 11/18/2015
Lab ID: 200-30555-I-5
Specific Gravity: 2.650
End Date: 11/25/2015

Shape (> #10): subrounded
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	68.5	31.5
#4	4750	46.0	22.5
#10	2000	34.4	11.6
#20	850	30.2	4.2
#40	425	27.7	2.5
#60	250	23.5	4.2
#80	180	19.5	4.0
#100	150	16.9	2.6
#200	75	13.0	3.9
Hyd1	36.1	5.3	7.7
Hyd2	23	4.5	0.9
Hyd3	13.6	2.3	2.2
Hyd4	9.4	1.0	1.3
Hyd5	6.9	0.5	0.4
Hyd6	3.3	0.5	0.0
Hyd7	1.4	0.5	0.0

Soil Classification	Percent of sample
Gravel	54.0
Sand	33.0
Coarse Sand	11.6
Medium Sand	6.7
Fine Sand	14.7
Silt	12.5
Clay	0.5

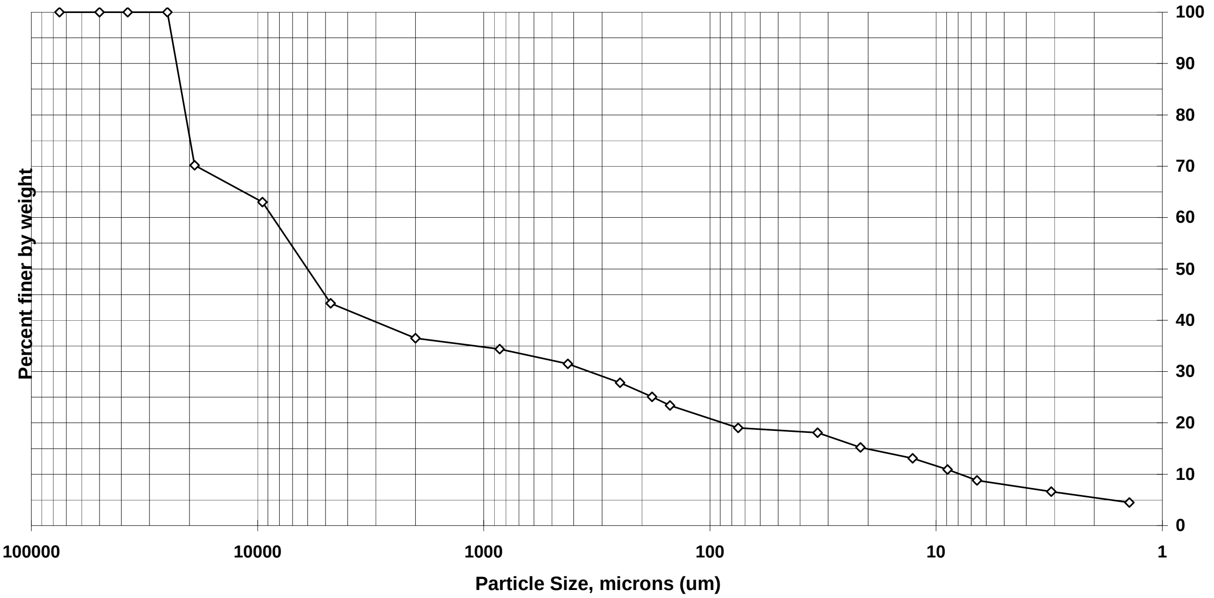
Particle Size of Soils by ASTM D422

				Date Received:	11/5/2015
Sample ID:	RB15-11-SURF	**Percent Solids:**	48.7%	**Start Date:**	11/27/2015
Lab ID:	200-30593-J-1	**Specific Gravity:**	2.650	**End Date:**	12/2/2015

Shape (> #10): subrounded

Non-soil material: shell

Hardness (> #10): hard



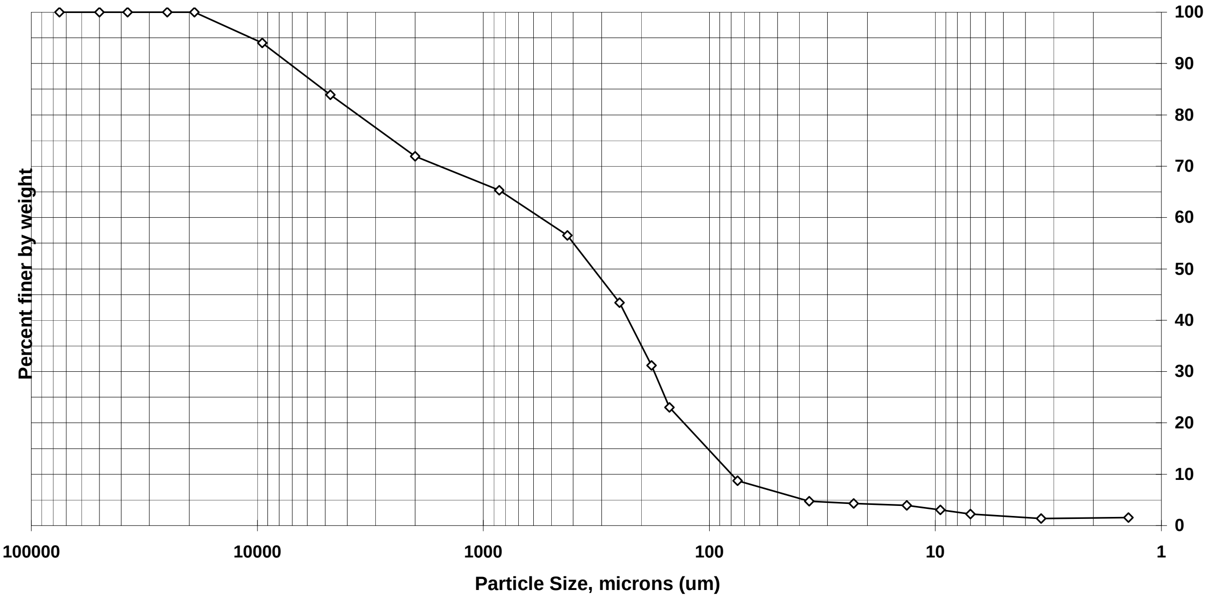
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	70.2	29.8
3/8 inch	9500	63.0	7.2
#4	4750	43.3	19.7
#10	2000	36.5	6.8
#20	850	34.4	2.1
#40	425	31.5	2.9
#60	250	27.8	3.7
#80	180	25.1	2.7
#100	150	23.4	1.7
#200	75	19.0	4.4
Hyd1	33.4	18.1	0.9
Hyd2	21.6	15.2	2.9
Hyd3	12.7	13.1	2.1
Hyd4	8.9	10.9	2.2
Hyd5	6.6	8.8	2.1
Hyd6	3.1	6.6	2.2
Hyd7	1.4	4.5	2.1

Soil Classification	Percent of sample
Gravel	56.7
Sand	24.3
Coarse Sand	6.8
Medium Sand	5.0
Fine Sand	12.5
Silt	10.2
Clay	8.8

Particle Size of Soils by ASTM D422

Date Received: 11/4/2015
Sample ID: RB15-13-SURF
Percent Solids: 73.2%
Start Date: 11/25/2015
Lab ID: 200-30575-E-16
Specific Gravity: 2.650
End Date: 11/30/2015

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	94.0	6.0
#4	4750	83.9	10.1
#10	2000	71.9	12.0
#20	850	65.3	6.6
#40	425	56.5	8.8
#60	250	43.4	13.1
#80	180	31.2	12.2
#100	150	23.0	8.2
#200	75	8.8	14.3
Hyd1	36.2	4.8	4.0
Hyd2	23	4.3	0.4
Hyd3	13.4	3.9	0.4
Hyd4	9.5	3.1	0.8
Hyd5	7	2.2	0.8
Hyd6	3.4	1.4	0.8
Hyd7	1.4	1.6	-0.2

Soil Classification	Percent of sample
Gravel	16.1
Sand	75.2
Coarse Sand	12.0
Medium Sand	15.4
Fine Sand	47.8
Silt	6.5
Clay	2.2

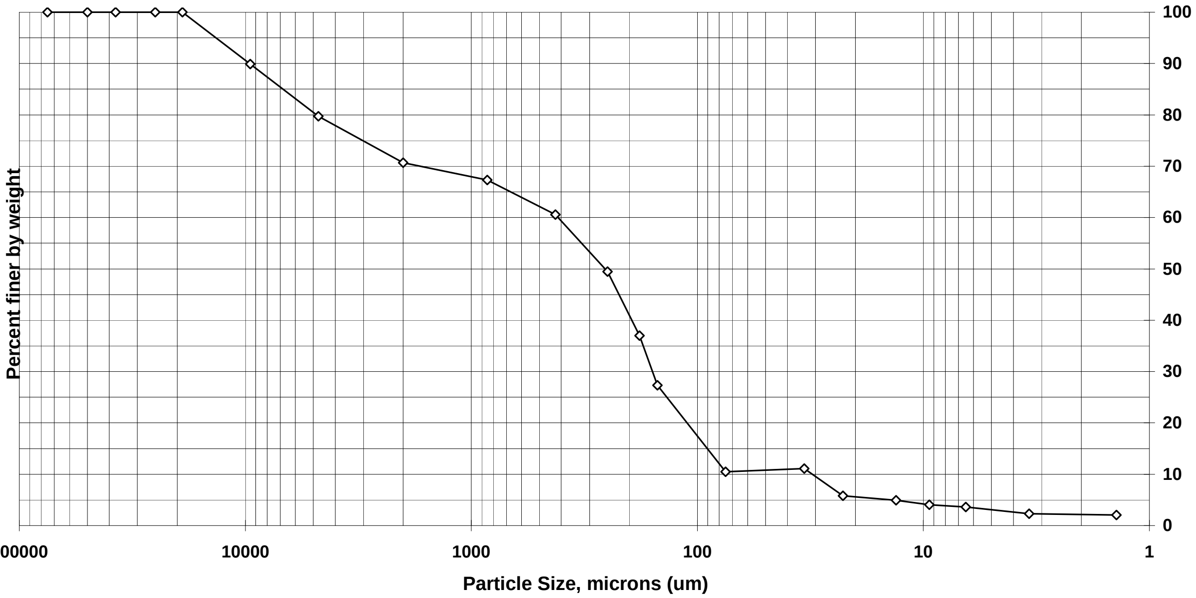
Particle Size of Soils by ASTM D422

				Date Received:	11/4/2015
Sample ID:	RB15-14-SURF	**Percent Solids:**	65.8%	**Start Date:**	11/25/2015
Lab ID:	200-30576-E-1	**Specific Gravity:**	2.650	**End Date:**	11/30/2015

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	89.9	10.1
#4	4750	79.7	10.2
#10	2000	70.7	9.0
#20	850	67.3	3.4
#40	425	60.6	6.7
#60	250	49.5	11.1
#80	180	37.0	12.5
#100	150	27.3	9.7
#200	75	10.5	16.8
Hyd1	33.7	11.1	-0.6
Hyd2	22.7	5.8	5.3
Hyd3	13.2	4.9	0.9
Hyd4	9.4	4.1	0.9
Hyd5	6.5	3.6	0.4
Hyd6	3.4	2.3	1.3
Hyd7	1.4	2.1	0.2

Soil Classification	Percent of sample
Gravel	20.3
Sand	69.2
Coarse Sand	9.0
Medium Sand	10.1
Fine Sand	50.1
Silt	6.9
Clay	3.6

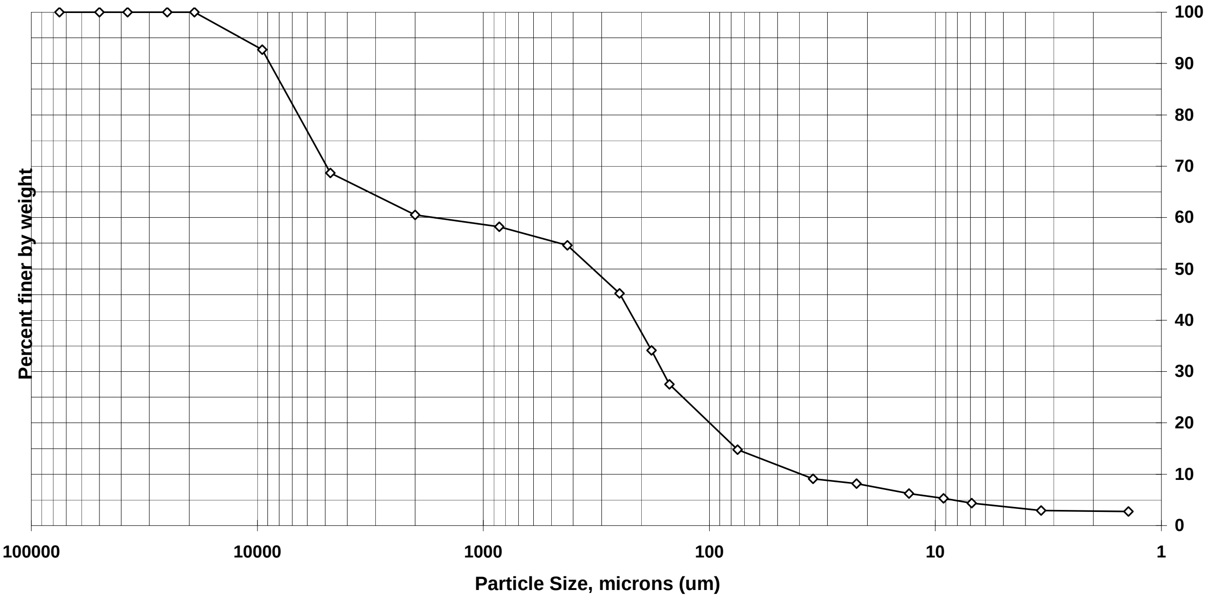
Particle Size of Soils by ASTM D422

				Date Received:	11/4/2015
Sample ID:	RB15-15-SURF	**Percent Solids:**	67.3%	**Start Date:**	11/25/2015
Lab ID:	200-30576-E-2	**Specific Gravity:**	2.650	**End Date:**	11/30/2015

Shape (> #10): subangular

Non-soil material: shell

Hardness (> #10): hard



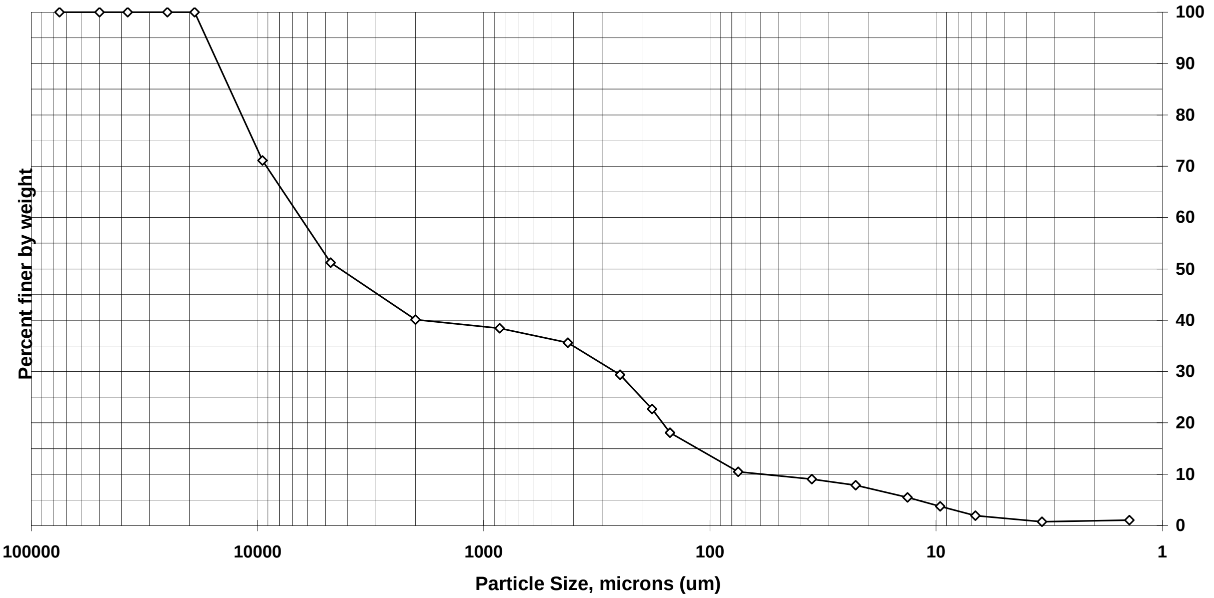
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	92.7	7.3
#4	4750	68.7	24.0
#10	2000	60.5	8.2
#20	850	58.2	2.3
#40	425	54.6	3.6
#60	250	45.2	9.4
#80	180	34.1	11.1
#100	150	27.5	6.6
#200	75	14.8	12.7
Hyd1	34.8	9.1	5.7
Hyd2	22.3	8.2	0.9
Hyd3	13.1	6.3	1.9
Hyd4	9.2	5.3	1.0
Hyd5	6.9	4.4	0.9
Hyd6	3.4	3.0	1.4
Hyd7	1.4	2.7	0.2

Soil Classification	Percent of sample
Gravel	31.3
Sand	53.9
Coarse Sand	8.2
Medium Sand	5.9
Fine Sand	39.8
Silt	10.4
Clay	4.4

Particle Size of Soils by ASTM D422

Date Received: 11/4/2015
Sample ID: RB15-16-SURF
Percent Solids: 53.1%
Start Date: 11/25/2015
Lab ID: 200-30575-I-14
Specific Gravity: 2.650
End Date: 11/30/2015

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	71.1	28.9
#4	4750	51.2	19.9
#10	2000	40.1	11.1
#20	850	38.4	1.7
#40	425	35.6	2.8
#60	250	29.4	6.2
#80	180	22.7	6.7
#100	150	18.1	4.6
#200	75	10.5	7.6
Hyd1	35.5	9.1	1.4
Hyd2	22.7	7.9	1.2
Hyd3	13.4	5.5	2.4
Hyd4	9.6	3.7	1.8
Hyd5	6.7	1.9	1.8
Hyd6	3.4	0.7	1.2
Hyd7	1.4	1.0	-0.3

Soil Classification	Percent of sample
Gravel	48.8
Sand	40.7
Coarse Sand	11.1
Medium Sand	4.5
Fine Sand	25.1
Silt	8.6
Clay	1.9

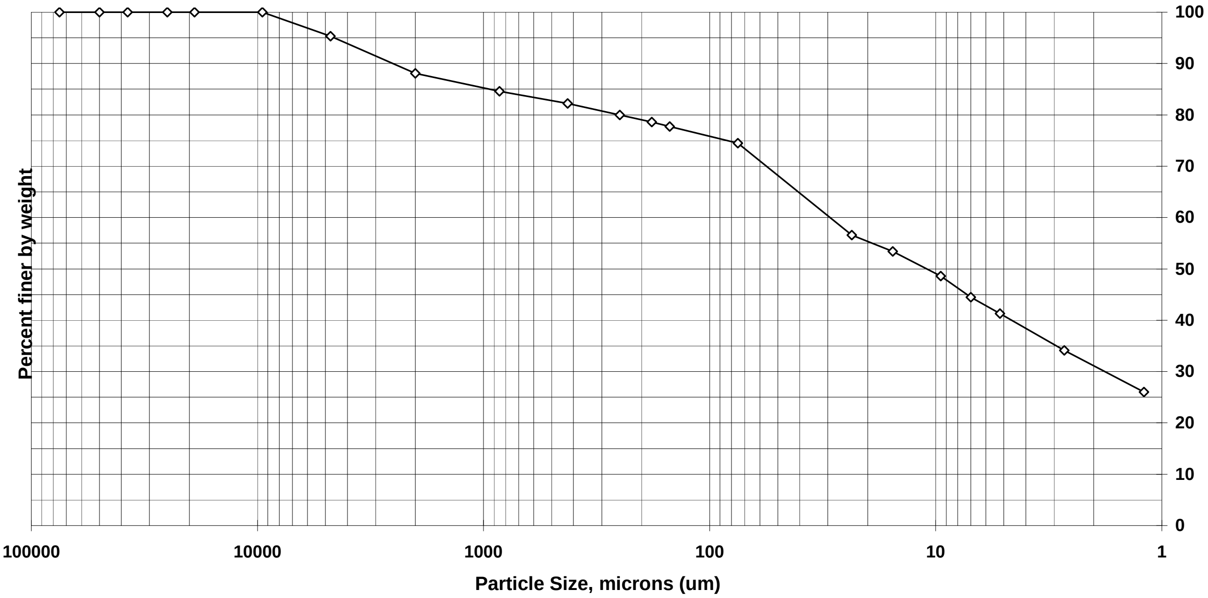
Particle Size of Soils by ASTM D422

				Date Received:	11/4/2015
Sample ID:	RB15-17-SURF	**Percent Solids:**	72.7%	**Start Date:**	11/27/2015
Lab ID:	200-30576-E-3	**Specific Gravity:**	2.650	**End Date:**	12/2/2015

Shape (> #10): subrounded

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	100.0	0.0
#4	4750	95.3	4.7
#10	2000	88.1	7.2
#20	850	84.6	3.5
#40	425	82.2	2.4
#60	250	80.0	2.2
#80	180	78.6	1.4
#100	150	77.7	0.9
#200	75	74.5	3.2
Hyd1	23.5	56.6	17.9
Hyd2	15.5	53.4	3.2
Hyd3	9.5	48.6	4.8
Hyd4	7	44.5	4.1
Hyd5	5.2	41.3	3.2
Hyd6	2.7	34.1	7.2
Hyd7	1.2	26.0	8.1

Soil Classification	Percent of sample
Gravel	4.7
Sand	20.8
Coarse Sand	7.2
Medium Sand	5.9
Fine Sand	7.7
Silt	33.2
Clay	41.3

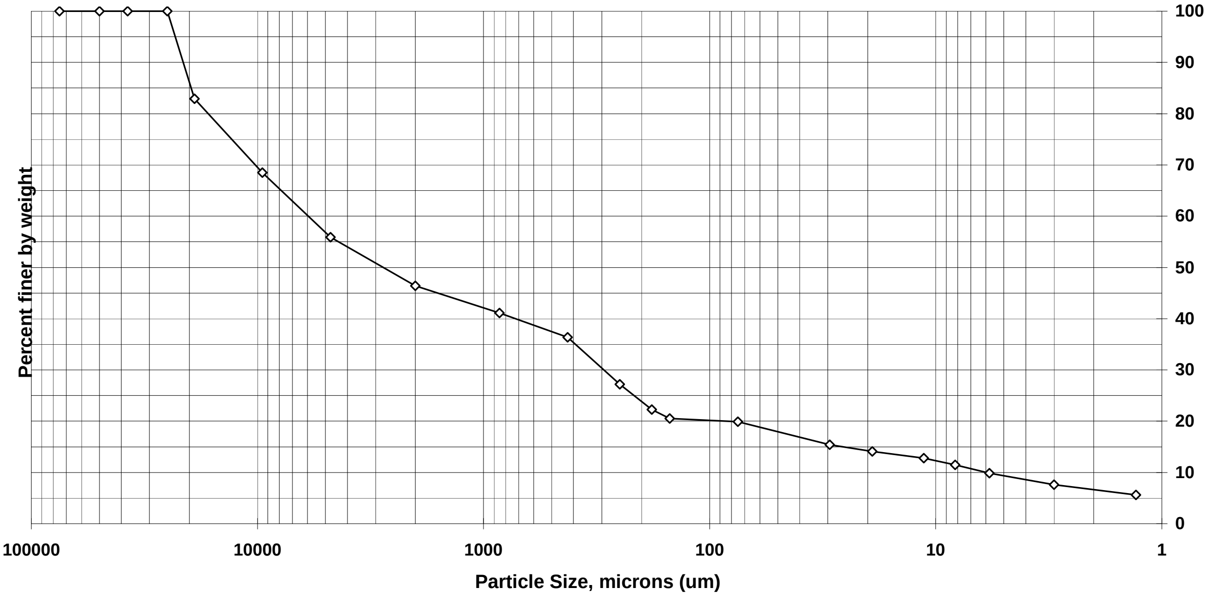
Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	RB15-18-SURF	**Percent Solids:**	85.1%	**Start Date:**	11/18/2015
Lab ID:	200-30555-E-6	**Specific Gravity:**	2.650	**End Date:**	11/25/2015

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	82.9	17.1
3/8 inch	9500	68.5	14.4
#4	4750	55.9	12.6
#10	2000	46.4	9.5
#20	850	41.1	5.3
#40	425	36.4	4.7
#60	250	27.2	9.2
#80	180	22.3	4.9
#100	150	20.5	1.8
#200	75	19.9	0.6
Hyd1	29.4	15.4	4.5
Hyd2	19.1	14.1	1.3
Hyd3	11.3	12.8	1.3
Hyd4	8.2	11.5	1.3
Hyd5	5.8	9.9	1.6
Hyd6	3	7.6	2.3
Hyd7	1.3	5.6	2.0

Soil Classification	Percent of sample
Gravel	44.1
Sand	36.0
Coarse Sand	9.5
Medium Sand	10.0
Fine Sand	16.5
Silt	10.0
Clay	9.9

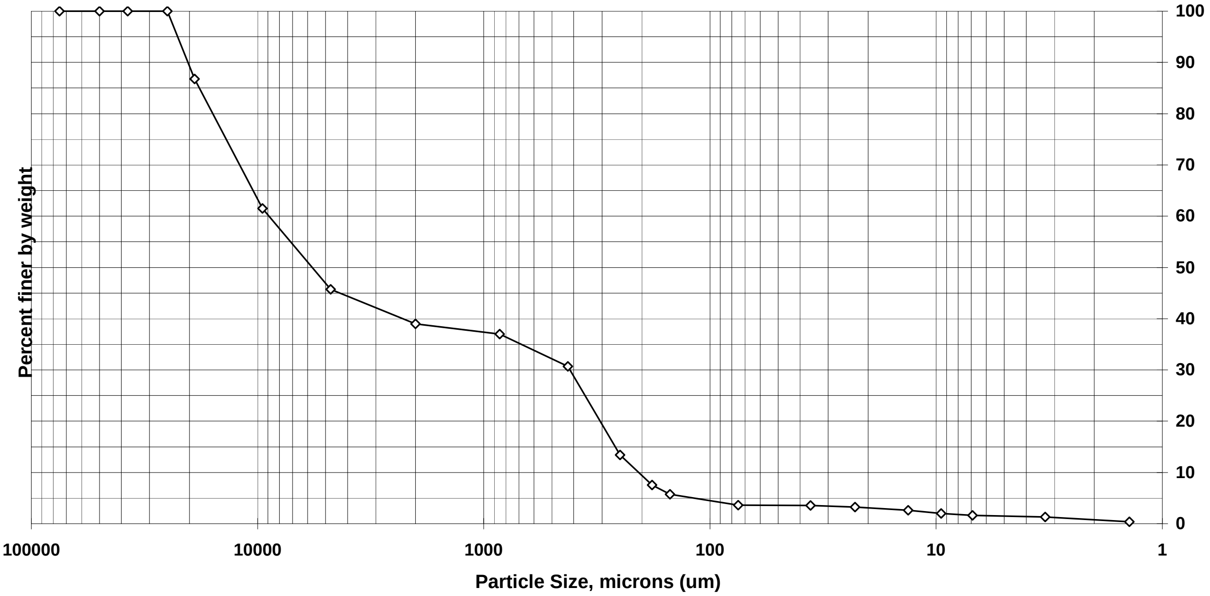
Particle Size of Soils by ASTM D422

				Date Received:	11/4/2015
Sample ID:	RB15-19-SURF	**Percent Solids:**	77.5%	**Start Date:**	11/27/2015
Lab ID:	200-30576-E-4	**Specific Gravity:**	2.650	**End Date:**	12/2/2015

Shape (> #10): subrounded

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	86.8	13.2
3/8 inch	9500	61.5	25.3
#4	4750	45.7	15.8
#10	2000	39.0	6.7
#20	850	37.0	2.0
#40	425	30.7	6.3
#60	250	13.4	17.3
#80	180	7.6	5.8
#100	150	5.8	1.8
#200	75	3.6	2.2
Hyd1	35.9	3.5	0.0
Hyd2	22.8	3.2	0.3
Hyd3	13.3	2.6	0.6
Hyd4	9.5	2.0	0.6
Hyd5	6.9	1.7	0.3
Hyd6	3.3	1.3	0.3
Hyd7	1.4	0.4	0.9

Soil Classification	Percent of sample
Gravel	54.3
Sand	42.1
Coarse Sand	6.7
Medium Sand	8.3
Fine Sand	27.1
Silt	1.9
Clay	1.7

Particle Size of Soils by ASTM D422

Date Received: 11/6/2015

Sample ID: RB15-20-SURF

Lab ID: 200-30626-E-1

Percent Solids: 42.5%

Specific Gravity: 2.650

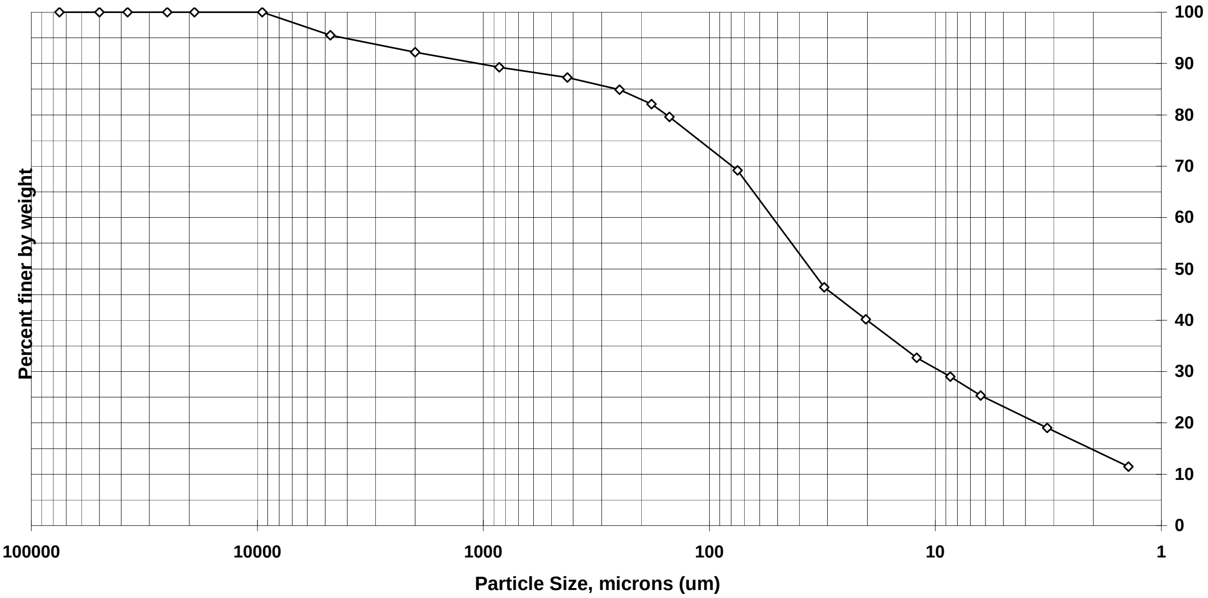
Start Date: 11/27/2015

End Date: 12/3/2015

Shape (> #10): subangular

Non-soil material: 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	95.5	4.5
#10	2000	92.2	3.3
#20	850	89.3	2.9
#40	425	87.3	2.0
#60	250	84.9	2.4
#80	180	82.1	2.8
#100	150	79.6	2.5
#200	75	69.2	10.4
Hyd1	31	46.4	22.8
Hyd2	20.3	40.2	6.2
Hyd3	12.1	32.7	7.5
Hyd4	8.6	29.0	3.7
Hyd5	6.3	25.3	3.7
Hyd6	3.2	19.0	6.3
Hyd7	1.4	11.5	7.5

Soil Classification	Percent of sample
Gravel	4.5
Sand	26.3
Coarse Sand	3.3
Medium Sand	4.9
Fine Sand	18.1
Silt	43.9
Clay	25.3

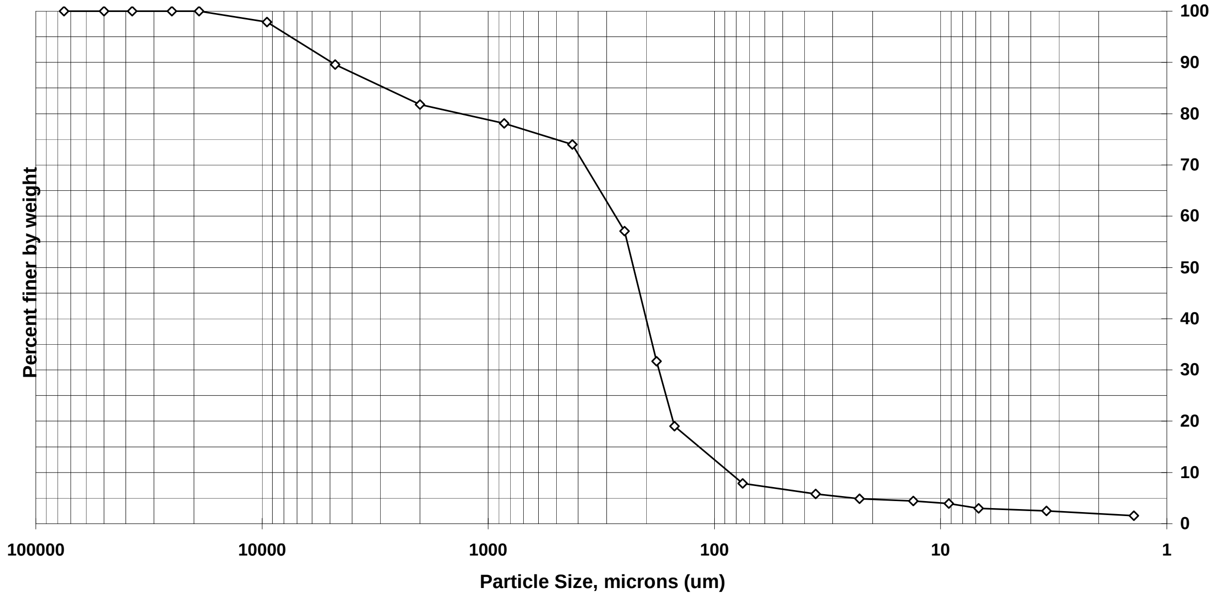
Particle Size of Soils by ASTM D422

				Date Received:	11/6/2015
Sample ID:	RB15-21-SURF	**Percent Solids:**	74.4%	**Start Date:**	11/27/2015
Lab ID:	200-30626-E-2	**Specific Gravity:**	2.650	**End Date:**	12/3/2015

Shape (> #10): subangular

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	97.9	2.1
#4	4750	89.6	8.3
#10	2000	81.8	7.8
#20	850	78.1	3.7
#40	425	74.0	4.1
#60	250	57.1	16.9
#80	180	31.7	25.4
#100	150	19.0	12.7
#200	75	7.9	11.1
Hyd1	35.7	5.8	2.1
Hyd2	22.8	4.9	0.9
Hyd3	13.2	4.4	0.5
Hyd4	9.2	3.9	0.5
Hyd5	6.8	3.0	1.0
Hyd6	3.4	2.5	0.5
Hyd7	1.4	1.5	0.9

Soil Classification	Percent of sample
Gravel	10.4
Sand	81.7
Coarse Sand	7.8
Medium Sand	7.8
Fine Sand	66.1
Silt	4.9
Clay	3.0

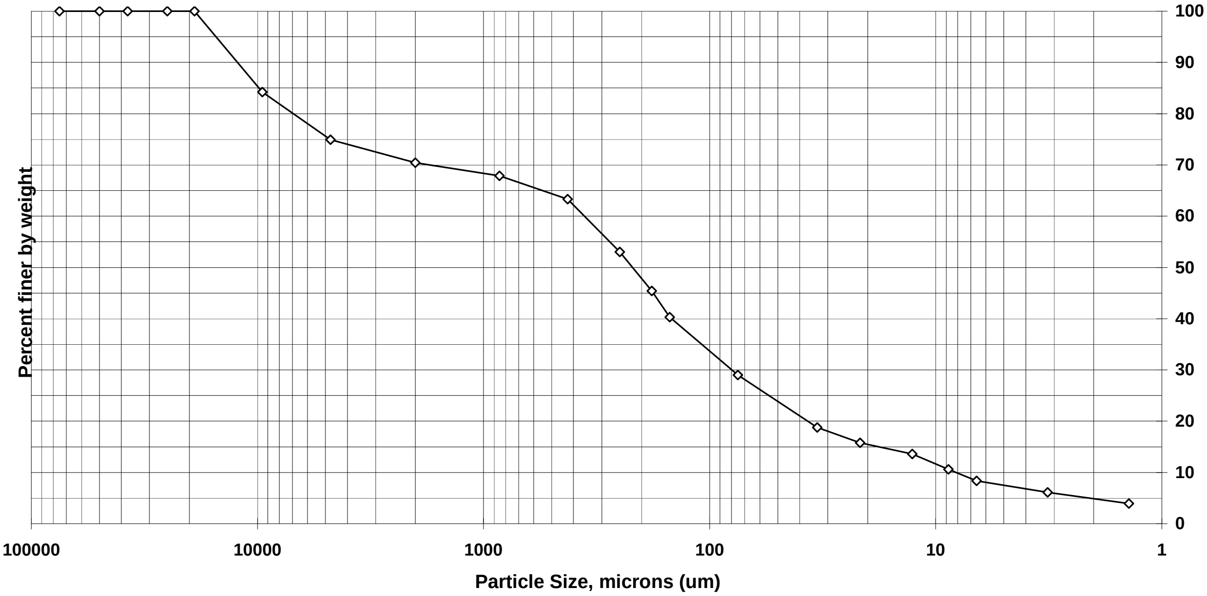
Particle Size of Soils by ASTM D422

				Date Received:	11/5/2015
Sample ID:	RB15-22-SURF	**Percent Solids:**	51.3%	**Start Date:**	11/27/2015
Lab ID:	200-30593-E-2	**Specific Gravity:**	2.650	**End Date:**	12/2/2015

Shape (> #10): subrounded

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	84.2	15.8
#4	4750	74.9	9.3
#10	2000	70.4	4.5
#20	850	67.9	2.5
#40	425	63.3	4.6
#60	250	53.0	10.3
#80	180	45.4	7.6
#100	150	40.3	5.1
#200	75	29.0	11.3
Hyd1	33.4	18.8	10.2
Hyd2	21.6	15.8	3.0
Hyd3	12.7	13.6	2.2
Hyd4	8.8	10.6	3.0
Hyd5	6.6	8.4	2.2
Hyd6	3.2	6.1	2.2
Hyd7	1.4	3.9	2.2

Soil Classification	Percent of sample
Gravel	25.1
Sand	45.9
Coarse Sand	4.5
Medium Sand	7.1
Fine Sand	34.3
Silt	20.6
Clay	8.4

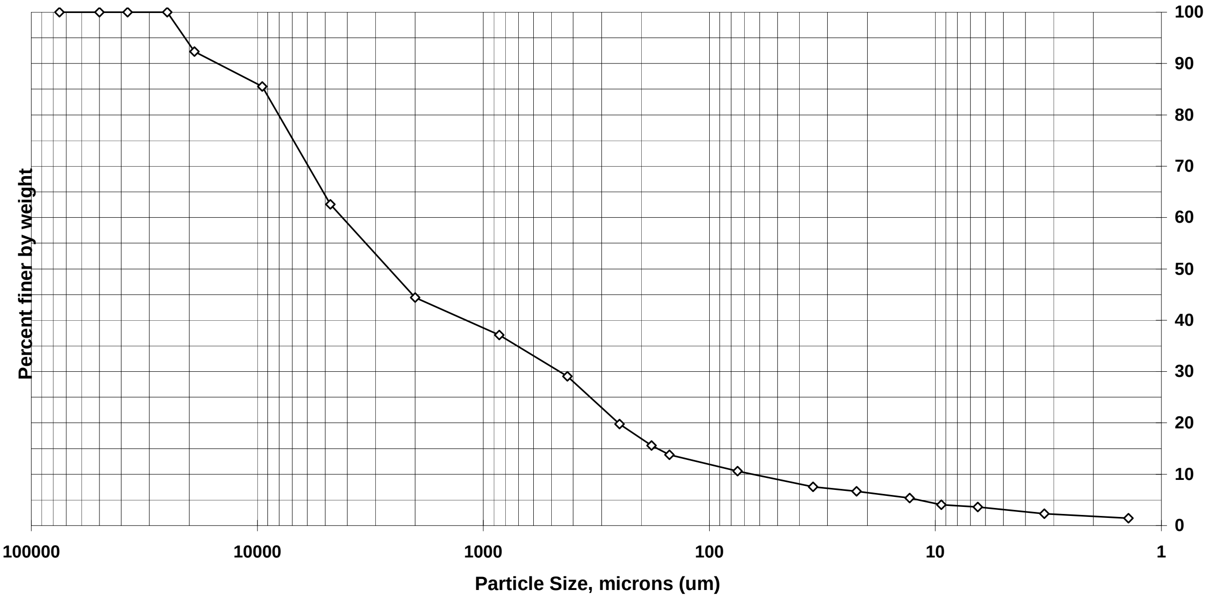
Particle Size of Soils by ASTM D422

				Date Received:	11/5/2015
Sample ID:	RB15-23-SURF	**Percent Solids:**	71.5%	**Start Date:**	11/27/2015
Lab ID:	200-30593-E-3	**Specific Gravity:**	2.650	**End Date:**	12/2/2015

Shape (> #10): subrounded

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	92.3	7.7
3/8 inch	9500	85.5	6.8
#4	4750	62.6	22.9
#10	2000	44.4	18.2
#20	850	37.1	7.3
#40	425	29.1	8.0
#60	250	19.8	9.3
#80	180	15.6	4.2
#100	150	13.8	1.8
#200	75	10.6	3.2
Hyd1	34.8	7.5	3.1
Hyd2	22.3	6.7	0.9
Hyd3	13	5.4	1.3
Hyd4	9.4	4.0	1.3
Hyd5	6.5	3.6	0.4
Hyd6	3.3	2.3	1.3
Hyd7	1.4	1.4	0.9

Soil Classification	Percent of sample
Gravel	37.4
Sand	52.0
Coarse Sand	18.2
Medium Sand	15.3
Fine Sand	18.5
Silt	7.0
Clay	3.6

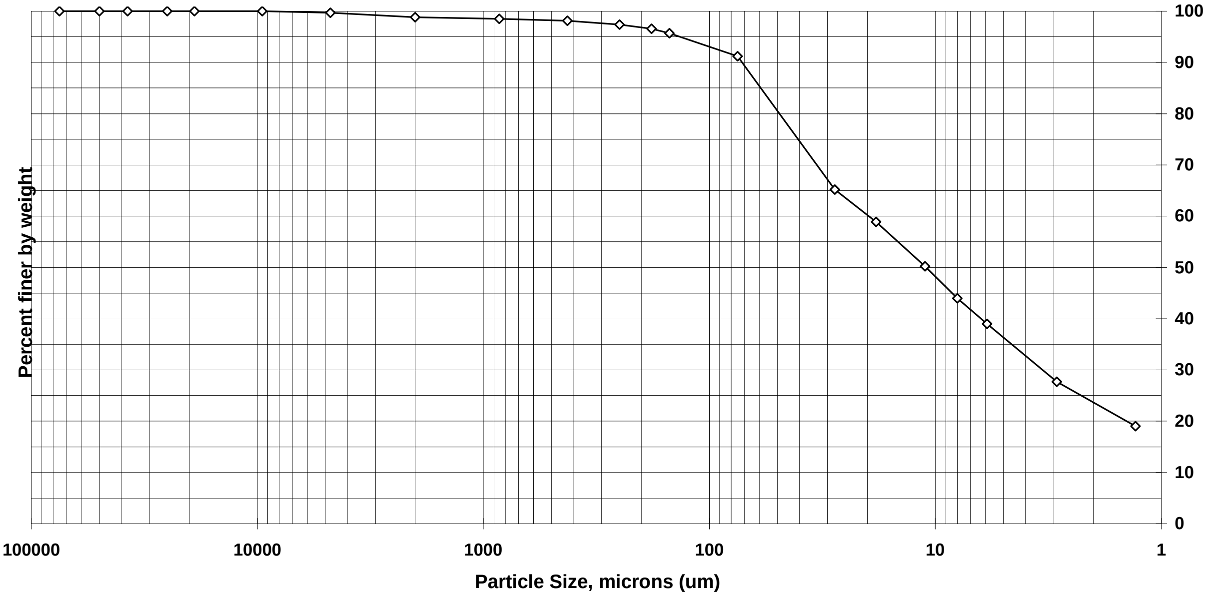
Particle Size of Soils by ASTM D422

				Date Received:	11/6/2015
Sample ID:	RB15-24-SURF	**Percent Solids:**	41.3%	**Start Date:**	11/27/2015
Lab ID:	200-30626-E-3	**Specific Gravity:**	2.650	**End Date:**	12/3/2015

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	98.8	0.9
#20	850	98.5	0.3
#40	425	98.1	0.4
#60	250	97.4	0.7
#80	180	96.6	0.8
#100	150	95.7	0.9
#200	75	91.2	4.5
Hyd1	27.9	65.2	26.0
Hyd2	18.3	58.9	6.3
Hyd3	11.1	50.2	8.7
Hyd4	8	44.0	6.2
Hyd5	5.9	39.0	5.0
Hyd6	2.9	27.7	11.3
Hyd7	1.3	19.0	8.7

Soil Classification	Percent of sample
Gravel	0.3
Sand	8.5
Coarse Sand	0.9
Medium Sand	0.7
Fine Sand	6.9
Silt	52.2
Clay	39.0

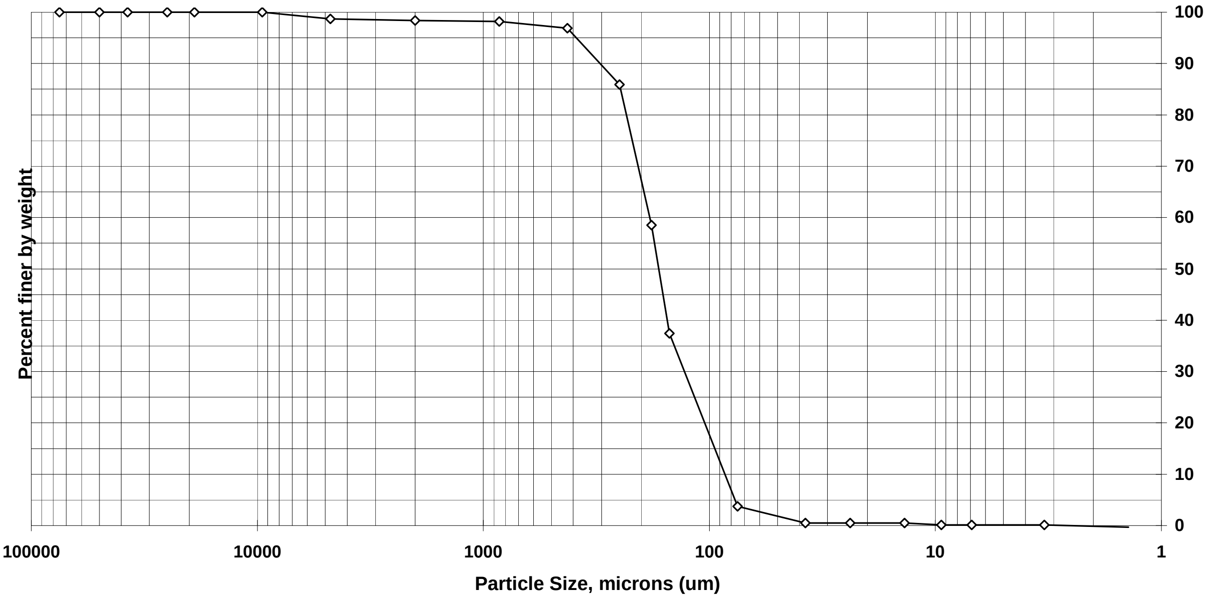
Particle Size of Soils by ASTM D422

				Date Received:	11/6/2015
Sample ID:	RB15-25-SURF	**Percent Solids:**	78.6%	**Start Date:**	11/27/2015
Lab ID:	200-30626-E-4	**Specific Gravity:**	2.650	**End Date:**	12/3/2015

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	98.7	1.3
#10	2000	98.4	0.3
#20	850	98.2	0.2
#40	425	96.9	1.3
#60	250	85.9	11.0
#80	180	58.5	27.4
#100	150	37.4	21.1
#200	75	3.8	33.7
Hyd1	37.6	0.5	3.3
Hyd2	23.8	0.5	0.0
Hyd3	13.7	0.5	0.0
Hyd4	9.4	0.1	0.4
Hyd5	6.9	0.1	0.0
Hyd6	3.3	0.1	0.0
Hyd7	1.4	-0.3	0.4

Soil Classification	Percent of sample
Gravel	1.3
Sand	95.0
Coarse Sand	0.3
Medium Sand	1.5
Fine Sand	93.2
Silt	3.7
Clay	0.1

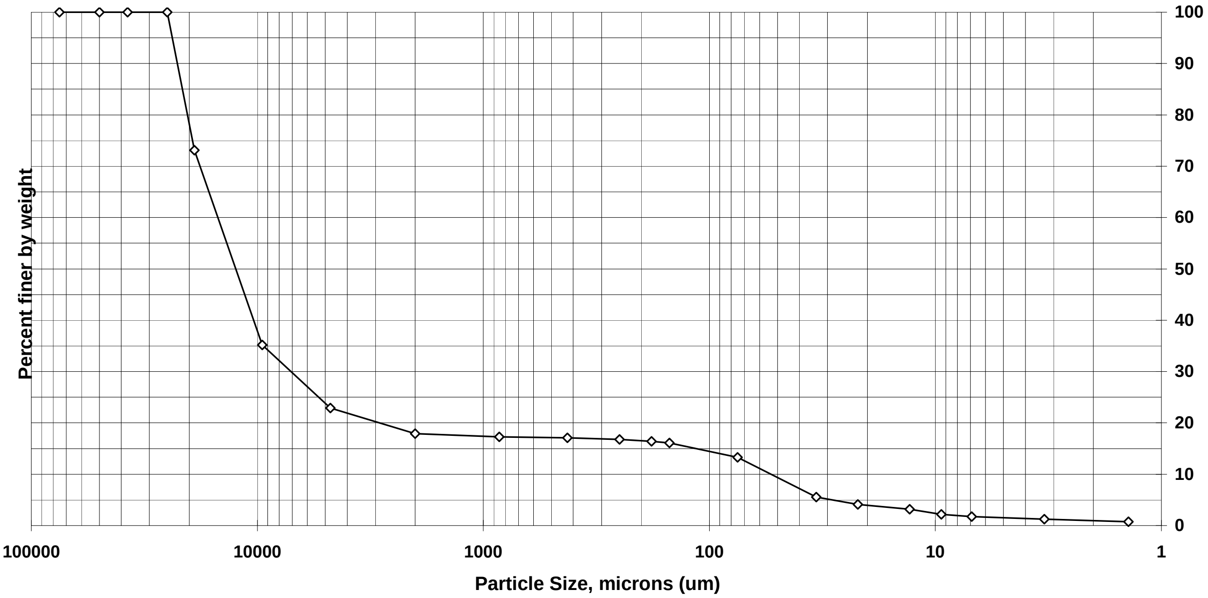
Particle Size of Soils by ASTM D422

				Date Received:	11/5/2015
Sample ID:	RB15-26-SURF	**Percent Solids:**	91.2%	**Start Date:**	11/27/2015
Lab ID:	200-30593-E-4	**Specific Gravity:**	2.650	**End Date:**	12/2/2015

Shape (> #10): subangular

Non-soil material: shell

Hardness (> #10): hard



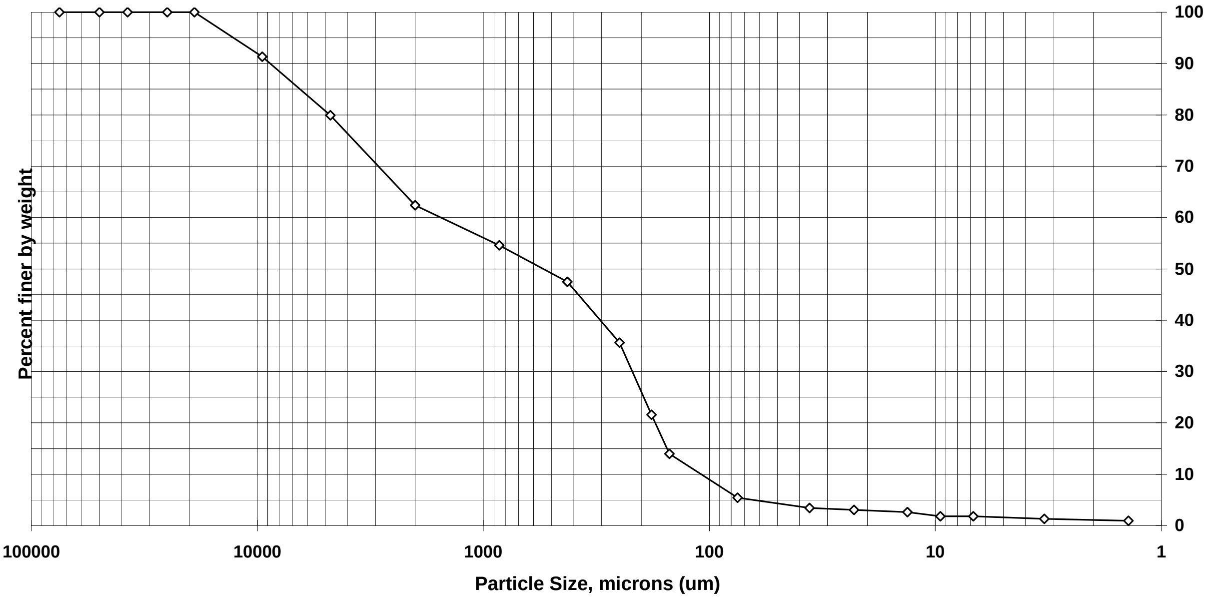
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	73.1	26.9
3/8 inch	9500	35.2	37.9
#4	4750	22.9	12.3
#10	2000	17.9	5.0
#20	850	17.3	0.6
#40	425	17.1	0.2
#60	250	16.8	0.3
#80	180	16.4	0.4
#100	150	16.1	0.3
#200	75	13.3	2.8
Hyd1	33.7	5.5	7.8
Hyd2	22	4.1	1.4
Hyd3	13	3.2	1.0
Hyd4	9.4	2.2	1.0
Hyd5	6.9	1.7	0.5
Hyd6	3.3	1.3	0.5
Hyd7	1.4	0.8	0.5

Soil Classification	Percent of sample
Gravel	77.1
Sand	9.6
Coarse Sand	5.0
Medium Sand	0.8
Fine Sand	3.8
Silt	11.6
Clay	1.7

Particle Size of Soils by ASTM D422

Date Received: 10/29/2015
Sample ID: RB15-27-SURF
Percent Solids: 76.0%
Start Date: 11/16/2015
Lab ID: 200-30485-E-3
Specific Gravity: 2.650
End Date: 11/20/2015

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	91.3	8.7
#4	4750	79.9	11.4
#10	2000	62.4	17.5
#20	850	54.6	7.8
#40	425	47.5	7.1
#60	250	35.6	11.9
#80	180	21.6	14.0
#100	150	14.0	7.6
#200	75	5.4	8.6
Hyd1	36	3.5	2.0
Hyd2	22.9	3.0	0.4
Hyd3	13.3	2.6	0.4
Hyd4	9.5	1.8	0.8
Hyd5	6.8	1.8	0.0
Hyd6	3.3	1.3	0.5
Hyd7	1.4	0.9	0.4

Soil Classification	Percent of sample
Gravel	20.1
Sand	74.5
Coarse Sand	17.5
Medium Sand	14.9
Fine Sand	42.1
Silt	3.6
Clay	1.8

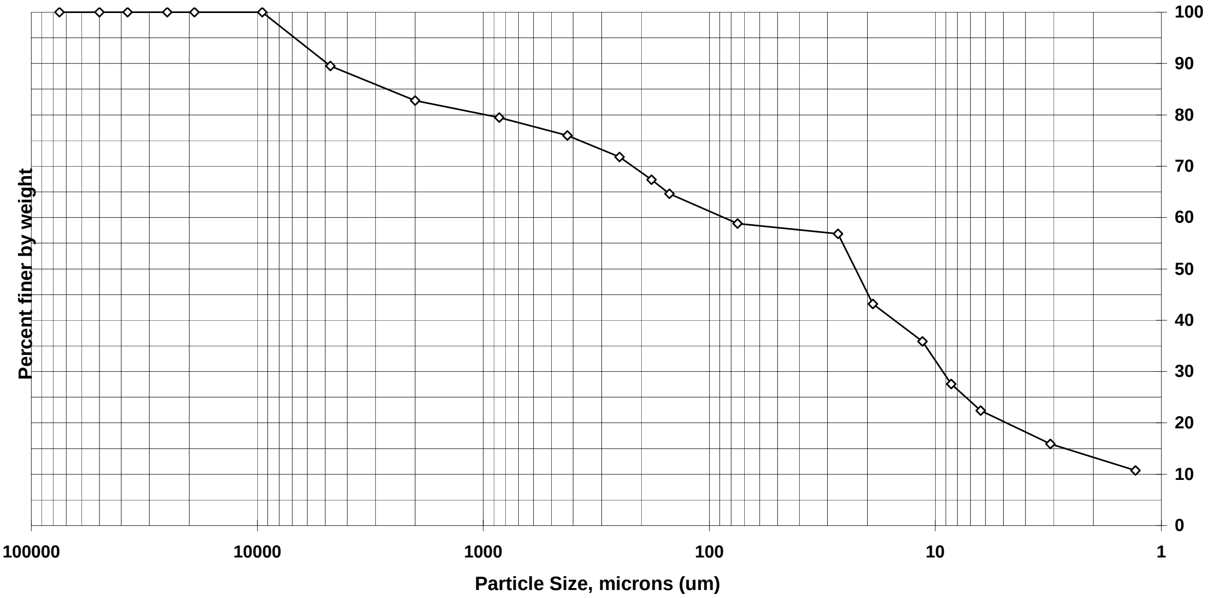
Particle Size of Soils by ASTM D422

				Date Received:	10/29/2015
Sample ID:	RB15-28-SURF	**Percent Solids:**	45.1%	**Start Date:**	11/16/2015
Lab ID:	200-30485-E-4	**Specific Gravity:**	2.650	**End Date:**	11/20/2015

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	89.5	10.5
#10	2000	82.8	6.7
#20	850	79.5	3.3
#40	425	76.0	3.5
#60	250	71.8	4.2
#80	180	67.4	4.4
#100	150	64.6	2.8
#200	75	58.8	5.8
Hyd1	27	56.8	2.0
Hyd2	18.9	43.2	13.6
Hyd3	11.4	35.9	7.3
Hyd4	8.5	27.6	8.3
Hyd5	6.3	22.4	5.2
Hyd6	3.1	15.9	6.5
Hyd7	1.3	10.7	5.2

Soil Classification	Percent of sample
Gravel	10.5
Sand	30.7
Coarse Sand	6.7
Medium Sand	6.8
Fine Sand	17.2
Silt	36.4
Clay	22.4

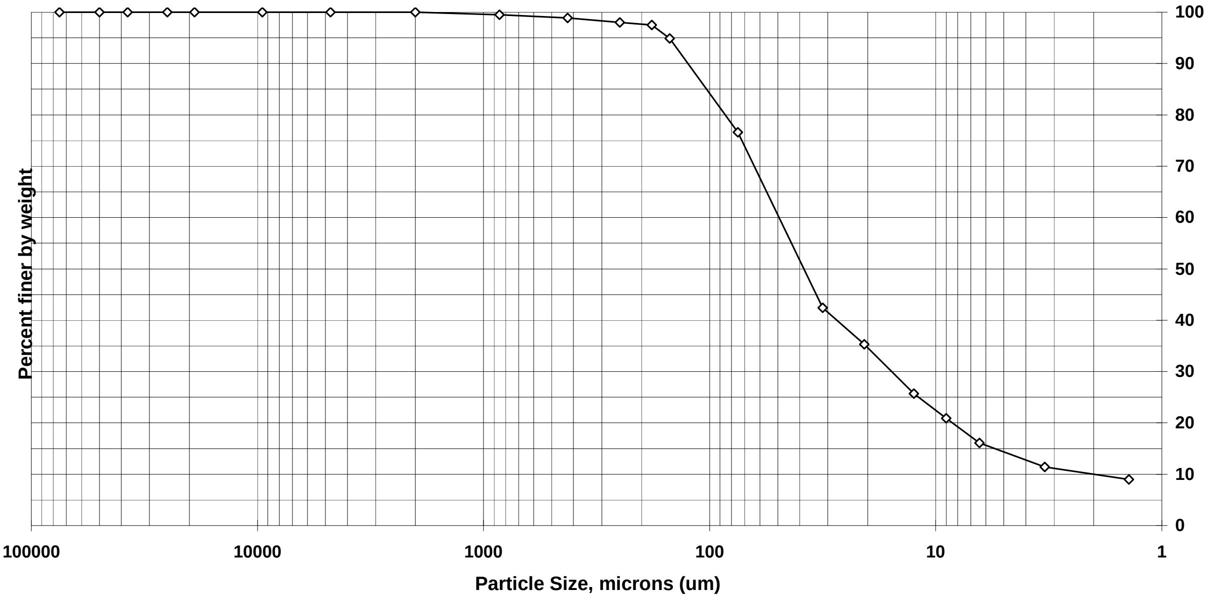
Particle Size of Soils by ASTM D422

				Date Received:	10/29/2015
Sample ID:	HBT15-A-SURF	**Percent Solids:**	37.5%	**Start Date:**	11/13/2015
Lab ID:	200-30485-E-1	**Specific Gravity:**	2.650	**End Date:**	11/19/2015

Shape (> #10): na

Non-soil material: na

Hardness (> #10): na



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	99.5	0.5
#40	425	98.9	0.6
#60	250	98.0	0.9
#80	180	97.5	0.5
#100	150	94.9	2.6
#200	75	76.6	18.3
Hyd1	31.6	42.4	34.2
Hyd2	20.7	35.3	7.1
Hyd3	12.5	25.7	9.6
Hyd4	9	20.9	4.8
Hyd5	6.4	16.1	4.8
Hyd6	3.3	11.4	4.7
Hyd7	1.4	9.0	2.4

Soil Classification	Percent of sample
Gravel	0.0
Sand	23.4
Coarse Sand	0.0
Medium Sand	1.1
Fine Sand	22.3
Silt	60.5
Clay	16.1

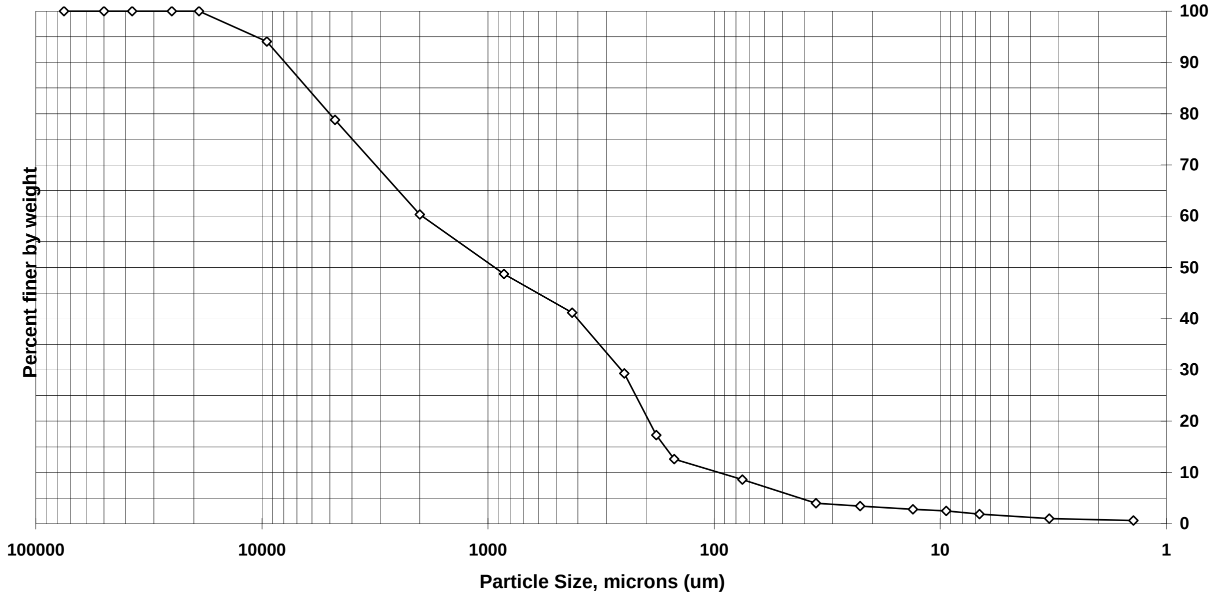
Particle Size of Soils by ASTM D422

				Date Received:	10/29/2015
Sample ID:	HBT15-B-SURF	**Percent Solids:**	71.2%	**Start Date:**	11/23/2015
Lab ID:	200-30485-E-2	**Specific Gravity:**	2.650	**End Date:**	11/27/2015

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	94.1	5.9
#4	4750	78.8	15.3
#10	2000	60.3	18.5
#20	850	48.7	11.6
#40	425	41.2	7.5
#60	250	29.3	11.9
#80	180	17.3	12.0
#100	150	12.6	4.7
#200	75	8.6	4.0
Hyd1	35.4	4.0	4.6
Hyd2	22.6	3.4	0.6
Hyd3	13.2	2.8	0.6
Hyd4	9.4	2.5	0.3
Hyd5	6.7	1.9	0.6
Hyd6	3.3	1.0	0.8
Hyd7	1.4	0.6	0.4

Soil Classification	Percent of sample
Gravel	21.2
Sand	70.2
Coarse Sand	18.5
Medium Sand	19.1
Fine Sand	32.6
Silt	6.8
Clay	1.8

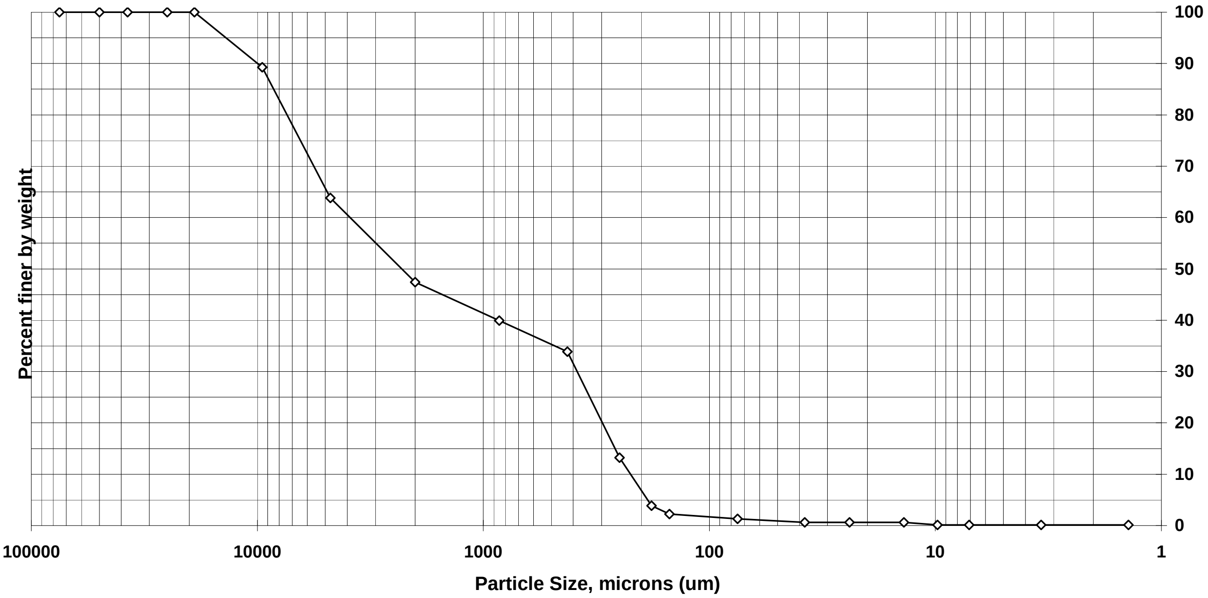
Particle Size of Soils by ASTM D422

				Date Received:	11/3/2015
Sample ID:	HBT15-C-SURF	**Percent Solids:**	77.2%	**Start Date:**	11/18/2015
Lab ID:	200-30555-E-7	**Specific Gravity:**	2.650	**End Date:**	11/25/2015

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	89.3	10.7
#4	4750	63.8	25.5
#10	2000	47.4	16.4
#20	850	39.9	7.5
#40	425	33.9	6.0
#60	250	13.2	20.7
#80	180	3.9	9.3
#100	150	2.2	1.6
#200	75	1.3	0.9
Hyd1	37.9	0.6	0.7
Hyd2	24	0.6	0.0
Hyd3	13.8	0.6	0.0
Hyd4	9.8	0.1	0.5
Hyd5	7.1	0.1	0.0
Hyd6	3.4	0.1	0.0
Hyd7	1.4	0.1	0.0

Soil Classification	Percent of sample
Gravel	36.2
Sand	62.5
Coarse Sand	16.4
Medium Sand	13.5
Fine Sand	32.6
Silt	1.2
Clay	0.1

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