Final
Assessment of Contaminated Sediments
Harbortown Upstream Area
Site Characterization Report

Detroit River Area of Concern, Detroit, Michigan

Great Lakes Architect-Engineer Services
Contract: EP-R5-11-10

Prepared for
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June 2019
Revision: 00
EA Project No. 62561.36

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degree Celsius
µg/kg	Microgram(s) per kilogram
µmol	Micromole(s)
µmol/g_{oc}	Micromole(s) per gram organic carbon
AOC	Area of Concern
APTIM	APTIM Federal Services, LLCAVS Acid volatile sulfide
COC	Contaminant of concern
CSO	Combined sewer overflow
cy	Cubic yard(s)
DRO	Diesel range organics
EA	EA Engineering, Science, and Technology, (MI) PLC and Its Affiliate EA Science and Technology
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EPA	U.S. Environmental Protection Agency
ESB	Equilibrium Partitioning Sediment Benchmarks
ESBTU	Equilibrium Partitioning Sediment Benchmarks Toxicity Unit
FD	Field duplicate
f_{oc}	Fraction of organic carbon in sediment
FSP	Field Sampling Plan
ft	Foot (feet)
GLNPO	Great Lakes National Program Office
GPS	Global Positioning System
K_{oc}	Sediment organic carbon/water partition coefficient
K_{ow}	Octanol-water partition coefficient
LRROC	Lower Rouge River Old Channel
MDNR	Michigan Department of Natural Resources
mg/kg	Milligram(s) per kilogram
MS	Matrix spike
MSD	Matrix spike duplicate
ND	Not detected or non-detect
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
RCRA	Resource Conservation and Recovery Act
RL	Reporting limit
RTK	Real time kinematic
SCBA	Sediment Contaminant Bioavailability Alliance
SEM	Simultaneously extracted metals
SOP	Standard operating procedure
SQG	Sediment Quality Guideline
SSRSL	Sample-Specific Risk Screening Level
TEC	Threshold effects concentration
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons (sum of ORO and DRO)
WAD	Weak acid dissociable
WDNR	Wisconsin Department of Natural Resources

EXECUTIVE SUMMARY

This report presents the characterization of contaminated sediments for the Harbortown Upstream 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 Field Sampling Plan for the Harbortown Upstream Area Site Characterization, Detroit River AOC, Detroit, Michigan (EA 2018), finalized in October 2018. To address the delisting criteria and allow for the eventual removal of the Degradation of Benthos beneficial use impairment, EPA's GLNPO, Michigan Department of Environmental Quality, Detroit River Public Advisory Committee, and Friends of Detroit River initiated an effort in 2012 to define the "known contaminated sediment sites" in the Detroit River. The partnership conducted a content analysis of a number of contaminant studies and established six sediment target sites. The Harbortown Upstream Area is an extension of the Harbortown sediment site, which 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 Harbortown Upstream 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.

ES.1 SEDIMENT CHEMISTRY RESULTS

Sampling was conducted to delineate the nature and extent of sediment contamination in the Harbortown Upstream Area of the Detroit River AOC. Thirty samples from locations HT18-01 through HT18-32 were collected from the surface interval to a depth of ten feet. Sampling extended from upstream location HT18-01, located southeast of the Keelson Road Canal, to location HT18-30, the furthest downstream location, just off the shore of Gabriel Richard Park east of the MacArthur Bridge. Two locations (HT18-31 and -32) were located in the center of the channel between Belle Isle and US mainland, and HT18-03 was located within Connor Creek by the request of EPA.

Constituent concentrations detected in sediment samples were compared to various sediment quality metrics including threshold effects concentrations (TECs), probable effects concentrations (PECs), Equilibrium Partitioning Sediment Benchmark Toxicity Units (ESBTUs), Probable Effects Concentration Quotients (PEC-Qs), and Sample-Specific Risk Screening Levels (SSRSLs). 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. Total petroleum hydrocarbon (TPH) (diesel range organics [DRO] + oil range organics [ORO]) results were compared to SSRSLs as a PEC has not been developed for DRO and ORO. 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. PEC-Qs are used to evaluate the combined effects of chemical mixtures on the toxicity of sediments to benthic organisms against recommended benchmarks including mean PEC quotients of 0.1, 0.5, 1, and 5 (Ingersoll et al. 2001).

Bulk Chemistry

Total polychlorinated biphenyl (PCB) concentrations (not detected [ND]=0) exceeded the TEC in five of the 29 surface grab samples in the Harbortown Upstream Area and no concentrations exceeded the PEC. In the core samples, total PCB concentrations exceeding the PEC were detected in at least one depth interval at four locations. The maximum total PCB concentration was detected at HT18-06.

For total 17 polycyclic aromatic hydrocarbons (PAHs) (ND=1/2 reporting limit [RL]), 22 surface grab samples had a maximum concentration between the TEC and PEC and no samples exceeded the PEC. In the core samples, 15 locations had a maximum total 17 PAHs concentration in at least one depth interval that was between the TEC and PEC; two locations had a maximum total 17 PAHs concentration in at least one depth interval that was between one and two times greater than the PEC; and four locations had a maximum total 17 PAHs concentration in at least one depth interval that exceeded three times the PEC. The maximum total 17 PAHs concentration in a surface sample and a subsurface sample were both detected at HT18-25.

For arsenic, two surface grab samples had a maximum concentration between the TEC and PEC and no samples exceeded the PEC. In the core samples, 12 locations had a maximum arsenic concentration in at least one depth interval that was between the TEC and PEC. One location had a maximum arsenic concentration in at least one depth interval that was between one and two times greater than the PEC. The maximum total arsenic concentrations in surface samples were detected at HT18-01 and HT18-05, and the maximum subsurface sample concentration was detected at HT18-08.

For cadmium, six surface grab samples had a maximum concentration that was between the TEC and PEC and one surface grab sample had a maximum cadmium concentration between one and two times greater than the PEC. In the core samples, five locations had a maximum cadmium concentration in at least one depth interval that was between the TEC and PEC. Seven locations had a maximum cadmium concentration in at least one depth interval that was one to two times greater than the PEC; and four locations had a maximum cadmium concentration in at least one depth interval that exceeded three times the PEC. The maximum cadmium concentrations in a surface grab sample and a subsurface were detected at HT18-03.

For copper, 17 surface grab samples had a maximum concentration that was between the TEC and PEC and no surface samples had maximum concentrations exceeding the PEC. In the core samples, 12 locations had a maximum copper concentration in at least one depth interval that was between the TEC and PEC. Five locations had a maximum copper concentration in at least one depth interval that was between one and two times greater than the PEC, and one location had a maximum copper concentration in at least one depth interval that exceeded two times the PEC. The maximum surface grab sample copper concentration was detected at HT18-03 and maximum subsurface concentration was detected at HT18-18.

For iron, 11 surface grab samples had a maximum concentration that was between the TEC and PEC and no surface grab samples had maximum iron concentrations that exceeded the PEC. In the core samples, 15 locations had a maximum iron concentration in at least one depth interval that was between the TEC and PEC, and no subsurface samples had maximum iron concentrations that exceeded the PEC. The maximum surface grab sample iron concentration was detected at HT18-30 and maximum subsurface concentration was detected at HT18-09.

For lead, 15 surface grab samples had a maximum lead concentration that was between the TEC and PEC and one surface grab sample had a maximum lead concentration that exceeded two times the PEC. In the core samples, eight locations had a maximum lead concentration in at least one depth interval that was between the TEC and PEC. Eight locations had a maximum lead concentration in at least one depth interval that was one to two times greater than the PEC; and five locations had a maximum lead concentration in at least one depth interval that exceeded three times the PEC. The maximum surface grab sample lead concentration was detected at HT18-16 and the maximum subsurface concentration was detected at HT18-19.

For mercury, four surface grab samples had a maximum mercury concentration that was between the TEC and PEC. One surface grab sample had a maximum mercury concentration that was between one and two times greater that the PEC; and one surface grab sample had a maximum mercury concentration that exceeded two times the PEC. In the core samples, ten locations had a maximum mercury concentration in at least one depth interval that was between the TEC and PEC. Four locations had a maximum mercury concentration in at least one depth interval that was greater than the PEC; and three locations had a maximum mercury concentration in at least one depth interval that exceeded three times the PEC. The maximum surface grab sample mercury concentration was detected at HT18-32 and the maximum subsurface concentration was detected HT18-18.

For nickel, fifteen surface grab samples had a maximum nickel concentration that was between the TEC and PEC and two surface grab samples had a maximum nickel concentration that was between one and two times greater that the PEC. In the core samples, 13 locations had a maximum nickel concentration in at least one depth interval that was between the TEC and PEC. Seven locations had a maximum nickel concentration in at least one depth interval that was between one and two times greater than the PEC and one location had a maximum nickel concentration in at least one depth interval that exceeded two times the PEC. The maximum surface grab sample nickel concentration and subsurface sample nickel concentration were both found at location HT18-03.

For silver, none of the surface grab sample silver concentrations exceeded the TEC. In the core samples, two locations had a maximum silver concentration in at least one depth interval that was between the TEC and PEC. Four locations had a maximum silver concentration in at least one depth interval that was between one and two times greater than the PEC; and one location had a maximum nickel concentration in at least one depth interval that was between two and three times greater than the PEC. The maximum surface grab sample silver concentration and subsurface silver concentration were both found at location at HT18-03.

For zinc, 14 surface grab samples had a maximum zinc concentration that was between the TEC and PEC and one surface grab sample had a maximum nickel concentration that was between one and two times greater that the PEC. In the core samples, three locations had a maximum zinc concentration in at least one depth interval that was between the TEC and PEC. Nine locations had a maximum zinc concentration in at least one depth interval that was between one and two times greater than the PEC and one location had a maximum zinc concentration in at least one depth interval that exceeded two times the PEC. The maximum surface grab sample zinc concentration and subsurface sample zinc concentration were both found at location HT18-03.

The ratio of simultaneously extracted metals (SEM) to acid volatile sulfide (AVS) was calculated for all surface grab samples. Three samples had an SEM/AVS ratio greater than or equal to one (HT18-10, -17, and -19). This indicates that metals may be bioavailable and there is potential for toxicity to benthic organisms.

The highest concentration of DRO (C_{10}-C_{20}) was detected in the surface grab sample from location HT18-03 (930 milligrams per kilogram [mg/kg]). The highest concentration of ORO (C_{20}-C_{36}) was also detected in the surface grab sample from HT18-03 (1,300 mg/kg). DRO (C_{10}-C_{20}) and ORO (C_{20}-C_{36}) concentrations were summed (by location) to create a TPH concentration (TPH [DRO+ORO]) for each location. DRO and ORO results were compared to SSRSLs as TEC and PECs have not been developed for TPH (DRO + ORO). Twelve locations had DRO concentrations exceeding the SSRSL. Three locations had DRO concentrations that were between three and four times the respective SSRL; four locations had DRO concentrations that were between two and three times the respective SSRL; and five locations had DRO concentrations that were between one and two times the respective SSRL. Nine locations had ORO concentrations exceeding the SSRSL. Five locations had DRO concentrations that were between two and three times the respective SSRL and four locations had DRO concentrations that were between one and two times the respective SSRL.

There were no locations with TPH values greater than 5,000 mg/kg; HT18-03 was the only location with a TPH (DRO+ORO) value between 1,000 and 5,000 mg/kg; 21 locations had TPH values between 100 and 1,000 mg/kg; and seven locations had a TPH value less than 100 mg/kg.

For cyanide, five samples had concentrations that exceeded the EPA Region 5 Resource Conservation and Recovery Act (RCRA) screening value for weak acid dissociable (WAD) cyanide at 0.1 mg/kg, and three samples had concentrations that exceeded the EPA Region 5 RCRA screening value for total cyanide at 0.1 mg/kg. The maximum WAD cyanide concentration was detected at location HT18-03 and the maximum total cyanide concentration was detected at HT18-06.

ES.2 EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARK TOXICITY UNITS AND PROBABLE EFFECTS CONCENTRATION QUOTIENTS

ESBTUs were calculated to estimate whether there is potential for ecological risk associated with exposure to pore water that is in equilibrium with a measured concentration of 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. In the Harbortown Upstream area, three surface grab sample locations had PAH ESBTU between 1 and 7.5, and all the remaining surface grab sample locations had PAH ESBTU values that were less than 1. In the core samples, 18 locations had a subsurface sample PAH ESBTU greater than 1 in at least one core depth interval. At HT18-19, the maximum PAH ESBTU value was greater than 10 in at least one subsurface depth interval; and at 17 locations, the maximum PAH ESBTU value was between 1 and 7.5 in at least one depth interval.

ESBTU results for metals did not exceed 130 micromoles per organic compound ($\mu mol/g_{oc}$) in any surface grab samples in the Harbortown Upstream Area.

PEC-Qs are used to evaluate the combined effects of chemical mixtures on the toxicity of sediments to benthic organisms against recommended benchmarks including mean PEC quotients of 0.1, 0.5, 1, and 5 (Ingersoll et al. 2001). Consensus-based freshwater sediment quality guidelines (SQGs) are used to calculate concentration quotients (or hazard quotients), defined as measured sediment concentrations divided by the specific SQG for that particular chemical or metal. The principle of PEC-Qs is to calculate the geometric mean of all quotients for a particular sediment sample, including those for metals, PAHs, and PCBs.

Ingersoll et al. demonstrated a relationship between the mean PEC-Q and sediment toxicity. This work showed that when the geometric mean PEC-Q was regressed with the percent toxicity found in a sample (typically growth or mortality), and the geometric mean of the PEC-Qs was approximately 1, between 30 and 50 percent of the organisms showed a toxic effect. This result implied that between 50 and 70 percent of the organisms should not show an effect when the PEC-Q is 1. The proportion of organisms that showed a toxic effect was in the range of 6 to 35 percent when the geometric mean of the PEC-Q of 0.5 was used, meaning that between 65 and 94 percent of organisms would not be expected to show a toxic effect when the PEC-Q was 0.5 (Ingersoll et. al. 2001).

A single PEC-Q was determined for each sediment sample (determined by 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). The mean PEC-Qs in the Harbortown Upstream area ranged from 0.03 to 3.41. The mean PEC-Q for each sediment sample was compared to benchmarks of 0.5, 1, and 5. In the surface grab samples, all the locations had mean PEC-Q values between 0 and 0.5. In the core samples, eight locations had a PEC-Q in at least one depth interval that was between one and five; five locations had a maximum PEC-Q value in at least one depth interval that was between 0.5 and 1; and the remaining locations had subsurface samples with PEC-Q values between 0 and 0.5.

ES.3 SPATIAL ANALYSIS

To determine the location of hot spots within the Harbortown Upstream Area, all individual constituents with concentrations exceeding their respective PEC in sediment samples, calculated PAH ESBTUs, and the calculated PEC-Qs were spatially interpolated using the kriging method. Although ESBTUs were also calculated for metals, these data were 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. Five hot spots in the study area where identified where one or more analytes were present at concentrations exceeding the PEC. The five 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 Levels 1, 2, or 3, consistent with previous characterizations in the Detroit River AOC. Level 1 hot spots are recognized as those having the highest impact, Level 2 the impact is lower, and Level 3 hot spots are identified as 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.

Harbortown Upstream Hot Spots 1, 3, and 4 each have at least one contaminant of concern (COC) result that is equal to or greater than three times the respective PEC and PEC-Q values greater than 1, therefore, meeting the Level 2 criteria. Harbortown Upstream Hot Spots 2 and 5 each have at least one contaminant of concern (COC) result that is equal to or greater than three times the respective PEC, PEC-Q values greater than 0.5, and ESBTU values greater than 1, therefore, meeting the Level 3 criteria.

Harbortown Upstream Hot Spot 1 contains seven sample locations (HT18-03, -04, -05, -06, -07, -08, and -09). The COCs for this hot spot area include total PCBs, total 17 PAHs, and nine metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc). The predominant constituents contributing to the elevated concentrations are total PCBs (HT18-03 and -06), total 17 PAHs (HT18-08), cadmium (HT18-03 and 07), and lead (HT18-03, -05, and -06), which all exceed three times the PEC. Five sample locations in Hot Spot 1 had PAH ESBTUs between 1 and 7.5. All seven sample locations had metal ESBTUs less than 130 µmol/g_{oc}. Four sample locations in Hot Spot 1 had PEC-Q values between one and five, and one sample location had PEC-Q values between 0.5 and 1.

Harbortown Upstream Hot Spot 2 contains three sample locations (HT18-12, -13, and -14). The COCs for this hot spot area include total 17 PAHs and five metals (cadmium, copper, lead, nickel, and zinc). The predominant constituent contributing to the elevated concentrations is cadmium (HT18-13), which exceeded three times the PEC. All of the sample locations in Hot Spot 2 have PAH ESBTUs between 1 and 7.5 and all of the sample locations have metal ESBTUs less than 130 µmol/g_{oc}. Two sample locations have PEC-Q values between 0.5 and 1.

Harbortown Upstream Hot Spot 3 contains five locations (HT18-16, -18, -19, -20, and -21). The COCs for this hot spot area include total 17 PAHs and six metals (cadmium, copper, lead, mercury, silver, and zinc). The predominant constituents contributing to the elevated concentrations are total 17 PAHs, lead, and mercury, which all exceed three times the PEC in HT18-18 and -19. One sample location (HT18-20) in Hot Spot 3 had PAH ESBTUs between 1 and 7.5 and one sample location (HT18-19) had PAH ESBTUs exceeding 10. No sample locations had metal ESBTUs greater than 130 µmol/g_{oc} and two sample locations had PEC-Q values between one and five.

Harbortown Upstream Hot Spot 4 contains two locations (HT18-24 and -25). The COCs for this hot spot area include total 17 PAHs and six metals (cadmium, copper, lead, mercury, silver, and zinc). The predominant constituents contributing to the elevated concentrations are total 17 PAHs, lead, and mercury, which all exceed three times the PEC in HT18-25. HT18-25 in Hot Spot 4 had PAH ESBTUs between 1 and 7.5 and both sample locations had metal ESBTUs less than 130 µmol/g_{oc}. HT18-25 samples had a PEC-Q value between one and five.

Harbortown Upstream Hot Spot 5 contains three locations (HT18-28, -29, and -30). The COCs for this hot spot area include total 17 PAHs and six metals (cadmium, copper, lead, mercury, nickel, and zinc). The predominant constituent contributing to the elevated concentrations is cadmium, which exceeds three times the PEC in HT18-30. All three sample locations in Hot Spot 5 had PAH ESBTUs between 1 and 7.5 and each location had metal ESBTUs less than 130 µmol/g_{oc}. One sample in Hot Spot 5 had PEC-Q values between 0.5 and 1.

ES.4 CONCLUSIONS

Based on the data collected during the Harbortown Upstream Area sediment characterization, there are no Level 1 high impact hot spots. The Level 2 hot spot areas with elevated concentrations of constituents are: Harbortown Upstream Hot Spots 1, 3, and 4. These Level 2 hot spots have an estimated total of approximately 466,194 cubic yard (cy) of sediment with constituent concentrations meeting the Level 2 criteria.

The Level 3 hot spot areas with elevated concentrations of constituents are: Harbortown Upstream Hot Spots 2 and 5. These Level 3 hot spots have an estimated total of approximately 368,345 cubic yard (cy) of sediment with constituent concentrations meeting the Level 3 criteria.

The five hot spots identified in the Harbortown Upstream Area were determined to be Level 2 or 3 hot spots and should be considered for further investigation. Model results indicated that three of these five areas have (Level 2) a large volume of sediment with elevated concentrations of constituents exceeding three times respective PECs and elevated PAH ESBTUs and PEC-Qs. There is a possible correlation of elevated concentrations being associated with soft sediment; cores that were comprised primarily of fat, gray clay had fewer to no exceedances. 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 Harbortown Upstream Area. However, it should be noted that 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 characterization of contaminated sediments for the Harbortown Upstream Area (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 Harbortown Upstream Area Site Characterization, Detroit River AOC, Detroit, Michigan, which was finalized in October 2018 (EA 2018).

1.1 WORK SCOPE AND OBJECTIVES

1.1.1 Project Objectives

The purpose of the field investigation was to obtain the data necessary to define the spatial (horizontal and vertical) nature and extent of chemical contamination in the areas of soft sediment deposition—using the kriging method to model—in the Harbortown Upstream Area. The primary objectives of the field investigation were collection and chemical and physical analysis of surface and subsurface sediment from locations in the Harbortown Upstream Area to characterize the contaminated sediments as a basis for identifying possible areas of focus, for further evaluation and/or remediation, in the Detroit River.

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 Harbortown Upstream 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 Harbortown Upstream Area where remediation efforts might be warranted.

1.2 SITE LOCATION AND HISTORY

The Detroit River is a 32-mile strait from Lake St. Clair to Lake Erie, forming the international boundary between the Province of Ontario, Canada, and the State of Michigan (Michigan Department of Environment, Great Lakes, and Energy [EGLE] 2008). The Detroit River flows in a southerly direction and connects the upper Great Lakes to Lake Erie. Although the Detroit River has five tributaries, more than 95 percent of its total flow comes from Lake Huron via the St. Clair River and Lake St. Clair (EPA 2015). The Detroit River AOC is 807 square miles and includes the areas that drain directly to the river, the drainage area of its tributaries in Michigan and Ontario (700 square miles of land), and a 107-square mile area of the City of Detroit sewershed. The Detroit River AOC and the Harbortown Upstream project area are shown on Figure 1-1. Approximately 75 percent of the total land area of the watershed is in Michigan

(607.7 square miles) (MDNR1996). The mean discharge of the Detroit River into Lake Erie is 185,000 cubic feet (ft) per second. Its velocity is 1–3 ft per second, and the average time for water to pass through the river is approximately 21 hours. The project location includes the Harbortown Upstream Area, which is one of six target areas in the Detroit River AOC. The Harbortown Upstream Area is an approximately 3-mile stretch of the upper Detroit River beginning at AB Ford Park and extending to the MacArthur Bridge to Belle Isle. This area is upstream and contiguous with the Detroit River AOC Harbortown Upstream target sediment site (Figure 1-2). Within the Harbortown Upstream Area, there are 10 known combined sewer overflows (CSOs) (Figure 1-3); further details are provided in Section 3.2.

The Detroit River has a past and present use as an industrial and drinking water source. Very little historical information 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 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. CSOs and municipal and industrial discharges are major sources of contaminants within the AOC. Stormwater runoff and discharge from tributaries in Michigan are also major sources of contaminants. The following beneficial use impairments were identified in the Stage 1 RAP:

- Restrictions on fish and wildlife consumption
- Tainting of fish and wildlife flavor
- Restrictions on drinking water consumption, or taste and odor
- Degradation of fish and wildlife populations
- Beach closings
- Fish tumors or other deformities
- Degradation of aesthetics
- Bird or animal deformities or reproduction problems
- Degradation of benthos
- Restriction on dredging activities
- 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, electrical power generating plants, chemical manufacturing plants, and automotive part manufacturers. The largest discharger to the river was the Detroit

Water and Sewerage Department, which discharged an average of 715 million gallons per day, including waste from more than 700 industrial users. An additional 46 facilities discharged to Detroit River tributaries. The river also received urban and industrial runoff directly and through its tributaries and storm sewer systems (MDNR 1991).

Use of the river today is similar to 1991 except that there are fewer industries and wastewater treatment plants. In the Michigan portion of the AOC, there are currently four municipal drinking water intakes serving approximately 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 approximately 29 additional facilities discharge to the tributaries. There are five municipal wastewater treatment plants. The Detroit Water and Sewerage Department is still the largest discharger, discharging an average of 1.3 billion gallons per day, including waste from approximately 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 Trenton Channel appears to be the most impacted. Contaminant distributions in sediment reflect 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 longshore 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).

Within the Harbortown Upstream Area, there are 10 known CSOs (Figure 1-3). Elevated PCBs in the upper Detroit River are believed to be associated with discharge from some of these CSOs (Kenaga and Crum 1987). Historically, U.S. Rubber and Parke Davis operated industrial facilities within the Harbortown Upstream Area, which discharged to the Detroit River from five or six outfalls (Figure 1-3). These outfalls are believed to be currently inactive (EPA 2015).

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2. HARBORTOWN UPSTREAM AREA SITE INVESTIGATION

The Harbortown Upstream 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 Harbortown Upstream FSP and QAPP (EA 2018).

2.1 SAMPLING PROGRAM DESIGN AND RATIONALE

The site-specific QAPP details the project data quality objectives and outlines how the sample collection program fulfills the project objectives (EA 2018). Sampling was conducted to delineate the nature and extent of sediment contamination in the Harbortown Upstream Area of the Detroit River AOC. Thirty samples from locations HT18-01 through HT18-32 were collected using a vibracoring system and ponar grab sampler provided and operated by Cetacean Marine from onboard the *R/V Mudpuppy* II that was operated by Cetacean Marine.

2.1.1 Sample Locations

Sample Locations were selected in consultation with EPA and EGLE based on historical sampling data, location of historical and current outfalls (Figure 1-3), water depth, and proximity to the navigation channel. The locations HT18-31 and 32 were identified for sediment sampling by EPA during the field event and were located upstream of the MacArthur Bridge in the center of the channel between Belle Isle and the US mainland side of the Detroit River. Ponar grabs and sediment cores were successfully collected from 29 of the 32 targeted locations. Collection of one core and one ponar surface sample for physical and chemical analysis was attempted at each location, with the exception of HT18-16 where only a ponar sample was taken, and HT18-27 where only a core sample was taken as described in Section 2.3.

Figure 2-1 presents the actual locations sampled in the Harbortown Upstream Area. Variance between the actual and target coordinates was calculated and documented and is provided in Table 2-1. Surface sample coordinates are provided in Table 2-2. Sample locations moved or abandoned in the field are described in Section 2.8.

2.1.2 Number of Samples

Sediment core samples and ponar grabs were successfully collected from 29 of the 32 sample locations in the Harbortown Upstream Area. Sediment core intervals were defined by observable lithological changes and sediment recovery and varied from 1.1 to 9.7 ft (Table 2-3). From the cores collected in the Harbortown Upstream Area, 142 sediment samples and 15 field duplicates (FDs) were submitted for analysis (Table 2-4). Tables 2-2 and 2-3 provide details of the sediment cores collected and analytical samples submitted.

A ponar grab sampler was used to collect sample volume from the top 6 inches (0-0.5 ft) of sediment at the 30 sample locations to support analysis of the uppermost interval. Sufficient volume for analysis of the surface sample was collected at 29 of the 32 sample locations and a total of 29 surface grab samples and three FDs were submitted for analysis.

2.2 NAVIGATION AND SURVEY

Cetacean Marine used an onboard real time kinematic (RTK) Global Positioning System (GPS) receiver—with a geodetic accuracy of 10 centimeters in the horizontal and two centimeters in the vertical planes at an update frequency of 1 hertz—with a preloaded base map identifying target sample locations to navigate to sample locations HT18-01 through HT18-30. Locations 18-31 and 18-32 were identified in the field by EPA.

The unit was checked for accuracy prior to use in accordance with EPA's Interim Guidance for Developing GPS Data Collection Standard Operating Procedures (SOPs) and QAPPs (EPA 2008) and the procedures outlined in the Harbortown Upstream Area site characterization QAPP (EA 2018). Once the vessel had navigated to a 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 in the QAPP (EA 2018) prior to sampling. Actual sample location coordinates were recorded on the field data sheets and stored in the RTK GPS unit at the time of sampling. Target and actual sample location coordinates are presented in Table 2-1.

2.3 SEDIMENT SAMPLING

Mobilization for the Harbortown Upstream Area sediment sampling effort commenced on 22 October 2018. Sample collection was initiated on 22 October 2018, and continued through 30 October 2018. Staging for the Harbortown Upstream Area field investigation took place at the historical stables in Belle Isle Park 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 2018). EA's SOPs 016 and 059 for maintaining field logbooks (Attachment A of the FSP) were followed throughout sample collection and processing.

2.3.1 Vibracore Sampling

Cetacean Marine used vibracore technology to retrieve a total of 29 sediment cores from 32 locations for sediment sampling. Cores were retrieved as described in SOP MP103 (EA 2018). The vibracoring system consisted of the vibracore head, and control box located between the underwater cable and the power source. The vibracore head had a core tube clamp and an internal vibrator motor. The vibracorer applied thousands of vibrations per minute to help penetrate the sediment. The vibracorer was lowered to one ft above the water body and then turned on when the core tube extending below it made contact with the sediment surface. The vibracore system on board the *R/V Mudpuppy II* was a Rossfelder P3C Vibracore. The core barrel was fitted with polycarbonate 4-inch diameter core tubes for sample collection.

After retrieval, each core tube was capped at both ends, sealed, and measured. Each core tube was also labeled with the location number, direction of top and bottom of core, and date and time of retrieval. All sediment cores were stored upright on the *R/V Mudpuppy II*. At the end of each day, sediment cores were transferred to a refrigeration truck (cooled to 4 degrees Celsius [°C]) at the onshore staging areas. 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 2018). A log of coring activities, sampling locations, water depths, and core recoveries was recorded in a permanently bound logbook 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 29 surface sediment samples from locations HT18-01 through HT18-32 were successfully collected using a ponar sampler onboard the *R/V Mudpuppy II* and are included in this Site Characterization Report. The procedure included deploying the sampler off the *R/V Mudpuppy II* using a winch to deploy and retrieve the sampler to the 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.

For each field effort, after ponar samples were retrieved, sediment for analysis of the ratio of simultaneously extracted metals (SEM) to acid volatile sulfide (AVS) was placed into a jar directly after sufficient volume for the surface 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 barge until they were transferred to the sample processing areas onshore and stored in a refrigeration truck (cooled to 4°C) until transit to laboratory facilities.

2.3.3 Sediment Core Processing

Sediment core sample processing was performed at a temporary staging location at the historical stables in Belle Isle Park in Detroit, Michigan. At the processing facility, cores were split lengthwise, photographed, and lithologically logged and sampled at depth intervals as described in the FSP and QAPP (EA 2018), unless otherwise noted. Sediments were classified in general accordance with the Unified Soil Classification System under ASTM International Standard D2487-11. Sediment logging activities were performed in accordance with SOP 016 (Attachment A of the FSP [EA 2018]).

After photographing and completing the core's lithologic log, interval-dedicated decontaminated spatulas or spoons were used to remove sediment from the designated sample intervals within a core and placed in clean, disposable aluminum trays. Prior to sample collection, sample interval material was homogenized by mixing until consistency was uniform. Cores were generally sampled at two-ft intervals. This was altered if there was a distinct change in lithology or there was visible contamination. Sediment samples were packaged and shipped in accordance with EA SOPs (EA 2018). Re-used equipment (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 provided in Appendixes B and C, respectively.

2.4 ANALYTICAL PROGRAM

The analytical program is summarized in Table 2-4. With a few exceptions due to inadequate sample volume (as detailed in Section 3.2.1), Harbortown Upstream Area sediment samples underwent the following analyses:

- PCBs (Aroclors)
- 34 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, surface sediment samples (0- to 0.5-ft interval) were analyzed for:

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

These additional analyses were performed on the surface 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), 34 PAHs, total Michigan metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc) plus iron and nickel, TOC, percent solids, SEM/AVS, DRO, ORO, grain size, and cyanide 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 2018). 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 sufficient surface sample volume was collected, prior to homogenization. SEM/AVS samples were filled without headspace. In preparation for shipment to the laboratories, all samples were packaged in accordance with the procedures outlined in the FSP (EA 2018).

Sample labeling was performed in accordance with SOP 001 (Attachment A of the FSP [EA 2018]). 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 2018) outlines the specific sample identification procedures that were implemented. Sample identifications included the location (HT for Harbortown Upstream), the year of sampling (18 for 2018), the location number, and either "-SURF" for surface samples or the interval from the core in feet. An example of a sample identifier is "HT18-22-3050," which describes a sample collected from the Harbortown Upstream Area in 2018 at location 22 at the depth interval of 3-5 ft below sediment surface. Sample intervals within the core were determined based on lithological features, visual or olfactory signs of contamination, and guidance from EPA. FDs 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: HT18-23-1030-FD or HT18-12-SURF-MS.

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 (available electronically) of the Data Usability Assessment Report (EA 2019).

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 data quality objectives as defined in Section A.7 of the QAPP (EA 2018). Duplicate samples were submitted as described in the FSP, and field and laboratory quality control requirements were completed in accordance with Section B.5 of the QAPP (EA 2018). 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 2018).

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 2018). 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 *R/V Mudpuppy II* 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 QUALITY ASSURANCE PROJECT PLAN AND FIELD SAMPLING PLAN

2.8.1 Sampling Locations

Thirty sample locations within the Harbortown Upstream Area were originally chosen based on historical sampling data, location of historic and current outfalls, water depth, and input from EGLE. Two additional samples were added at locations determined by EPA during the field event (Table 2-1).

Of the 32 actual sample locations in the Harbortown Upstream Area, 26 were more than 10 ft from the target sample location (Table 2-1). Per the QAPP, sample locations could be adjusted up to 33 ft (10 meters) to allow for accessibility. Of the 26 locations that were more than 10 ft from the target sample location, 19 locations were moved more than 33 ft from the target sample location (HT18-01, -02, -03, -04, -05, -09, -10, -11, -13, -15, -17, -18, -19, -20, -21, -24, -25, -27, and -30); EPA was aware of and approved these location moves.

Nine locations (HT18-01, -09, -10, -18, -19, -21, -24, -25, and -27) were shifted due to weather/wind and current conditions that affected anchoring placement at the time of core retrieval. Five locations (HT18-04, -13, -17, -20, and -30) were moved per EPA's request with concern for location in proximity to the shore or the MacArthur Bridge. Two locations (HT18-02 and HT18-15) were moved to avoid structures such as rip rap, pipeline, and large rocks. Two locations (HT18-03 and -05) were moved closer to the mouth of Connor Creek and within Conner Creek to follow expected contamination and HT18-11 was moved to avoid close proximity of a burned Bolbo boat. HT18-30 was shifted approximately 100 ft upstream from the MacArthur Bridge during the field effort; however, the coordinates in this report are estimated due to an error with GPS coordinates. Table 2-1 presents coordinates for the target and actual locations, as well as the distance between the actual and target locations.

2.8.2 Sample Recovery

Sediment penetration and recovery of the cores, as observed through the clear core liner, were recorded on a field data collection form for each location. The recovery value was also verified immediately prior to processing to ensure sediment had settled in core tubes that were partially full. Sediment penetration and recovery of the cores used for chemical analysis are presented in Table 2-3. Per the QAPP, if sufficient core recovery (60 percent) is not achieved in during core collection, up to three attempts can be made at that sample location.

Cores were not recovered from three locations: HT18-16, -22, and -28 (Table 2-3). Stations HT18-22 and HT18-28 were abandoned as per instruction of EPA in favor of HT18-31 and HT18-32, while three attempts were made at HT18-16 with little to no recovery before this location was abandoned per EPA's request. Boring depths ranged from 2 ft (HT18-10 and HT18-21) to 10 ft (HT18-02, -06, -07, -08, -09, -11, -12, -13, -23, -25. -26, and -30). In four locations (HT18-14, -21, -24, and -27), two attempts were completed to collect a core that had 60 percent or more recovery; and in location HT18-23, three attempts were completed to collect a core with over 60 percent recovery. The number of attempts at each location is included in the field logbook and field data sheets in Appendix A. Details of the cores that were processed and submitted for analysis are presented in Table 2-3.

Surface samples were collected at 29 of the 32 sample locations (Tables 2-2 and 2-3). No surface sediment was retrieved at locations HT18-22 and 28, as these stations were abandoned per instruction of EPA in favor of locations HT18-31 and 32. After six ponar attempts, HT18-27 was abandoned per instruction from EPA. In four locations (HT18-10, -14, -19, -26), two ponar attempts were consolidated to achieve the needed volume for grab sample analysis; in location HT18-29, three attempts were consolidated; and in location HT18-21, four ponar attempts were consolidated. The number of attempts at each location is included in the field logbook and field data sheets in Appendix A, and details of the cores that were processed and submitted for analysis are presented in Table 2-2.

2.8.3 Sample Processing and Analytical Program

In accordance with the QAPP, sediment core intervals were defined by observable lithological changes. Per EPA's direction during the field investigation, sediment core intervals were also observed for visible or olfactory signs of contamination (e.g., non-aqueous phase liquid, sheen, hydrocarbon odor). Table 2-4 presents the actual analytical program, including the start and end of each sample interval. Sediment intervals are documented in the field data collection forms (Appendix A), lithologic logs (Appendix B), and the photographic log (Appendix C).

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3. RESULTS

3.1 DATA EVALUATION

The overall data quality objective for the project was to provide data of known and documented quality to characterize current site conditions in the Harbortown Upstream Area. Data collected from the Harbortown Upstream 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 2018). 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 2019).

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, 2005; Wisconsin Department of Natural Resources [WDNR] 2003). A PEC has not been developed for total petroleum hydrocarbon (TPH) (DRO + ORO); however, the DRO and ORO results were compared to Sample-Specific Risk Screening Level (SSRSLs). Equilibrium Partitioning Sediment Benchmarks 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. 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). Contaminant concentrations exceeding the applicable SQGs, SSRSLs, ESBTUs, or PEC-Qs 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 and discussion.

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 Harbortown Upstream Area were compared to the TEC and PEC values for iron documented in the Ontario effect-based freshwater SQGs (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 EGLE and EPA, and they also appear in guidance from the WDNR (WDNR 2003).

3.1.2 Calculation of Total Polycyclic Aromatic Hydrocarbons and Total Polychlorinated Biphenyls

When calculating total 17 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 ND 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 NDs. This overestimation is important to consider when comparing calculated total values to guidelines. Total PCB results often have a significant number of NDs. Additionally, individual PCB Aroclors represent mixtures of PCB congeners, creating the potential for double counting. For these reasons, total PCB concentrations were calculated by summing the concentrations of each PCB Aroclor with NDs 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 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 micromoles per gram) 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.

While the SEM/AVS ratio provides information on bioavailability, it does not always inform toxicity. 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 Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal

Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc) (EPA 2005). The molar concentration of AVS was subtracted from the molar concentration of the sum of the SEM measured in each sediment sample, and the result was divided by the fraction of organic carbon, accounting for preferential sorption of metals to organic carbon. It should be noted that if the particular sample has excess AVS such that all SEM is accounted for, this value can be negative.

As presented in the EPA 2005 guidance, when metals ESBTUs are calculated using this method, a value less than 130 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 greater than 3,000 µmol/g_{oc} are expected to be associated with adverse effects. Details of the metals ESBTU calculation and results are presented in Chapter 4.

3.1.4 Equilibrium Partitioning Sediment Benchmark Toxic Units

ESBTUs were used to estimate if a potential ecological risk exists 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 EGLE 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.

3.1.5 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 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 HARBORTOWN UPSTREAM AREA SEDIMENT INVESTIGATION

Due to the close proximity of the sample locations within the Harbortown Upstream Area, there was no division of this area needed for reporting and visual presentation. HT18-01 was the sampling location furthest upstream and was located off southeast of the Keelson Road canal. HT18-30 was the sampling location furthest downstream and was located off the shore of Gabriel Richard Park just east of the MacArthur Bridge. Two locations (HT18-31, and -32) were located in the center of the channel between Belle Isle and US mainland, and HT18-03 was located within Connor Creek by the request of EPA.

3.2.1 Sample Recovery

One core was collected and processed from 29 of 32 locations during the 2018 Harbortown Upstream field effort. Cores were not collected from three locations (HT18-16, -22, and -28). Core recovery did not meet or exceed 70 percent after at least three attempts at HT18-16 (no recovery) while HT18-22 and HT18-28 were abandoned per EPA's request in favor of alternate locations. Ponar surface samples were collected at 29 of 32 sample locations. No surface sediment was retrieved at locations HT18-22, -27, and -28. HT18-27 had little to no recovery after six ponar grab attempts, while HT18-22 and HT18-28 were abandoned per EPA's request in favor of locations HT18-31 and HT18-32.

Core collection attempts were targeted to reach a depth of 10 ft or clay, whichever occurred first. Sediment recovery ranged from 1.2 ft (HT18-29) to 9.7 ft (HT18-12) (Table 2-3). Detailed lithographic descriptions of the 29 collected cores are presented in Appendix B.

3.2.2 Lithology

The sediment cores collected within the Harbortown Upstream Area demonstrated core profiles containing sediment types consistent with a fluvial system with a strong current. A majority of the cores were comprised of a sandy silt mixture with bands on clay running through them. Native and non-native material such as shells, roots, organic material, and organic/ hydrocarbon odors were observed within various sediment types and depths. Complete core logs and photographs are provided in Appendixes B and C, respectively. A general description of cores collected during the investigation is included in the text that follows.

A total of 30 cores were collected in the Harbortown Upstream Area. Starting upstream of the sample area, HT18-01 off the shore southeast of Keelson Road Canal and ending HT18-30 just east of the MacArthur Bridge off the shore of Gabriel Richard Park. Cores collected in the sample area had varying lithology; however, a majority of them included layers of silt, sand, and clay.

Starting in the upstream area, cores HT18-01 and -02 were comprised of a fine-grained silt/sand mixture imbedded with stiffer clay nodules and layers intermixed lower in the core. HT18-03 was collected within Connor Creek and also contained soft, silt layers imbedded with stiff clay and sand lower in the core. HT18-04 through -09 contained soft, silty sediment layers near the top of the core underlain by sandy silt layered with sand and some clay. HT18-10 was collected upstream of the St. Jean Boat Launch, and it was comprised mainly of clean medium-grained sand. HT18-11 and HT18-12 both contained wet, soft, silty top layers underlain by silty sand with HT18-12 having interbedded clay mixed throughout the silty sand within deeper layers. HT18-13 through -17 had sandy tops underlain by silty clay. HT18-18 and -19 had silty tops with HT18-18 having clay and sand in the deeper layers while HT18-19 had a coarse sand underlayment. Both HT18-20 and -21 had sandy tops while HT18-20 had a stiff clay underlayment. HT18-23 through-26 had a fine, sandy/silty top with sand and clay underlayment. HT18-27 and -29 both had a gravely top with HT18-27 having a stiff clay underlayment. HT18-30 was composed of uniform clayey silt. HT18-31 and -32 both had a sandy top with a layered sand and clay underlayment.

Many of the cores in the Harbortown Upstream Area had pebbles and cobbles in the soft sediment. Hydrocarbon odors were observed in the following cores: HT18-03, -06, -07, -08, 09, -12, -13, -18, -19, -25, and -30. A sheen from non-aqueous phase liquid was observed at on HT18-18 and HT18-19. The core colors ranged from gray, dark gray, very dark gray, black, blueish black, and dark greenish gray. Construction and cultural debris were found in HT18-02, -06, -14, -21, and -29. Peat and organic silt were found in HT18-31.

Bulk Sediment Results

From the 32 sample locations, 15 FDs and 142 sediment samples were submitted for PCB Aroclors , 34 PAHs, total Michigan metals plus iron and nickel, , and TOC analyses; 142 sediment samples and 15 FDs were submitted for percent moisture analysis; 29 sediment samples and three FDs were submitted for SEM/AVS, DRO, ORO, grain size, and cyanide analyses (Table 2-4). A summary of the screening criteria, number of exceedances, and maximum values for each constituent is provided in Table 3-1.

The APTIM Federal Services, LLC (APTIM) 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 for Superfund Organics Method Data Review (EPA 2014a) and National Functional Guidelines for Inorganic Superfund Data Review (EPA 2014b). Electronic data validation was performed within GLNPO's exchange and Evaluation System prior to review by APTIM's Quality Assurance Technical Support Program (EA 2018). 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 (EPA 2009).

3.2.2.1 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. A total of 32 surface (0-0.5 ft) samples (including FDs) were submitted for grain size analysis. Of the total samples, 21 (67 percent) were composed primarily (greater than 50 percent) of silt and clay. Silt and clay content in samples ranged from 4.2 percent (HT18-10) to 95.2 percent (HT18-09).

Four of the surface grab samples were comprised of at least 65 percent sand (HT18-10, -15, -17, and -19,), with the highest percentage (86.7 percent) at HT18-10. HT18-14 had the highest percentage of gravel in the surface grab sample (55.8 percent). The surface grab sample with the highest percentage of silt and clay was collected at location HT18-10 (95.2 percent). Particle size distribution graphs for each sample are presented in Appendix D.

3.2.2.2 Polychlorinated Biphenyl Aroclors

PCB Aroclors data and total PCB (ND = 0) concentrations are presented in Table 3-3. Figure 3-1 shows the distribution of total PCB SQG exceedances (TEC is 59.8 micrograms per kilogram [µg/kg]; PEC is 676 µg/kg) in the sampling area. Results from the surface grab samples (0- to 0.5-ft interval) are shown on the aerial photo and results from the core depth intervals are shown on the associated graphs. The most frequently detected Aroclors were Aroclor 1254 (64 detections in 157 samples, 41 percent), Aroclor 1242 (43 detections in 157 samples, 27 percent), and Aroclor 1260 (28 detections in 157 samples, 18 percent).

In the Harbortown Upstream Area, a total of five surface grab samples had PCB concentrations greater than the TEC values and no samples above the PEC (HT18-03, -05, -06, -07, and -12). The remaining locations had total PCB concentrations in the grab surface samples that were less than the TEC. The highest total PCB concentration in a surface grab sample was detected in location HT18-03 (220 µg/kg).

In the core samples, eight locations had a maximum total PCB concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-01, -08, -09, -12, -13, -14, -20, and -30). Three locations had maximum total PCB concentrations in at least one depth interval that were greater than two times the PEC (HT18-03, -05, and -07); one location had a maximum total PCB concentration in at least one depth interval that was greater than three times the PEC (HT18-06). The remaining locations had total PCB concentrations in the subsurface intervals that were each below the TEC. The highest total PCB concentration in a subsurface sample was detected in location HT18-06 within the 7.1- to 8.1-ft interval (6,000 µg/kg).

3.2.2.3 Polycyclic Aromatic Hydrocarbons

PAH data, total 17 PAHs (ND = ½ RL), and total 34 PAHs (ND= ½ RL) are presented in Table 3-4. Total 17 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 3-2 shows the distribution of total 17 PAHs SQG exceedances (TEC is 1,610 µg/kg; PEC is 22,800 µg/kg) in the Harbortown Upstream Area. Results from the surface grab samples (0- to 0.5-ft interval) are shown on the aerial photo, and results from the core depth intervals are shown on the associated graphs.

In the Harbortown Upstream Area, a total of 22 surface grab samples had total 17 PAHs concentrations between the TEC and PEC and no samples were above the PEC (HT18-01, -02, -03, -05, -06 -08, -09, -10, -11, -12, -14, -15, -16 -18, -19, -20, -21, -22, -24, -25, -26 and -29). The highest total 17 PAHs concentration in a surface grab sample was detected in location HT18-19 (14,015 µg/kg).

In the core samples, 15 locations had a maximum total 17 PAHs concentrations in at least one depth interval that was greater than the TEC and below the PEC (HT18-01, -02, -03, -05, -06, -07, -09, -11, -12, -13, -20, -24, -26, -29, and -30). Two locations had a maximum total 17 PAHs concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-14 and -27); and four locations had a maximum total 17 PAHs concentration in at least one depth interval that was greater than three times the PEC (HT18-08, -18, -19, and -25). The highest total 17 PAHs concentration in a subsurface sample was detected in location HT18-25 within the 0- to 1-ft interval (117,500 µg/kg).

3.2.2.4 Total Organic Carbon

TOC results are provided in Table 3-5. 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 2,340 mg/kg (0.23 percent) at HT18-10, to 53,100 mg/kg (5.31 percent) at location HT18-03. For the core samples, TOC ranged from 2,180 mg/kg (0.22 percent) at HT18-31 in the 2.6- to 5.7-ft interval, to 113,000 mg/kg (11.3 percent) at HT18-01 in the 5- to 7-ft interval.

3.2.2.5 Metals

Metal results were compared to respective TEC and PEC values and are presented in Table 3-5 (MacDonald et al. 2000; 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: Figure 3-3 (arsenic), Figure 3-4 (cadmium), Figure 3-5 (chromium), Figure 3-6 (copper), Figure 3-7 (iron), Figure 3-8 (lead), Figure 3-9 (mercury), Figure 3-10 (nickel), Figure 3-11 (silver), and Figure 3-12 (zinc). Results from the surface grab samples (0- to 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

Figure 3-3 shows the distribution of arsenic SQG exceedances (TEC is 9.79 mg/kg; PEC is 33 mg/kg) in the Harbortown Upstream Area. Each surface grab sample at the site had a total arsenic concentration below the TEC with the exception of HT18-01 and -05, both of which had a concentration between one and two times greater than the TEC and below the PEC (10.1 and 10.1 mg/kg, respectively). HT18-01 and -05 had the highest surface sample arsenic concentrations detected in the Harbortown Upstream Area (10.1 and 10.1 mg/kg, respectively).

For the core samples, 12 locations had a maximum arsenic concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-03, -05, -06, -09, -12, -13, -15, -18, -19, -25-, -30, and -31). One location had a maximum arsenic concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-08). The maximum subsurface arsenic concentration detected in the Harbortown Upstream Area was at HT18-08 in the 2.3- to 4.6-ft depth interval (34.1 mg/kg).

Cadmium

Figure 3-4 shows the distribution of cadmium SQG exceedances (TEC is 0.99 mg/kg; PEC is 4.98 mg/kg) in the Harbortown Upstream Area. In this area, six surface grab samples had a maximum cadmium concentration that was greater that the TEC and below the PEC (HT18-05, -08, -12, -16, -18, and -26). One surface grab sample had a maximum cadmium concentration between one and two times greater than the PEC (HT18-03). The maximum surface grab sample cadmium concentration detected in the Harbortown Upstream Area was at HT18-03 (6.1 mg/kg).

For the core samples, five locations had a maximum cadmium concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-01, -08, -11, -14, and -20). Seven locations had a maximum cadmium concentration in at least one depth interval that was one and two times greater than the PEC (HT18-05, -06, -09, -12, -18, -19, and -25); and four locations had a maximum cadmium concentration in at least one depth interval that was greater than three times the PEC (HT18-03, -07, -13, and -30). The maximum subsurface cadmium concentration detected in the Harbortown Upstream Area was at HT18-03 in the 3- to 4.6-ft depth interval (25.1 mg/kg).

Chromium

Figure 3-5 shows the distribution of chromium SQG exceedances (TEC is 43.4 mg/kg; PEC is 111 mg/kg) in the Harbortown Upstream Area. In this area, each surface grab sample maximum chromium concentration was below the TEC with the exception HT18-03 and -05, which both had a concentration between one and two times greater than the TEC and below the PEC (84.6 and 57.3 mg/kg, respectively).

For the core samples, six locations had a maximum chromium concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-05, -09, -12, -13, -21, and -25). Three locations had a maximum chromium concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-06, -07, and -30); and one location had a maximum chromium concentration in at least one depth interval that was greater than two times the PEC (HT18-03). The maximum subsurface concentration detected in the Harbortown Upstream Area was at HT18-03 in the 3- to 4.6-ft depth interval (232 mg/kg).

Copper

Figure 3-6 shows the distribution of copper SQG exceedances (TEC is 31.6 mg/kg; PEC is 149 mg/kg) in the Harbortown Upstream Area. In this area, 17 surface grab samples had a maximum copper concentration that was greater that the TEC and below the PEC (HT18-03, -05, -06, -08, -09, -11, -12, -13, -16, -18, -19, -20, -23, -24, -25, -26, and -30). There were no surface grab samples that exceeded the PEC and the maximum surface grab sample copper concentration detected was at HT18-03 (113 mg/kg).

For the core samples, 12 locations had a maximum copper concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-01, -02, -06, -07, -08, -09, -11, -13, -14, -20, -29, and -30). Five locations had a maximum copper concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-03, -05, -12, -19, and -25); and one location had a maximum copper concentration in at least one depth interval that was greater two times than the PEC (HT18-18). The maximum subsurface concentration detected in the Harbortown Upstream Area was at HT18-18 in the 0- to 1.9-ft depth interval (302 mg/kg).

Iron

Figure 3-7 shows the distribution of iron SQG exceedances (TEC is 20,000 mg/kg; PEC is 40,000 mg/kg) in the Harbortown Upstream Area. In this area, 11 surface grab samples had a maximum iron concentration that was greater that the TEC and below the PEC (HT18-01, -05, -06, -08, -09, -11, -13, -23, -25, -30, and -31). No surface grab samples had maximum iron concentrations above the PEC and the maximum iron concentration found in a surface sample was at location HT18-30 (27,000 mg/kg).

For the core samples, 15 locations had a maximum iron concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-03, -05, -06, -08, -09, -11, -12, -13, -15, -18, -20, -21, -25, -27, and -30). No subsurface samples had maximum iron concentrations that exceeded the PEC and the maximum subsurface concentration detected in the Harbortown Upstream Area was at HT18-09 in the 5- to 7-ft depth interval (28,700 mg/kg).

Lead

Figure 3-8 shows the distribution of lead SQG exceedances (TEC is 35.8 mg/kg; PEC is 128 mg/kg) in the Harbortown Upstream Area. In this area, 15 surface grab samples had a maximum lead concentration that was greater that the TEC and below the PEC (HT18-03, -05, -06, -07, -08, -11, -12, -18, -19, -20, -23, -24, -26, -29, and -30). One surface grab sample had a maximum lead concentration that was greater than two times the PEC (HT18-16). The maximum lead concentration found in a surface sample was found at location HT18-16 (288 mg/kg).

For the core samples, eight locations had a maximum lead concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-01, -02, -09, -11, -14, -26, -27, and -29). Eight locations had a maximum lead concentration in at least one depth interval that was one to two times greater than the PEC (HT18-06, -07, -08, -12, -13, -20, -21,, and -30); and five locations had a maximum lead concentration in at least one depth interval that was greater than three times the PEC (HT18-03, -05, -18, -19, and -25). The maximum subsurface lead concentration detected in the Harbortown Upstream Area was at HT18-19 in the 0- to 1-ft depth interval (624 mg/kg).

Mercury

Figure 3-9 shows the distribution of mercury SQG exceedances (TEC is 0.18 mg/kg; PEC is 1.06 mg/kg) in the Harbortown Upstream Area. In this area, four surface grab samples had a maximum mercury concentration that was greater that the TEC and below the PEC (HT18-03, -05, -19, and -25). One surface grab sample had a maximum mercury concentration that was between one and two times greater that the PEC (HT18-24); and one surface grab sample had a maximum mercury concentration that was greater than two times the PEC (HT18-32). The maximum mercury concentration found in a surface sample was found at location HT18-32 (2.8 mg/kg).

For the core samples, 10 locations had a maximum mercury concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-02, -06, -07, -09, -11, -12, -13, -20, -27, and -32). Four locations had a maximum mercury concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-03, -05, -08, and -30); and three locations had a maximum mercury concentration in at least one depth interval that was greater than three times the PEC (HT18-18, -198, and -25). The maximum subsurface mercury concentration detected in the Harbortown Upstream Area was at HT18-18 in the 0- to 1.9-ft depth interval (4.8 mg/kg).

Nickel

Figure 3-10 shows the distribution of nickel SQG exceedances (TEC is 22.7 mg/kg; PEC is 48.6 mg/kg) in the Harbortown Upstream Area. In this area, fifteen surface grab samples had a maximum nickel concentration that was greater that the TEC and below the PEC (HT18-01, -02, -06, -08, -09, -11, -12, -13, -16, -18, -23, -25, -30, -31, and -32). Two surface grab samples had a maximum nickel concentration that was between one and two times greater that the PEC (HT18-03 and HT18-05). The maximum nickel concentration found in a surface sample was found at location HT18-03 (58.8 mg/kg).

For the core samples, 13 locations had a maximum nickel concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-01, -02, -08, -11, -13, -15, -17, -18, -19, -20, -24, -25, and -31). Seven locations had a maximum nickel concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-05, -06, -07, -09, -12, -27, and -30); and one location had a maximum nickel concentration in at least one depth interval that was greater than two times the PEC (HT18-03). The maximum subsurface nickel concentration detected in the Harbortown Upstream Area was at HT18-03 in the 3- to 4.6-ft depth interval (101 mg/kg).

Silver

Figure 3-11 shows the distribution of silver SQG exceedances (TEC is 1.6 mg/kg; PEC is 2.2 mg/kg) in the Harbortown Upstream Area. In this area, none of the surface grab sample silver concentrations exceeded the TEC. The maximum silver concentration found in a surface sample was found at location HT18-03 (0.72 mg/kg).

For the core samples, two locations had a maximum silver concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-05 and-19). Four locations had a maximum silver concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-06, -07, -18, and -25); and one location had a maximum silver concentration in at least one depth interval that was greater than two times the PEC (HT18-03). The maximum subsurface silver concentration detected in the Harbortown Upstream Area was at HT18-03 in the 1- to 3-ft depth interval (4.8 mg/kg).

Zinc

Figure 3-12 shows the distribution of zinc SQG exceedances (TEC is 121 mg/kg; PEC is 459 mg/kg) in the Harbortown Upstream Area. In this area, 14 surface grab samples had a maximum zinc concentration that was greater that the TEC and below the PEC (HT18-05, -06, -08, -09, -11, -12, -13, -16, -18, -23, -24, -25, -26, and -30). One surface grab sample had a maximum zinc concentration that was between one and two times greater that the PEC (HT18-03). The maximum zinc concentration found in a surface sample was found at location HT18-03 (587 mg/kg).

For the core samples, three locations had a maximum zinc concentration in at least one depth interval that was greater than the TEC and below the PEC (HT18-08, -09, and -11). Nine locations had a maximum zinc concentration in at least one depth interval that was between one and two times greater than the PEC (HT18-05, -06, -07, -12, -13, -18, -19, -25, and -30); and one location had a maximum zinc concentration in at least one depth interval that was greater than two times the PEC (HT18-03). The maximum subsurface zinc concentration detected in the Harbortown Upstream Area was at HT18-03 in the 3- to 4.6-ft depth interval (1,010 mg/kg).

3.2.2.6 Ratio of Simultaneously Extracted Metals to Acid Volatile Sulfide

A total of 29 surface grab samples and three FDs were submitted for the ratio of SEM to AVS analysis. The SEM/AVS ratio was calculated for samples from 31 of the 32 samples that were submitted for analysis but could not be calculated for HT18-14 because AVS was not detected. Three samples had an SEM/AVS ratio greater than or equal to 1 (HT18-10, -17, and -19). This indicates that metals may be bioavailable and there is potential for toxicity to benthic organisms. All SEM/AVS results are presented in Table 3-6. These data were used for derivation of the ESBTUs presented in Chapter 4.

3.2.2.7 Petroleum Hydrocarbons

Results for DRO and ORO are presented in Table 3-7. The highest concentration of DRO (C_{10}-C_{20}) was detected in the surface grab sample from location HT18-03 (930 mg/kg). The highest concentration of ORO (C_{20}-C_{36}) was also detected in the surface grab sample from HT18-03 (1,300 mg/kg).

DRO (C_{10}-C_{20}) and ORO (C_{20}-C_{36}) concentrations were summed (by location) to create a TPH concentration (TPH [DRO+ORO]) for each location. Figure 3-13 presents the distribution of TPH (DRO+ORO) results in the Harbortown Upstream Area. For the evaluation purposes of this report, TPH (DRO+ORO) sample results were compared to values of 100, 1,000, 5,000, and 10,000 mg/kg. There were no locations with TPH values greater than 5,000 mg/kg; HT18-03 was the only location with a TPH (DRO+ORO) value between 1,000 and 5,000 mg/kg; 21 locations had TPH values between 100 and 1,000 mg/kg (HT18-05, -06, -07, -08, -09, -11, -12, -14, -15, -16, -18, -19, -20, -21, -24, -25, -26, -29, -30, -31, and -32); and seven locations had a TPH value less than 100 mg/kg (HT18-01, -02, -04, -10, -13, -17, and -23).

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:

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

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 Harbortown Upstream Area:

Hydrocarbon Fraction	**Geometric Mean Log K_{ow}**	**K_{oc}**	**Final Chronic Value (µg/L)**	**Sediment Benchmark (mg/kg f_{oc})**
$C_{13} – C_{18}$ (DRO)	8.57	1.10×10^{8}	0.05[a]	5,543
$C_{19} – C_{36}$ (ORO)	11.64	8.32×10^{10}	0.0001[a]	9,883

(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.
Source: Table 6, Sediment Toxicity of Petroleum Hydrocarbon Fractions (Battelle 2007).
NOTES: f_{oc} = Fraction of organic carbon in sediment.
K_{oc} = Sediment organic carbon/water partition coefficient.
K_{ow} = Octanol-water partition coefficient.

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 SSRSLs:

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

This example calculation uses the DRO (C_{10}-C_{20}) results of FD for surface sample HT18-03 (the maximum detected result for DRO in the Harbortown Upstream Area):

$$\text{HT18-03-SURF SSRSL} = 5543 \text{ mg/kg (sediment benchmark) x } 0.0531 \text{ } (f_{oc} \text{ for HT18-03-SURF}) = 294 \text{ mg/kg}$$

Table 3-7 and Figure 3-14 (DRO) and 3-15 (ORO) present the comparison of results to the calculated DRO and ORO SSRSLs.

In the Harbortown Upstream Area, 12 locations (HT18-03, -05, -10, -12, -15, -16, -19, -20, -21, -24, -26, and -29) had DRO concentrations exceeding the SSRSL. Three locations had DRO concentrations that were between three and four times the respective SSRL (HT18-03, -19, and -29); four locations had DRO concentrations that were between two and three times the respective SSRL (HT18-10, -15, -21, and -26); and five locations had DRO concentrations that were between one and two times the respective SSRL (HT18-05, -12, -16, -20, and -24) (Figure 3-14).

Nine locations had ORO concentrations exceeding the SSRSL. Five locations had DRO concentrations that were between two and three times the respective SSRL (HT18-03, -19, -21, -26, and -29); and four locations had DRO concentrations that were between one and two times the respective SSRL (HT18-05, -10, -15, and -24) (Figure 3-15).

3.2.2.8 Cyanide

A total of 29 surface grab samples and three FDs were submitted for WAD cyanide and total cyanide analysis and the results are presented in Table 3-8. WAD cyanide was detected in five of 32 samples submitted for analysis, including FDs. WAD cyanide concentrations ranged from 0.81 mg/kg (HT18-04) to 1.3 mg/kg (HT18-03). Of the total samples submitted, five samples had concentrations that exceeded the EPA Region 5 Resource Conservation and Recovery Act (RCRA) screening value for WAD cyanide at 0.1 mg/kg (HT18-02, -03, -04, -05, and -32).

Total cyanide was detected in four of 32 samples submitted for analysis. Total cyanide concentrations ranged from 0.83 mg/kg (HT18-19) to 2.7 mg/kg (HT18-06). Of the total samples submitted, three samples had concentrations that exceeded the EPA Region 5 RCRA screening value for total cyanide at 0.1 mg/kg (HT18-06, -16, and -19).

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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 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:

$$C_{NormalizedPAHi} = \frac{C_{PAHi}}{f_{oc}}$$

$C_{NormalizedPAHi}$ = Normalized individual PAH concentration.
C_{PAHi} = Individual PAH concentration in sediment.
f_{oc} = Fraction of organic carbon in sediment.

This value was then compared to the maximum solubility of that PAH in sediment on an organic carbon basis (EPA 2003a). To be conservative, the lesser of the two values was used to calculate the PAH ESBTU. 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 Equilibrium Partitioning Sediment Benchmark for each individual PAH.

$$ESB_{PAHi} = \frac{C_{NormalizedPAHi} \text{ or } K_{max}}{C_{EC}}$$

ESB_{PAHi} = Equilibrium Partitioning Sediment Benchmark for each individual PAH.
$C_{NormalizedPAHi}$ = Normalized individual PAH concentration.
K_{Max} = Maximum solubility concentration.
C_{EC} = PAH's effective concentration in sediment (provided in Table 3-4 from EPA 2003a).

The PAH ESBTU for a sediment sample is the sum of the 34 individual PAHs' ESBTUs (Table 4-1).

$$\sum ESBTU_{FCV} = \sum_{34} ESB_{PAHi}$$

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. Calculated PAH ESBTU results for each analyzed sample are provided in Table 4-1. Results from the PAH ESBTU calculations from the Harbortown Upstream Area are presented in Figure 4-1.

In the Harbortown Upstream area, three surface grab sample locations had PAH ESBTU between 1 and 7.5 (HT18-10, -19, and -29). All the remaining surface grab sample locations had PAH ESBTU values that were less than 1.

In the core samples, 18 locations had a subsurface sample PAH ESBTU greater than 1 in at least one core depth interval. At HT18-19, the maximum PAH ESBTU value was greater than 10 in at least one subsurface depth interval; and at 17 locations, the maximum PAH ESBTU value was between 1 and 7.5 in at least one depth interval (HT19-01, -02, -03, -05, -06, -07, -08, -12, -13, -14, -18, -20, -25, -26, -27, -29, and -30).

4.2 METALS

Metal toxicity is evaluated through an indirect estimate of toxicity 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.

$$ESBTU_{Metals} = \frac{\sum SEM - AVS}{f_{oc}}$$

$ESBTU_{Metals}$	=	Metal ESBTU.
$\sum SEM - AVS$	=	Difference between sum of SEM and AVS.
f_{oc}	=	Fraction of organic carbon in sediment.

As presented in the EPA 2005 guidance, when metals ESBTUs are calculated using this method, a value less than 130 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 greater than 3,000 µmol/g_{oc} are expected to be associated with adverse effects.

ESBTU results for metals did not exceeded 130 µmol/g_{oc} in surface grab samples from any location throughout the Harbortown Upstream Area (Table 4-2).

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 SQGs to calculate concentration quotients (or hazard quotients) defined as measured sediment concentrations divided by the specific SQG 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 and 50 percent of the organisms showed a toxic effect. This could be termed the Effect Concentration for 30 or 50 percent, respectively. This means that between 50 and 70 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 and 35 percent of the organisms showed a toxic effect, again meaning that between 94 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 that 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 Harbortown Upstream 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 one-half the RL for NDs (ND = ½ RL), and total PCBs using a value of zero for the NDs (ND=0). Nine of the 17 PAHs had 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 0.03 in the 1- to 3-ft interval at location HT18-23 to 3.41 in the 7- to 8-ft interval at location HT18-06 (Table 5-1, Figure 5-1). The mean PEC-Q for each sediment sample was compared to benchmarks of 0.5, 1, and 5.

In the surface grab samples from the Harbortown Upstream Area, all the locations had mean PEC-Q values between 0 and 0.5. In the core samples, eight locations had a PEC-Q in at least one depth interval that was between one and five (HT18-03, -05, -06, -07, -08, -18, -19, and -25); five locations had a maximum PEC-Q value in at least one depth interval that was between 0.5 and 1 (HT18-09, -12, -14, -27, and -30); and the remaining locations had subsurface samples with PEC-Q values between 0 and 0.5.

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6. SPATIAL ANALYSIS TO DETERMINE HOT SPOTS WITHIN THE HARBORTOWN UPSTREAM AREA

To determine the location of hot spots within the Harbortown Upstream 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), and (3) the calculated PEC-Qs (Chapter 5). Metals ESBTU results (Section 4.2) are referenced but were not included as inputs for spatial analysis. This methodology is consistent with previous projects and facilitate direct comparison between studies (Section 6.6). 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 with a PEC, 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 classification and priority assessment of hot spots based on kriging results.

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 Earth Volumetric Studio, Version 2019.3.0.

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, these data were 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 PROBABLE EFFECT CONCENTRATION CONSTITUENTS IN THE HARBORTOWN UPSTREAM 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. Five non-continuous hot spots were identified within the study where one or more analytes were present in concentrations exceeding three times the PEC.

Figures 6-1 and 6-2 present the results for all constituents exceeding their respective PECs in the Harbortown Upstream Area. 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 is provided in the figure. The volume estimates do not include contingency or overburden; however, they are subject to the uncertainties of the study design and modeling limitations.

- ***Harbortown Upstream Hot Spot 1***—Harbortown Upstream Hot Spot 1 includes locations HT18-03, -05, -06, -07, -08, and -09. The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 413,519 cy (Figure 6-1). Constituents for which the PEC exceedances are occurring within Hot Spot 1 include total PCBs, total 17 PAHs, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc (Figure 6-2, Table 6-1). The predominant constituents contributing to the elevated concentrations are total PCBs (HT18-03 and -06), total 17 PAHs (HT18-08), cadmium (HT18-03 and 07), and lead (HT18-03, -05, and -06), which all exceed three times the PEC within Hot Spot 1. Total PCBs (HT18-05 and -07), cadmium (HT18-06), nickel (HT18-03), silver (HT18-03), and zinc (HT18-03) had concentrations exceeding two times the PEC while all other remaining constituents found in this area had concentrations below two times the PEC.

- ***Harbortown Upstream Hot Spot 2***—Harbortown Hot Spot 2 includes locations HT18-12, -13, and -14. The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 166,389 cy (Figure 6-1). Constituents for which the PEC exceedances are occurring within Hot Spot 2 include total 17 PAHs, cadmium, copper, lead, nickel, and zinc (Figure 6-2, Table 6-1). The predominant constituent contributing to the elevated concentrations is cadmium, which all exceeded three times the PEC in HT18-13 and are between one and two times the PEC in HT18-12. Lead had concentrations exceeding two times the PEC in HT18-12, and all other remaining constituents found in this area had concentrations below two times the PEC.

- ***Harbortown Upstream Hot Spot 3***—Harbortown Upstream Hot Spot 3 includes locations HT18-16, -18, -19, -20, and -21. The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 30,699 cy (Figure 6-1). Constituents for which the PEC exceedances are occurring within Hot Spot 3 include Total 17 PAHs, cadmium, copper, lead, mercury, silver, and zinc (Figure 6-2, Table 6-1). The predominant constituents contributing to the elevated concentrations are total 17 PAHs, lead, and mercury, which all exceed three times the PEC in HT18-18 and -19. Cadmium, copper, and lead had concentrations exceeding two times the PEC in other locations within Hot Spot 3, while all other remaining constituents found in this area had concentrations below two times the PEC.

- ***Harbortown Upstream Hot Spot 4***—Harbortown Upstream Hot Spot 4 includes locations HT18-24 and -25. The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 22,976 cy (Figure 6-1). Constituents for which the

PEC exceedances are occurring within Hot Spot 4 include total 17 PAHs, cadmium, copper, lead, mercury, silver, and zinc. The predominant constituents contributing to the elevated concentrations are total 17 PAHs, lead, and mercury, which all exceed three times the PEC in HT18-25 (Figure 6-2, Table 6-1). Cadmium had concentrations exceeding two times the PEC in HT18-15 while all other remaining constituents found in this area had concentrations below two times the PEC.

- ***Harbortown Upstream Hot Spot 5***—The Harbortown Upstream Hot Spot 5 included locations HT18-27, and -30. The estimated volume of sediment with constituent concentrations exceeding the PEC is approximately 201,956 cy (Figure 6-1). Constituents for which the PEC exceedances are occurring within Hot Spot 5 include Total 17 PAHs, cadmium, chromium, lead, mercury, nickel, and zinc (Figure 6-2, Table 6-1). The predominant constituent contributing to the elevated concentrations is Cadmium, which exceeds three times the PEC in HT18-30. All other remaining constituents found in this area had concentrations below two times the PEC.

6.3 MODEL RESULTS FOR POLYCYCLIC AROMATIC HYDROCARBON EQUILIBRIUM PARTITIONING SEDIMENT BENCHMARK TOXIC UNITS FOR THE HARBORTOWN UPSTREAM 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 identified when all constituents with a PEC were kriged (Section 6.2). Figure 6-3 presents the results for PAH ESBTUs exceeding 1 overlain with the Harbortown Upstream Hot Spots 1-5.

PAH ESBTU values greater than 1 are primarily in the same areas as the five hot spots that had constituents exceeding three times the PEC, identified in Section 6.2; however, some PAH ESBTU values extend upstream from Hot Spot 1 and Hot Spot 5.

6.3.1 Spatial Analysis for Polycyclic Aromatic Hydrocarbon Equilibrium Partitioning Sediment Benchmark Toxic Units in Harbortown Upstream Area

Figure 6-3 presents areas identified with elevated PAH ESBTUs, maximum PAH ESBTU values at each sample location, and the overlap of the spatial analysis for PAH ESBTUs with hot spots identified in the Harbortown Upstream Area using all PEC constituents depicted in Figure 6-1. The spatial analysis for PAH ESBTUs identified a continuous area including eight locations (HT18-01 to -08) that have ESBTU values greater than one and is located within Hot Spot 1 but extending upstream to HT18-01. A continuous area including two locations (HT18-12 and -13) and a single location (HT18-14) both have ESBTU values greater than one and are identified within Hot Spot 2. A continuous area including three sample locations (HT18-18, -19, and -20) is located within Hot Spot 3 and has PAH ESBTUs greater than one at HT18-18, and -20, and a PAH ESBTU value greater than 7.5 at HT18-19. Two individual areas (HT18-24 and -25) both have PAH ESBTU values greater than one and are located within Hot Spot 4. Finally, one continuous area including three sample locations (HT18-27, -28, -19) has PAH ESBTU values greater than one and is located in Hot Spot 5 but extending upstream toward HT18-18.

Two sample locations (HT18-10 and -26) have a PAH ESBTU value greater than one but are not included in a hot spot. Ten of 30 locations in the Harbortown Upstream Area had PAH ESBTU ratios less than 1 (HT18-09, -11, -15, -16, -17, -21, -23, -24, -31, and -32).

6.4 MODEL RESULTS FOR PROBABLE EFFECTS CONCENTRATION QUOTIENTS FOR THE HARBORTOWN UPSTREAM AREA

In addition to 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 constituents were kriged (Section 6.2). Figure 6-4 presents the results for PEC-Qs exceeding 0.5 overlain with the Harbortown Upstream Hot Spots 1-5.

6.4.1 Spatial Analysis for Probable Effects Concentration Quotients in the Harbortown Upstream Area

Figure 6-4 presents areas identified with elevated PEC-Qs, maximum PEC-Q values at each sample location, and the overlap of the spatial analysis for PEC-Qs with hot spots identified using all PEC constituents depicted in Figure 6-1. The spatial analysis for PEC-Qs identified three sample locations where sediment samples had PEC-Q values greater than 0.5 (HT18-09, -27, and -30, which correspond to Hot Spots 1, 5, and 5 respectively). Three sample locations also identified with sediment samples had PEC-Q values greater than one (HT18-05, -06, and -07, which correspond to Hot Spot 1). These areas identified with elevated PEC-Qs are all located within a hot spot and have an area less than the total hot spot identified using all PEC constituents in Section 6.2.

6.5 CLASSIFICATION OF HOT SPOTS BASED ON ALL KRIGING RESULTS IN THE HARBORTOWN UPSTREAM 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 3 – lowest impact
  - Contaminant results are ≥ 3 x PEC **OR**
  - PEC-Q ≥ 0.5, **OR**
  - ESBTU ≥ 1.

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

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

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. When determining the appropriate level classification for a contaminated area, Level 3 criteria (lowest impact) must be met before classifying a Level 2 hotspot, and Level 2 criteria must be met before classifying a Level 1 hotspot (highest impact). Because the PEC metric is the same for each hotspot level determination, if a hotspot in question has a PEC ≥ 3, the PEC-Q and ESBTU metrics will be used to determine the appropriate hotspot classification. The ESBTU metric is also the same for the Level 2 and Level 1 hotspot determination, so if a hotspot in question has an ESBTU ≥ 7.5, the PEC-Q value will be used to determine the appropriate hotspot classification. 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 three hot spot areas, presented within their respective levels. Table 6-1 presents maximum PEC exceedances in any interval for all constituents for sample locations and hot spots within the Harbortown Upstream Area. Table 6-2 presents maximum PAH ESBTUs in any interval for sample locations and hot spots within the Harbortown Upstream Area. Table 6-3 presents maximum PEC-Qs in any interval for sample locations and hot spots within the Harbortown Upstream Area.

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. Level 2 criteria must be met before classifying a Level 1 hotspot (highest impact). There are no Hot Spots within the Harbortown Upstream area that are classified as Level 1 Hot Spots.

6.5.2 Level 2 Hot Spots

To be considered Level 2, 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 1, or an ESBTU equal to or greater than 7.5. Level 3 criteria (lowest impact) must be met before classifying a Level 2 hotspot. Harbortown Upstream Hot Spots 1, 3, and 4 all meet the Level 2 criteria.

6.5.2.1 Harbortown Upstream Hot Spot 1

The Harbortown Upstream Hot Spot 1 includes six sample locations (Figure 6-2, Table 6-1). The COCs exceeding three times the PEC for this hot spot area are total 17 PAHs, total PCBs, and two metals (cadmium and lead).

Total 17 PAHs concentrations exceeded three times the PEC at HT18-8 and did not exceed the PEC in any other location within Hot Spot 1 (Figure 6-2). Of the intervals analyzed, total 17 PAHs concentrations exceeding three times the PEC in Hot Spot 1 were present to a maximum depth interval of 2-4.5 ft (HT18-08). Total PCB concentrations exceeded three times the PEC at two sample locations (HT18-03 and -06) (Figure 6-2, Table 6-1). Of the intervals analyzed, total PCB concentrations exceeding three times the PEC in Hot Spot 1 were present to a maximum depth interval of 7-8 ft (HT18-06). Cadmium concentrations exceeded three times the PEC at two sample locations (HT18-03 and -07). Of the intervals analyzed, cadmium concentrations exceeding three times the PEC in Hot Spot 1 were present to a maximum depth interval of 1-4.8 ft (HT18-07). Lead concentrations exceeded three times the PEC at two sample locations (HT18-03 and -05). Of the intervals analyzed, lead concentrations exceeding three times the PEC in Hot Spot 1 were present to a maximum depth interval of 2.7-5.1 ft (HT18-05).

Of the six locations in Hot Spot 1, total 17 PAHs exceeded the PEC at one location (HT18-08); total PCBs exceeded the PEC at four locations (HT18-03, -05, -06, and -07; arsenic exceeded the PEC at 1 location (HT18-08); cadmium exceeded the PEC at four locations (HT18-03, -05, -06, and -07); chromium exceeded the PEC at three locations (HT18-03, -06, and -07); copper exceeded the PEC at two locations (HT18-03 and -05); lead exceeded the PEC at five locations (HT18-03, -05, -06, -07, and -08); mercury exceeded the PEC at three locations (HT18-03, -05, and -08); nickel exceeded the PEC at four locations (HT18-03, -05, -06, and -07); silver exceeded the PEC at three locations (HT18-03, -06, and -07); and zinc exceeded the PEC at four locations (HT18-03, -05, -06, and -07). No metals exceeded the PEC in HT18-04. The highest concentrations of all constituents were detected in the subsurface samples. The highest concentrations of total 17 PAHs, arsenic, and mercury were detected in HT18-08; the highest concentration of total PCBs was detected in HT18-06; and the highest concentrations of cadmium, chromium, copper, lead, nickel, silver, and zinc were detected in HT18-03.

Five sample locations in Hot Spot 1 had PAH ESBTUs between 1 and 7.5 (Figure 6-3, Table 6-2) and all six sample locations had metal ESBTUs less than 130 $\mu mol/g_{oc}$. Four sample locations in Hot Spot 1 had PEC-Q values between one and five, and one sample location had PEC-Q values between 0.5 and 1 (Figure 6-4, Table 6-3).

6.5.2.2 Harbortown Upstream Hot Spot 3

The Harbortown Upstream Hot Spot 3 includes five sample locations (Figure 6-2, Table 6-1). The COCs that exceed three times the PEC for this hot spot area are total 17 PAHs, and two metals (lead and mercury).

Total 17 PAHs concentrations exceeded three times the PEC at two locations (HT18-18 and -19) (Figure 6-2, Table 6-1). Of the intervals analyzed, total 17 PAHs concentrations exceeding three times the PEC in Hot Spot 3 were present to a maximum depth interval of 1-1.9 ft (HT18-18). Lead concentrations exceeded three times the PEC at two sample locations (HT18-18 and -19) (Figure 6-2, Table 6-1). Of the intervals analyzed, lead concentrations exceeding three times the PEC in Hot Spot 3 were present to a maximum depth interval of 0-1.9 ft (HT18-18). Mercury concentrations exceeded three times the PEC at two locations (HT18-18 and -19) (Figure 6-1, Table 6-1). Of the intervals analyzed, mercury concentrations exceeding three times the PEC in Hot Spot 3 were present to a maximum depth interval of 1-1.9 ft (HT18-18).

Of the five locations in Hot Spot 3, total 17 PAHs exceeded the PEC in two locations (HT18-18 and -19); cadmium exceeded the PEC at two locations (HT18-18 and -19); copper exceeded the PEC at two locations (HT18-18 and -19); lead exceeded the PEC at five locations (HT18-16, -18, -19, -20, and -21); mercury exceeded the PEC at two locations (HT18-18 and -19); silver exceeded the PEC at one location (HT18-18); and zinc exceeded the PEC at two locations (HT18-18 and -19). The highest concentrations of all constituents were detected in the subsurface samples. The highest concentrations of total 17 PAHs and lead were detected in HT18-19; and the highest concentrations of cadmium, copper, mercury, silver, and zinc were detected in HT18-18

One sample location (HT18-20) in Hot Spot 3 had PAH ESBTUs between 1 and 7.5 and one sample location (HT18-19) had PAH ESBTUs exceeding 10 (Figure 6-3, Table 6-2). No sample locations had metal ESBTUs greater than 130 $\mu mol/g_{oc}$ and two sample locations had PEC-Q values between one and five (Figure 6-4, Table 6-3).

6.5.2.3 Harbortown Upstream Hot Spot 4

The Harbortown Upstream Hot Spot 4 includes HT18-24 and -25 (Figure 6-2, Table 6-1). The COCs exceeding three times the PEC for this hot spot area are total 17 PAHs and two metals (lead and mercury).

Total 17 PAHs concentrations exceeded three times the PEC at HT18-25. Of the intervals analyzed, total 17 PAHs concentrations exceeding three times the PEC in Hot Spot 4 were present to a maximum depth interval of 1-3 ft (HT18-25). Lead concentrations exceeded three times the PEC at HT18-25. Of the intervals analyzed, lead concentrations exceeding three times the PEC in Hot Spot 4 were present to a maximum depth interval of 1-3 ft (HT18-25). Mercury concentrations exceeded three times the PEC at HT18-25. Of the intervals analyzed, mercury concentrations exceeding three times the PEC in Hot Spot 4 were present to a maximum depth interval of 1-3 ft (HT18-25).

Of the two locations in Hot Spot 4, total 17 PAHs exceeded the PEC at HT18-25; cadmium exceeded the PEC at HT18-25; copper exceeded the PEC at HT18-25; lead exceeded the PEC at HT18-25; mercury exceeded the PEC at HT18-24 and -25; silver exceeded the PEC at HT18-25; and zinc exceeded the PEC at HT18-25. The highest concentrations of all constituents were detected in the subsurface samples. The highest concentrations of total 17 PAHs, cadmium, copper, lead, mercury, silver, and zinc were detected in HT18-25.

HT18-25 in Hot Spot 4 had PAH ESBTUs between 1 and 7.5 (Figure 6-3, Table 6-2) and both sample locations had metal ESBTUs less than 130 µmol/g_{oc}. HT18-25 samples had a PEC-Q value between one and five (Figure 6-4, Table 6-3).

6.5.3 Level 3 Hot Spots

To be considered Level 3, 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 0.5, or an ESBTU equal to or greater than 1.0. Harbortown Upstream Hot Spots 2 and 5 both meet the Level 3 criteria.

6.5.3.1 Harbortown Upstream Hot Spot 2

The Harbortown Upstream Hot Spot 2 includes three locations (Figure 6-2, Table 6-1). The COC exceeding three times the PEC for this hot spot area is cadmium. Cadmium concentrations exceeded three times the PEC at HT18-13 and is between one and two times the PEC in HT18-12. Of the intervals analyzed, cadmium concentrations exceeding three times the PEC in Hot Spot 2 were present to a maximum depth interval of 1-3 ft (HT18-13).

Of the three locations in Hot Spot 2, total 17 PAHS exceeded the PEC at one location (HT18-14); cadmium exceeded the PEC at two locations (HT18-12 and -13); copper exceeded the PEC at one location (HT18-12); lead exceeded the PEC at two locations (HT18-12 and -13); nickel exceeded the PEC at one location (HT18-12); and zinc exceeded the PEC at two locations (HT18-12 and -13). The highest concentrations of all constituents were detected in the subsurface samples. The highest concentration of cadmium was detected in HT18-13; and the highest concentrations of copper, lead, nickel, and zinc were detected in HT18-12.

All of the sample locations in Hot Spot 2 have PAH ESBTUs between 1 and 7.5 (Figure 6-3, Table 6-2) and all of the sample locations have metal ESBTUs less than 130 µmol/g_{oc}. Two sample locations have PEC-Q values between 0.5 and 1 (Figure 6-4, Table 6-3).

6.5.3.2 Harbortown Upstream Hot Spot 5

The Harbortown Upstream Hot Spot 5 includes three sample locations (Figure 6-2, Table 6-1). The COC exceeding three times the PEC for this hot spot area is cadmium.

Cadmium concentrations exceeded three times the PEC in HT18-30 (Figure 6-2, Table 6-1). Of the intervals analyzed, cadmium concentrations exceeding three times the PEC in Hot Spot 5 were present to a maximum depth interval of 7-10 ft (HT18-30).

Of the three locations in Hot Spot 5, total 17 PAHs exceeded the PEC at one location (HT18-27); cadmium exceeded the PEC at one location (HT18-30); chromium exceeded the PEC at one location (HT18-30); lead exceeded the PEC at one location (HT18-30); mercury exceeded the PEC at one location (HT18-30); nickel exceeded the PEC at two locations (HT18-27, and -30) and zinc exceeded the PEC at one location (HT18-30). No metals exceeded the PEC in HT18-29. The highest concentrations of all constituents were detected in the subsurface samples. The highest concentration of total 17 PAHs was detected in HT18-27; and the highest concentrations of cadmium, chromium, lead, mercury, nickel, and zinc were detected in HT18-30.

All three sample locations in Hot Spot 5 had PAH ESBTUs between 1 and 7.5 (Figure 6-3, Table 6-2) and each location had metal ESBTUs less than 130 µmol/g_{oc}. One sample in Hot Spot 5 had PEC-Q values between 0.5 and 1 (Figure 6-4, Table 6-3).

6.6 COMPARISON OF HARBORTOWN UPSTREAM 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 Riverbend Assessment of Contaminated Sediments (EA 2016a), Harbortown Assessment of Contaminated Sediments (EA 2016b), and 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, five hot spots have been identified in the Harbortown Upstream Area. No Hotspots were designated as Level 1, three were designated as Level 2, and two were designated as Level 3. The five Hot Spots (Level 2 and Level 3) would be identified as high impact hot spots under the criteria utilized in the Celeron Island Area characterization and would be identified as major hot spots according to the criteria applied in the River Rouge/Ecorse Shoreline characterization because they all had concentrations exceeding three times the respective PEC. 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 using the same criteria as the Harbortown designations (EA 2015).

Three hotspots were identified in the Harbortown Area, two of which are designated as Level 1, and one of which is designated as Level 3. The two Level 1 Hot Spots would be identified as high impact hot spots under the criteria utilized in the Celeron Island Area characterization and would be identified as major hot spots according to the criteria applied in the River Rouge/Ecorse Shoreline characterization. The Level 3 Hot Spot in this study would be identified as a low impact Hot Spot under the criteria utilized in the Celeron Island Area characterization and an "other" Hot Spot based on criteria in the River Rouge/Ecorse Shoreline study.

Four hots spots were 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.

Of the nine hot spots identified in the Mid/Lower Trenton Channel, seven 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. CONCLUSIONS

Based on the data collected during the Harbortown Upstream Area sediment characterization, there are no Level 1 high impact hot spots. The Level 2 hot spot areas with elevated concentrations of constituents are: Harbortown Upstream Hot Spots 1, 3, and 4. These Level 2 hot spots have an estimated total of approximately 466,194 cubic yard (cy) of sediment with constituent concentrations meeting the Level 2 criteria.

The Level 3 hot spot areas with elevated concentrations of constituents are: Harbortown Upstream Hot Spots 2 and 5. These Level 3 hot spots have an estimated total of approximately 368,345 cubic yard (cy) of sediment with constituent concentrations meeting the Level 3 criteria.

The five hot spots identified in the Harbortown Upstream Area were determined to be Level 2 or 3 hot spots and should be considered for further investigation. Model results indicated that three of these five areas have (Level 2) a large volume of sediment with elevated concentrations of constituents exceeding three times respective PECs and elevated PAH ESBTUs and PEC-Qs. There is a possible correlation of elevated concentrations being associated with soft sediment; cores that were comprised primarily of fat, gray clay had fewer to no exceedances. 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 Harbortown Upstream Area. However, it should be noted that 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

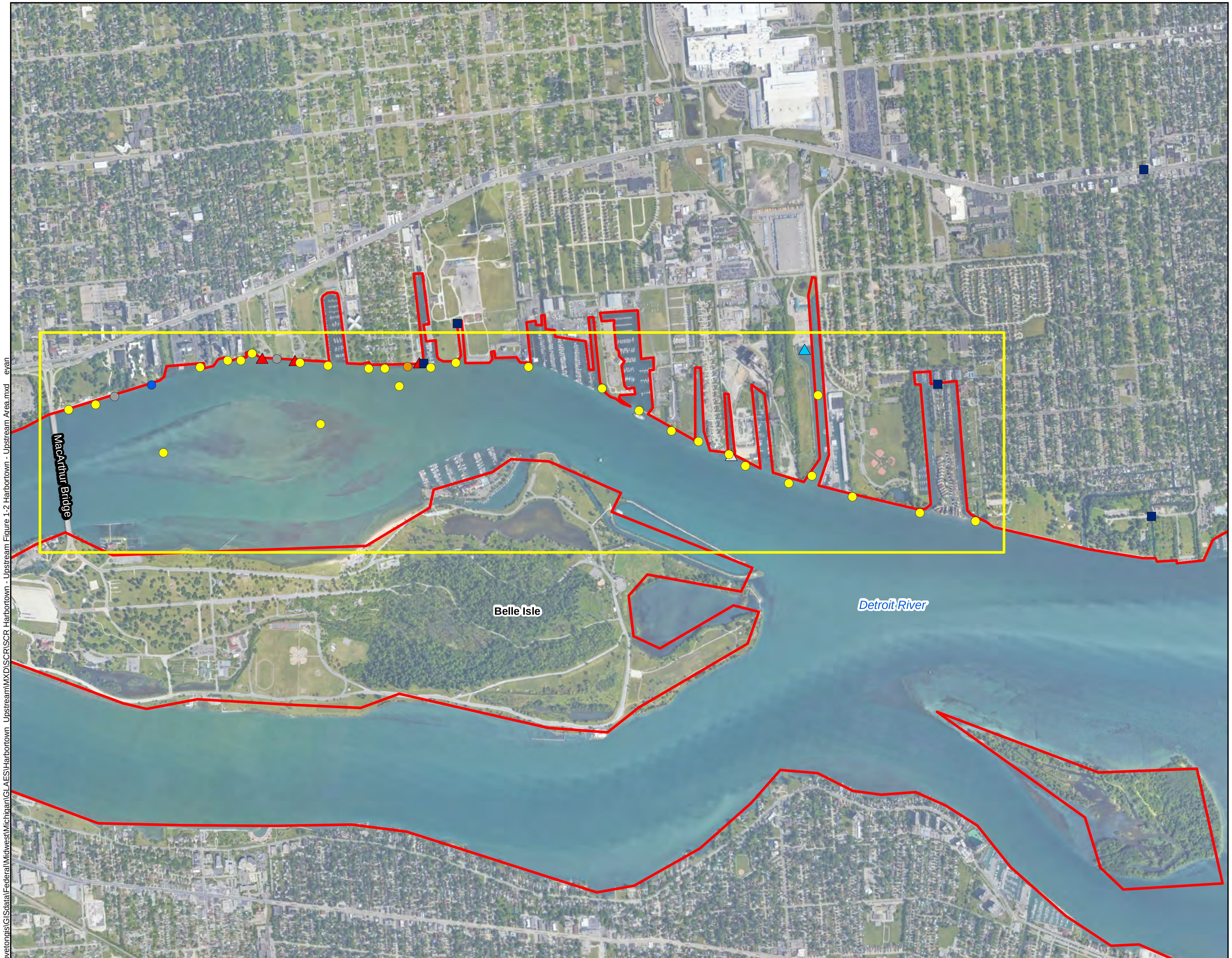
- Harbortown - Upstream Project Area
- Harbortown Project Area (EA 2016)
- Riverbend Project Area (EA 2016)
- Detroit River Area of Concern

Map Date: 5/6/2019
Source: ESRI 2017, Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

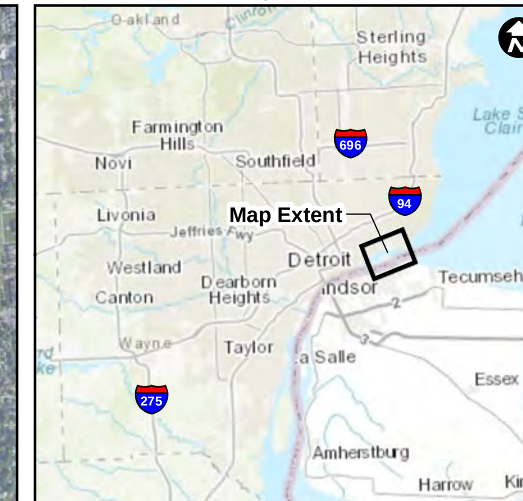
0 1 2 3 4
Miles

Figure 1-1
Project Site Location
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 1-1 Project Site Location.mxd eyan



VICINITY MAP



Legend

- Surface Sample Collected Only; Penetration Less than 1 ft
- Core Collected Only; Adequate Surface Volume Could Not Be Collected
- Ponar Surface Sample and Core Sample Location
- No Sample Collected; Location Abandoned

Combined Sewer Overflows (CSOs)

- Controlled CSO
- Uncontrolled CSO
- Historical

Industrial Outfalls

- Status Unknown
- Harbortown - Upstream Project Area
- Detroit River Area of Concern

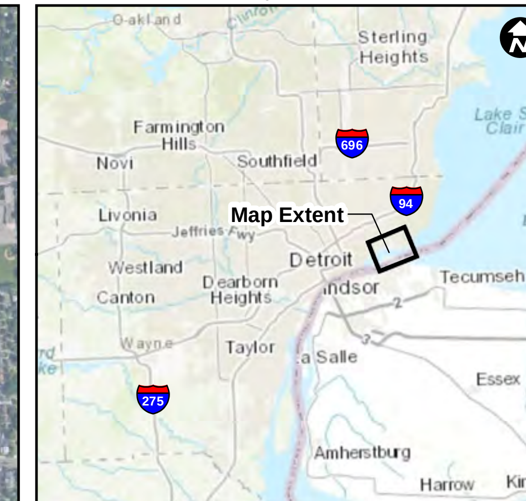
Map Date: 6/3/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 1-2
Harbortown - Upstream Area
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GIS\data\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 1-2 Harbortown - Upstream Area.mxd evan

VICINITY MAP



Legend

Combined Sewer Overflows (CSOs)

- Controlled CSO
- Uncontrolled CSO
- Historical

Industrial Outfalls

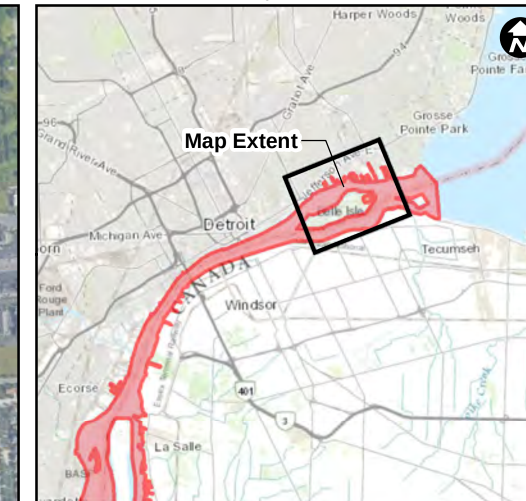
- Status Unknown
- Detroit River Area of Concern

Map Date: 6/3/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 1-3
Combined Sewer Overflows (CSOs) and Industrial Outfalls in the Harbortown - Upstream Area
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

VICINITY MAP



Legend

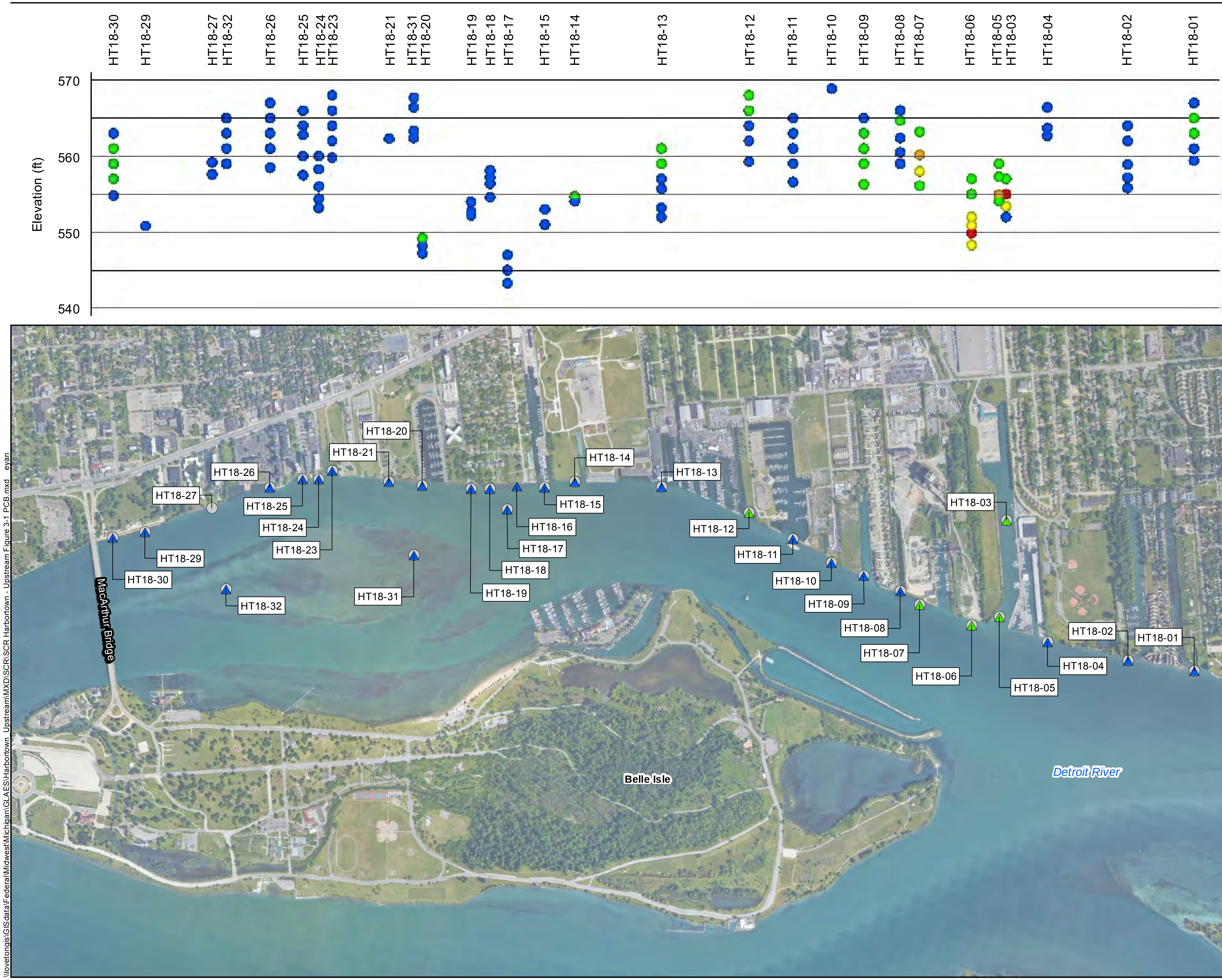
- Core Sample Location
- Ponar Surface Sample
- Location Abandoned
- Detroit River Area of Concern

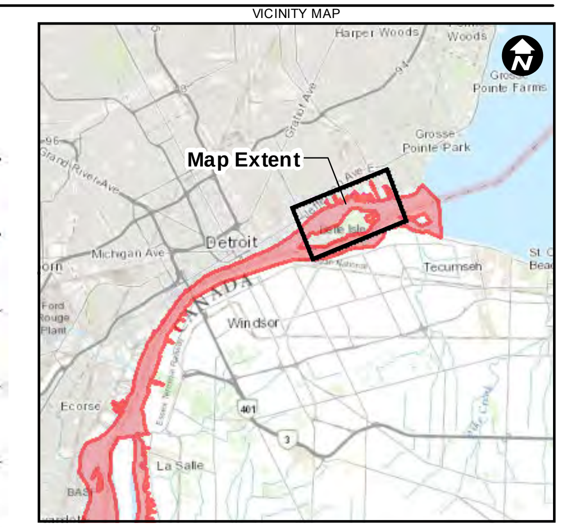
Map Date: 6/3/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 2-1
Sample Locations in the
Harbortown - Upstream Area
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GIS\data\Federal\Midwest\Michigan\GLAES\Harbortown Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 2-1 Sample Locations.mxd evan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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 PCB Aroclor (ND = 0) results.

Total PCB Aroclor Conc. (ND = 0)

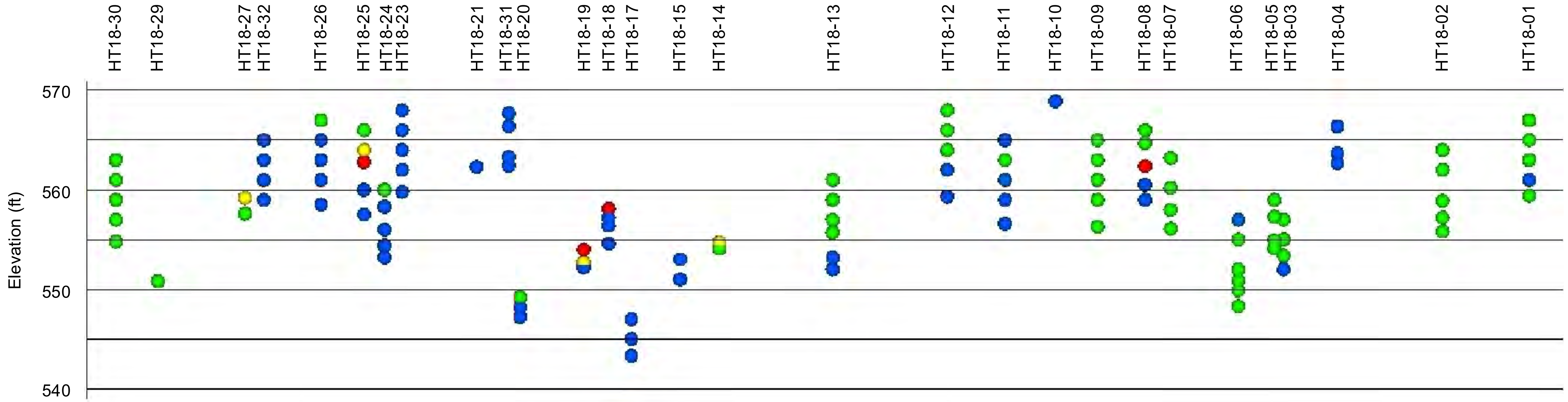
- >3x PEC (2,028 µg/kg)
- >2x PEC (1,352 µg/kg) and ≤3x PEC (2,028 µg/kg)
- >PEC (676 µg/kg) and ≤2x PEC (1,352 µg/kg)
- >TEC (59.8 µg/kg) and ≤PEC (676 µg/kg)
- ≤ TEC (59.8 µg/kg)

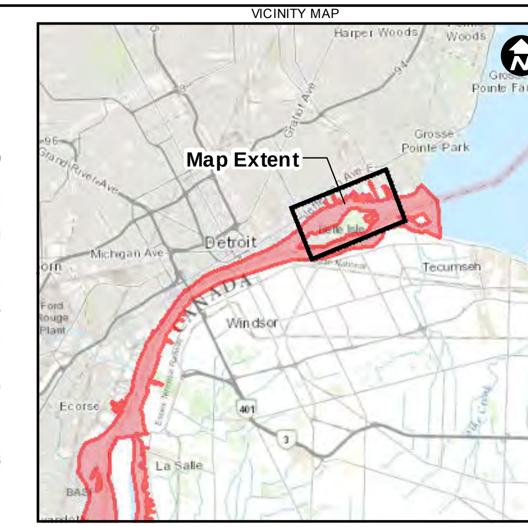
Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-1
Total PCB Aroclor (ND=0) Concentrations (µg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 3-1 PCB.mxd evan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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 17 PAH (ND = ½ RL) results.

Total 17 PAHs (ND = ½ RL) Concentrations

- >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)

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-2
Total 17 PAHs (ND= ½ RL)
Concentrations (µg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

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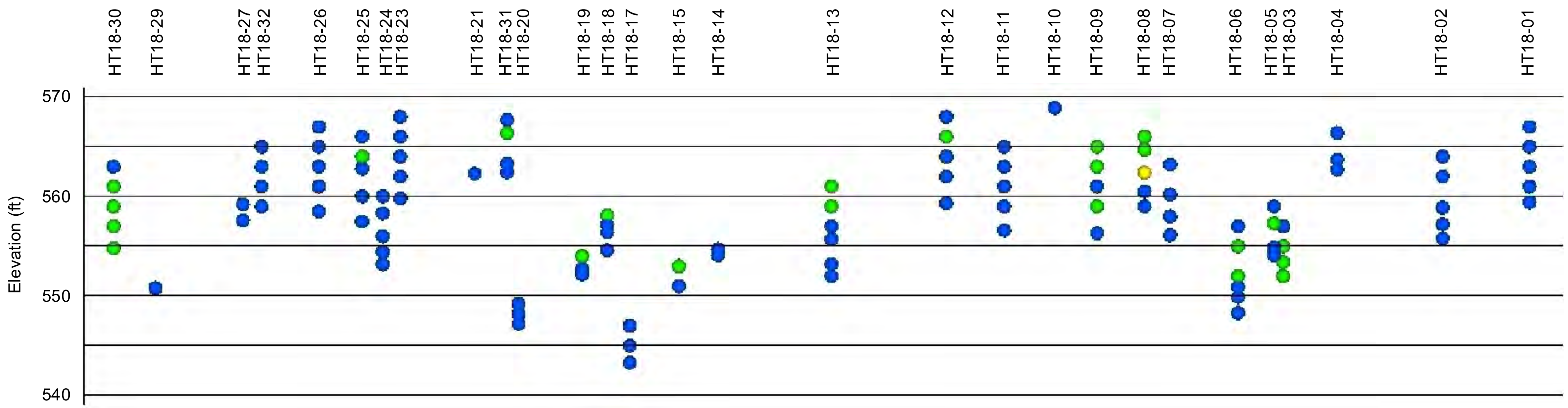

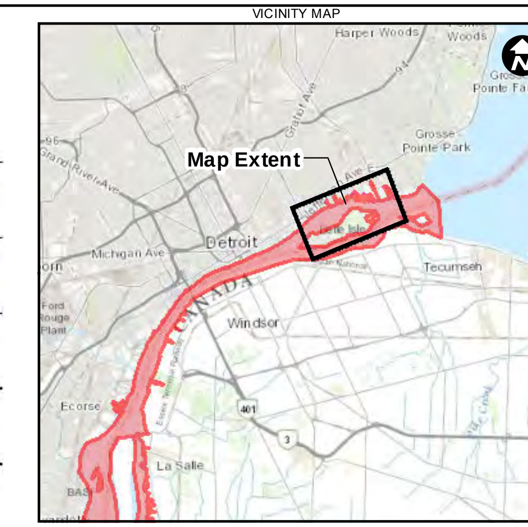

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Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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.

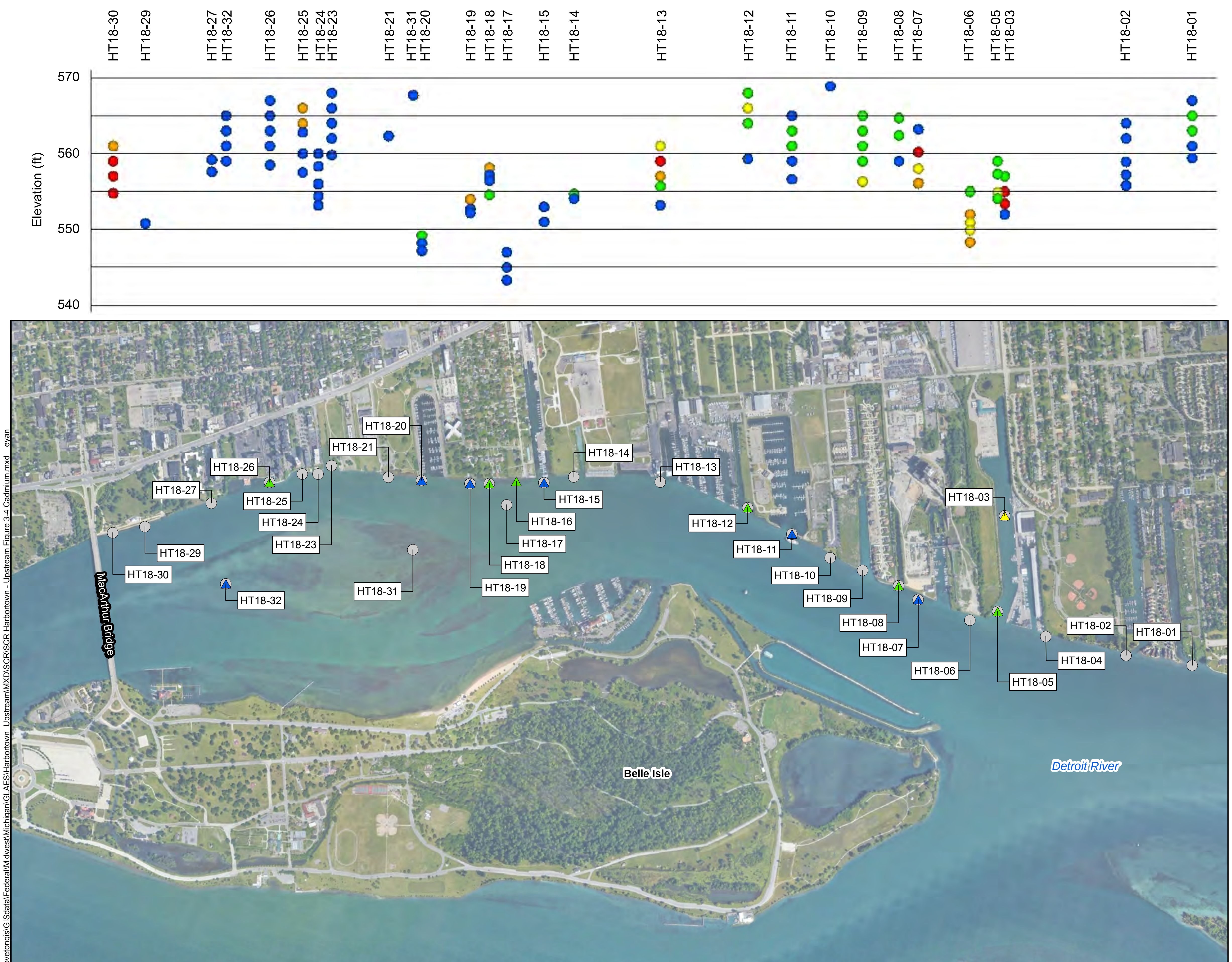
Arsenic Concentrations

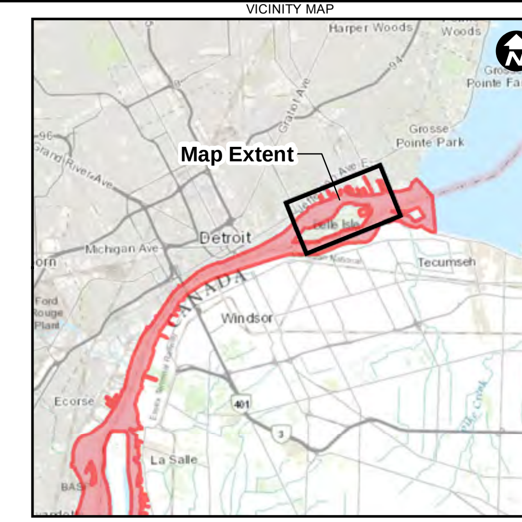
- >3x PEC (99 mg/kg)
- >2x PEC (66 mg/kg) and ≤3x PEC (99 mg/kg)
- >PEC (33 mg/kg) and ≤2x PEC (66 mg/kg)
- >TEC (9.79 mg/kg) and ≤PEC (33 mg/kg)
- ≤TEC (9.79 mg/kg)

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-3
Arsenic Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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)

Map Date: 6/4/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-4
Cadmium Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

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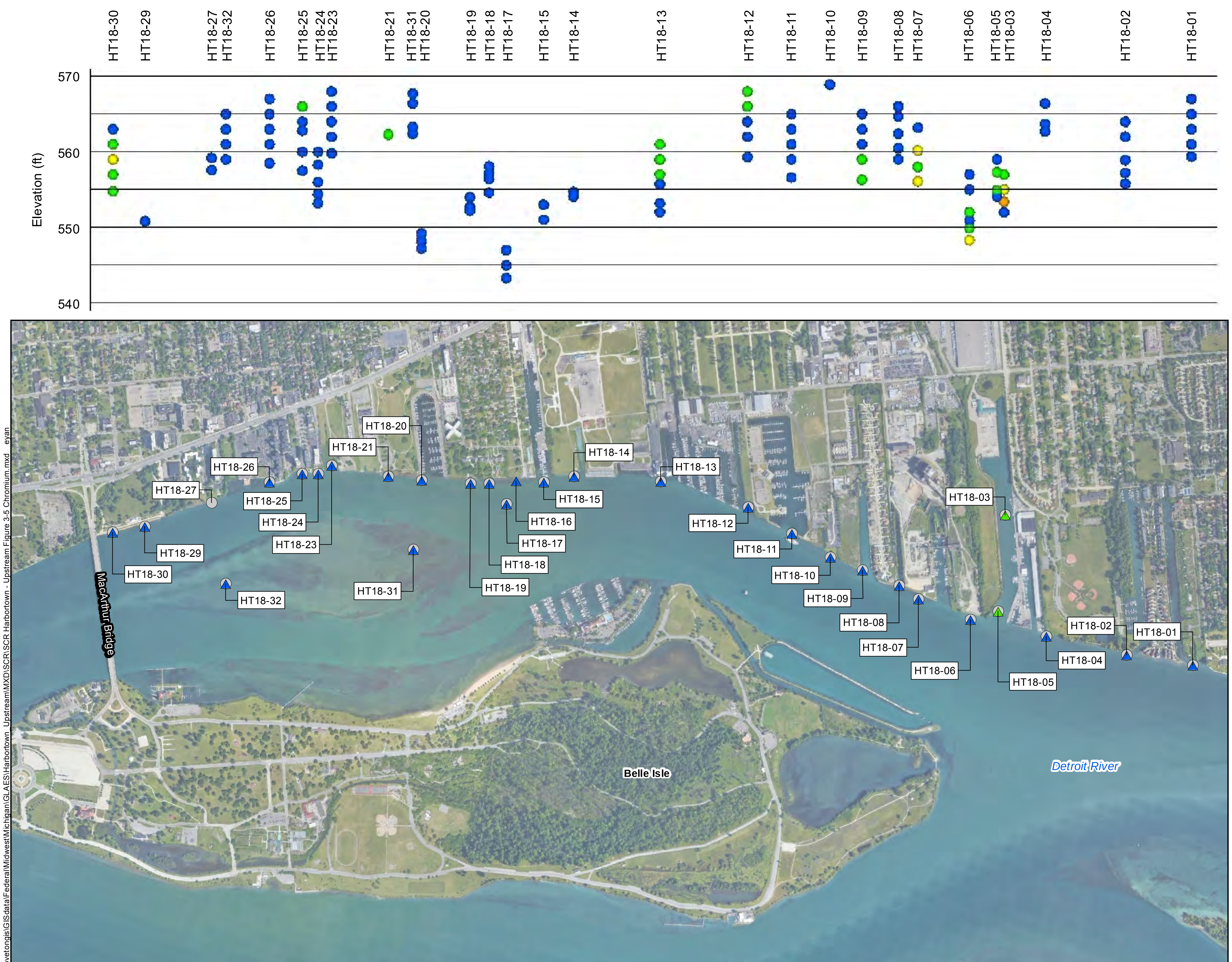
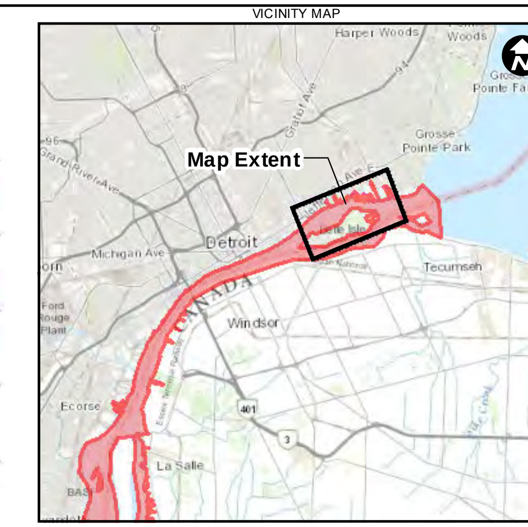




Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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.

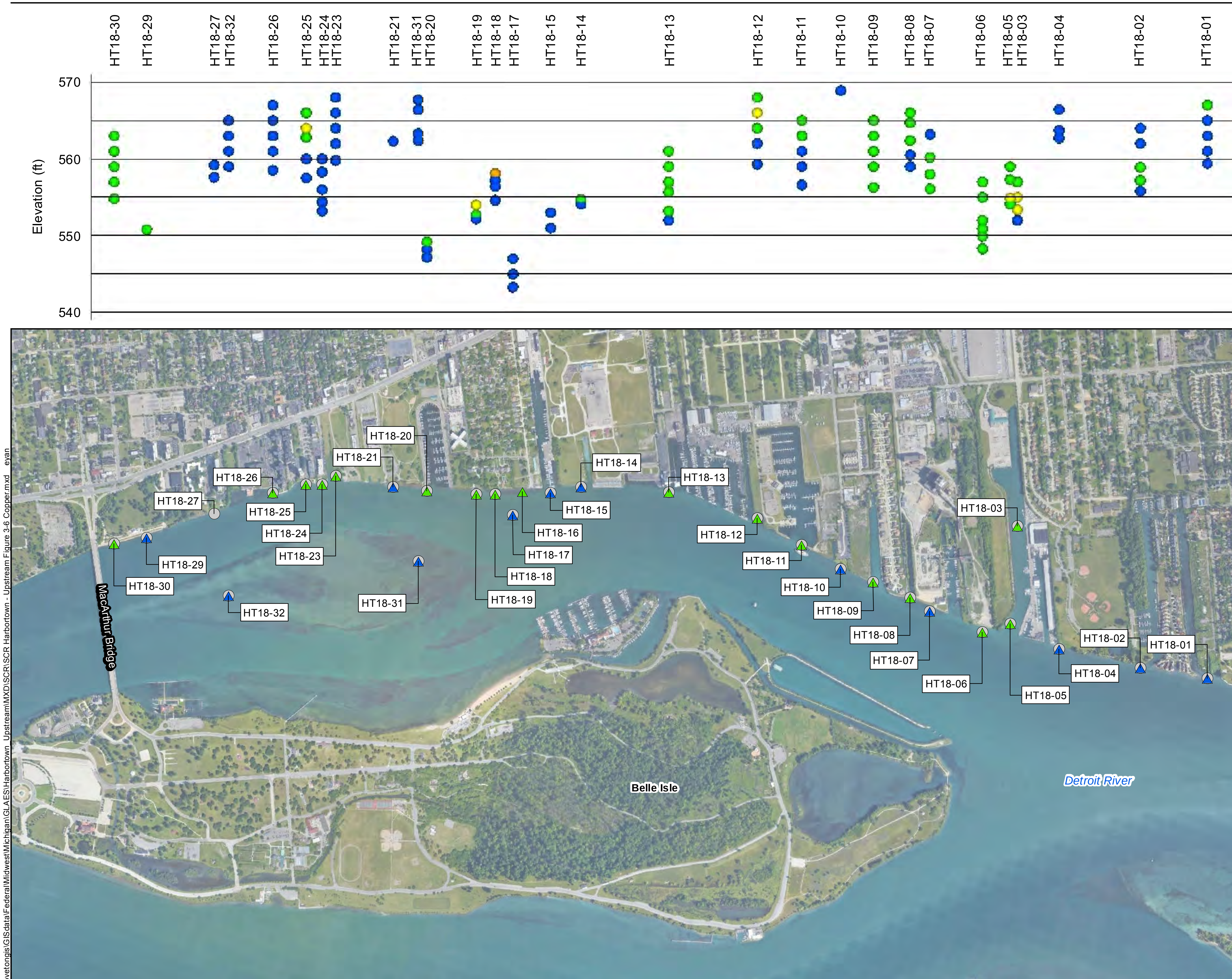
Chromium Concentrations

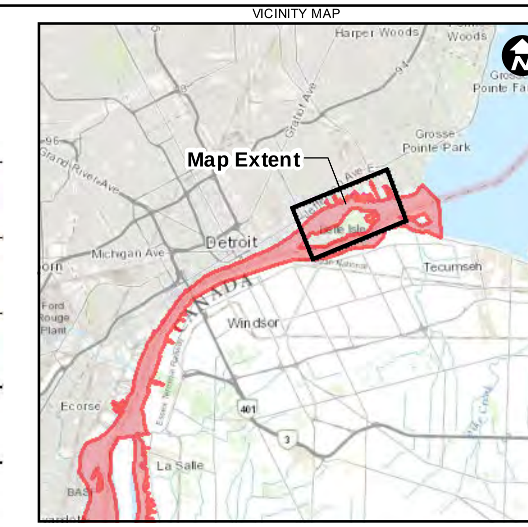
- >3x PEC (333 mg/kg)
- >2x PEC (222 mg/kg) and ≤3x PEC (333 mg/kg)
- >PEC (111 mg/kg) and ≤2x PEC (222 mg/kg)
- >TEC (43.4 mg/kg) and ≤PEC (111 mg/kg)
- ≤TEC (43.4 mg/kg)

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-5
Chromium Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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)

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-6
Copper Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

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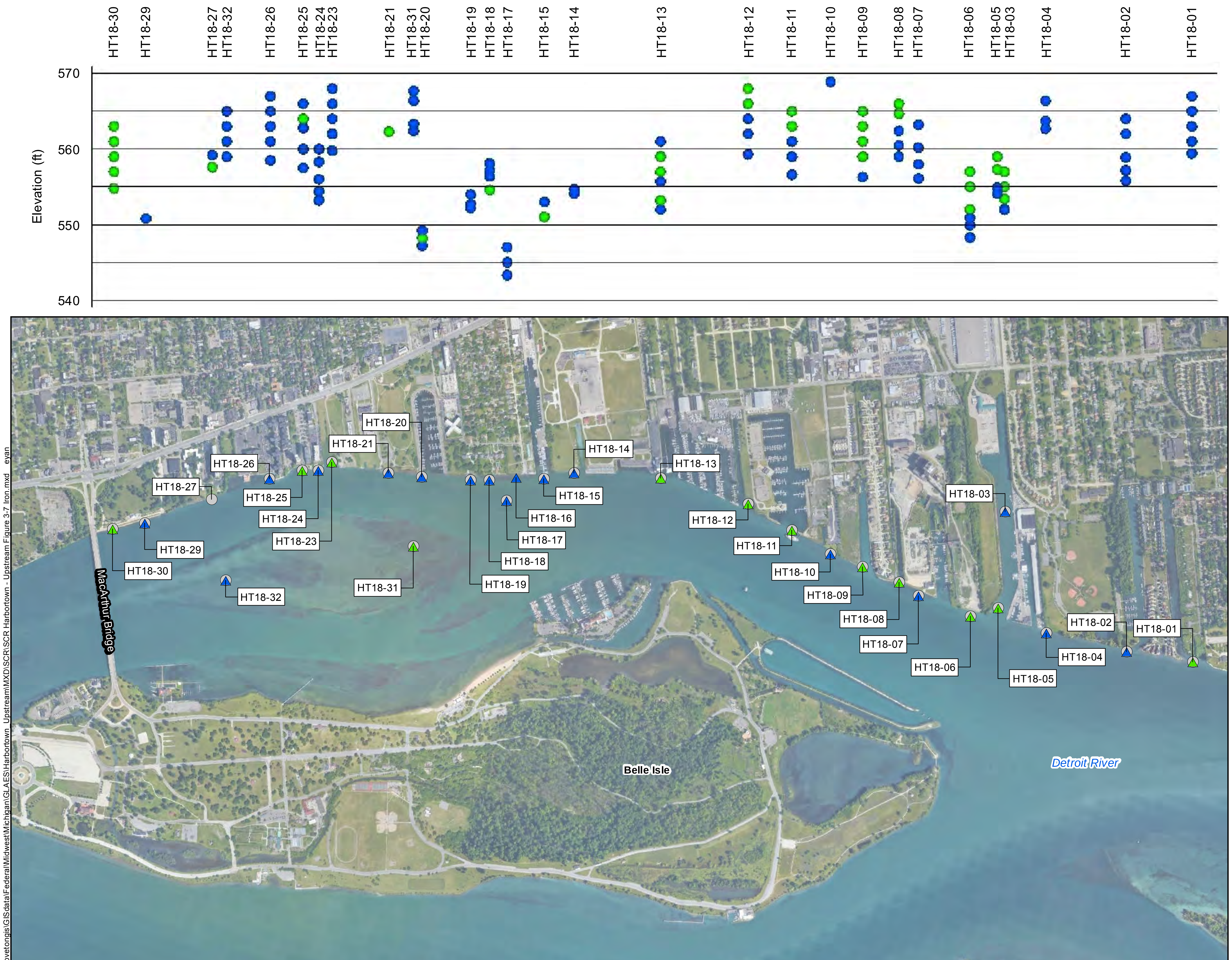
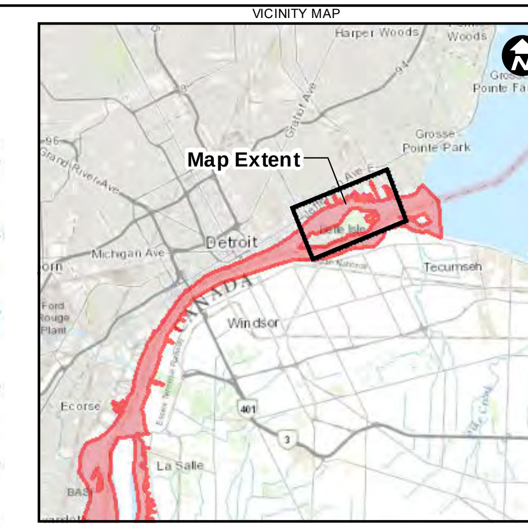




Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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.

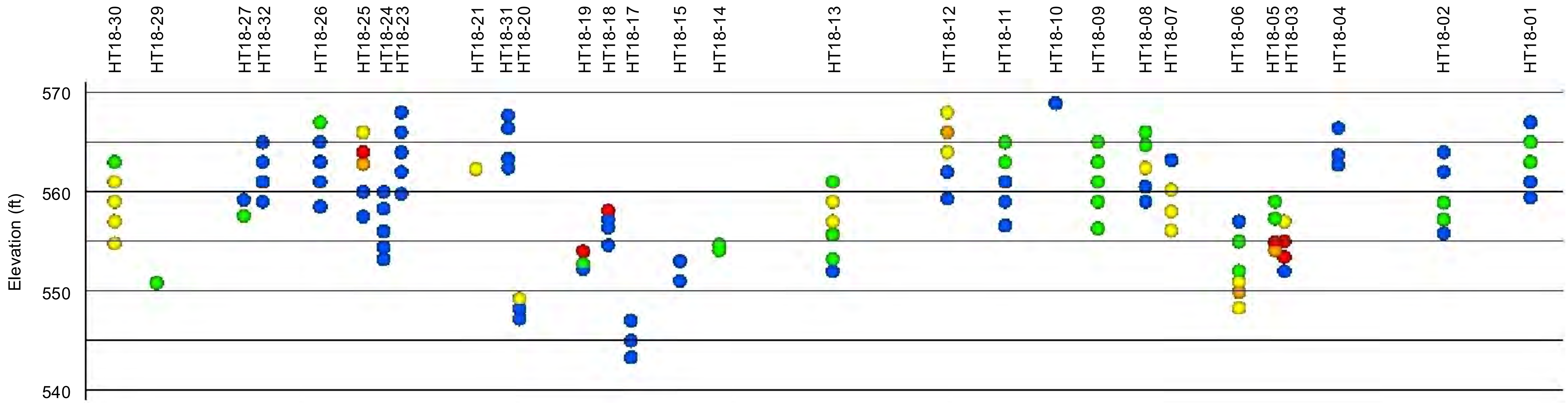
Iron Concentrations

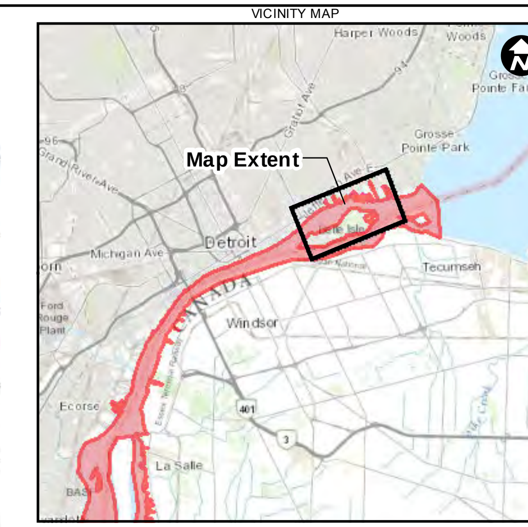
- >3x PEC (120,000 mg/kg)
- >2x PEC (80,000 mg/kg) and ≤3x PEC (120,000 mg/kg)
- >PEC (40,000 mg/kg) and ≤2x PEC (80,000 mg/kg)
- >TEC (20,000 mg/kg) and ≤PEC (40,000 mg/kg)
- ≤TEC (20,000 mg/kg)

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-7
Iron Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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

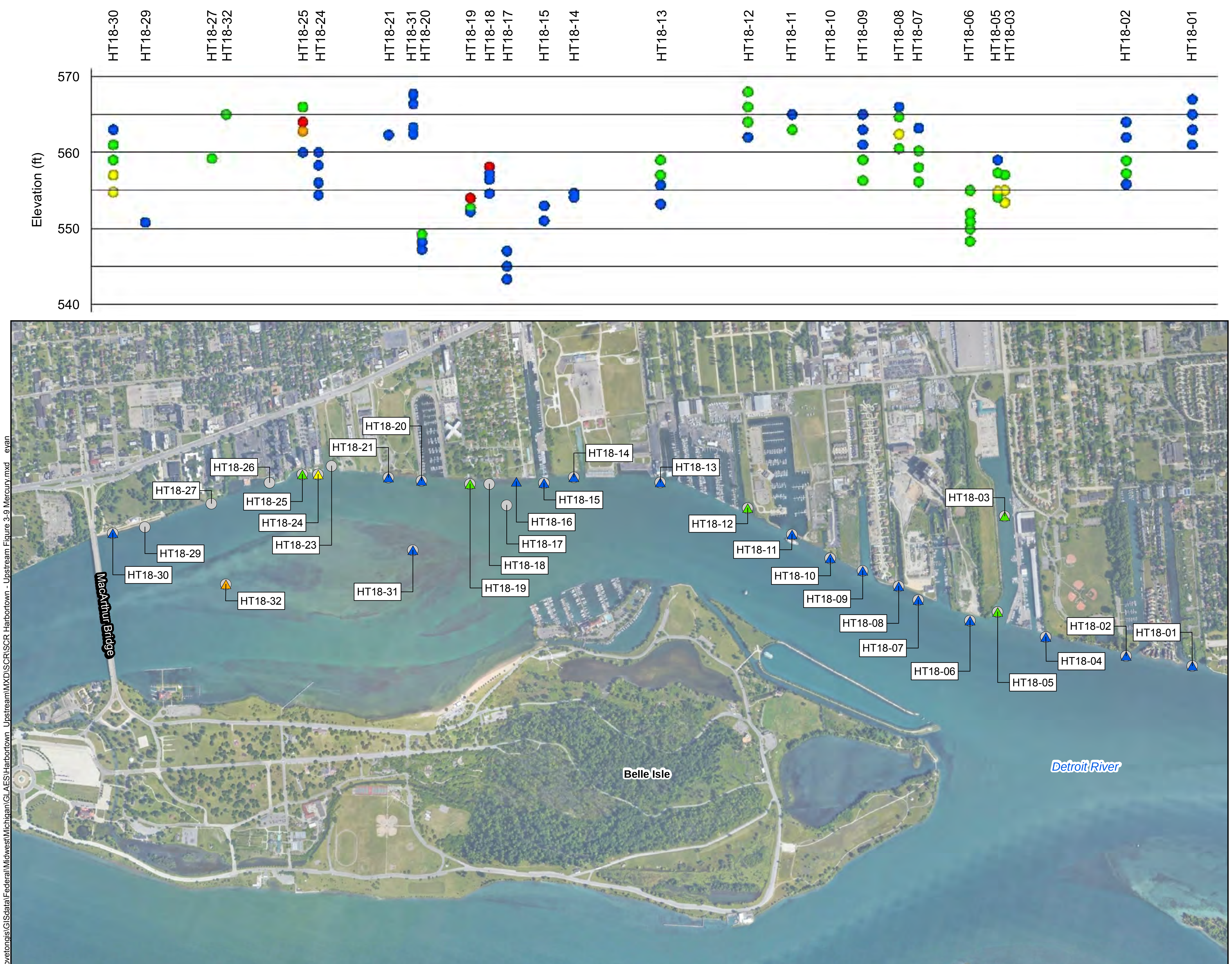
- >3x PEC (384 mg/kg)
- >2x PEC (256 mg/kg) and ≤3x PEC (384 mg/kg)
- >PEC (128 mg/kg) and ≤2x PEC (256 mg/kg)
- >TEC (35.8 mg/kg) and ≤PEC (128 mg/kg)
- ≤TEC (35.8 mg/kg)

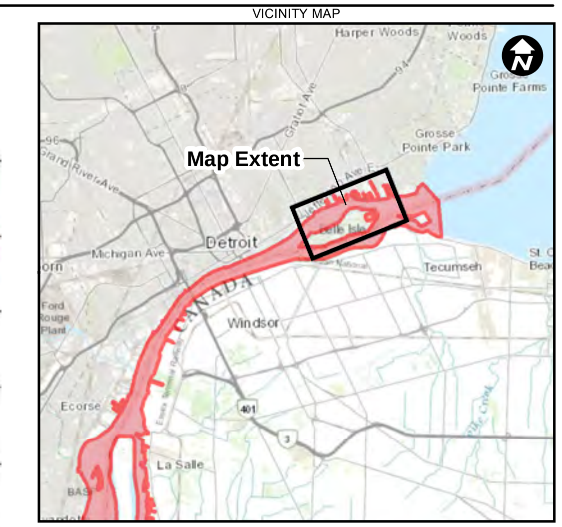
Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-8
Lead Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 3-8 Lead.mxd eyan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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.

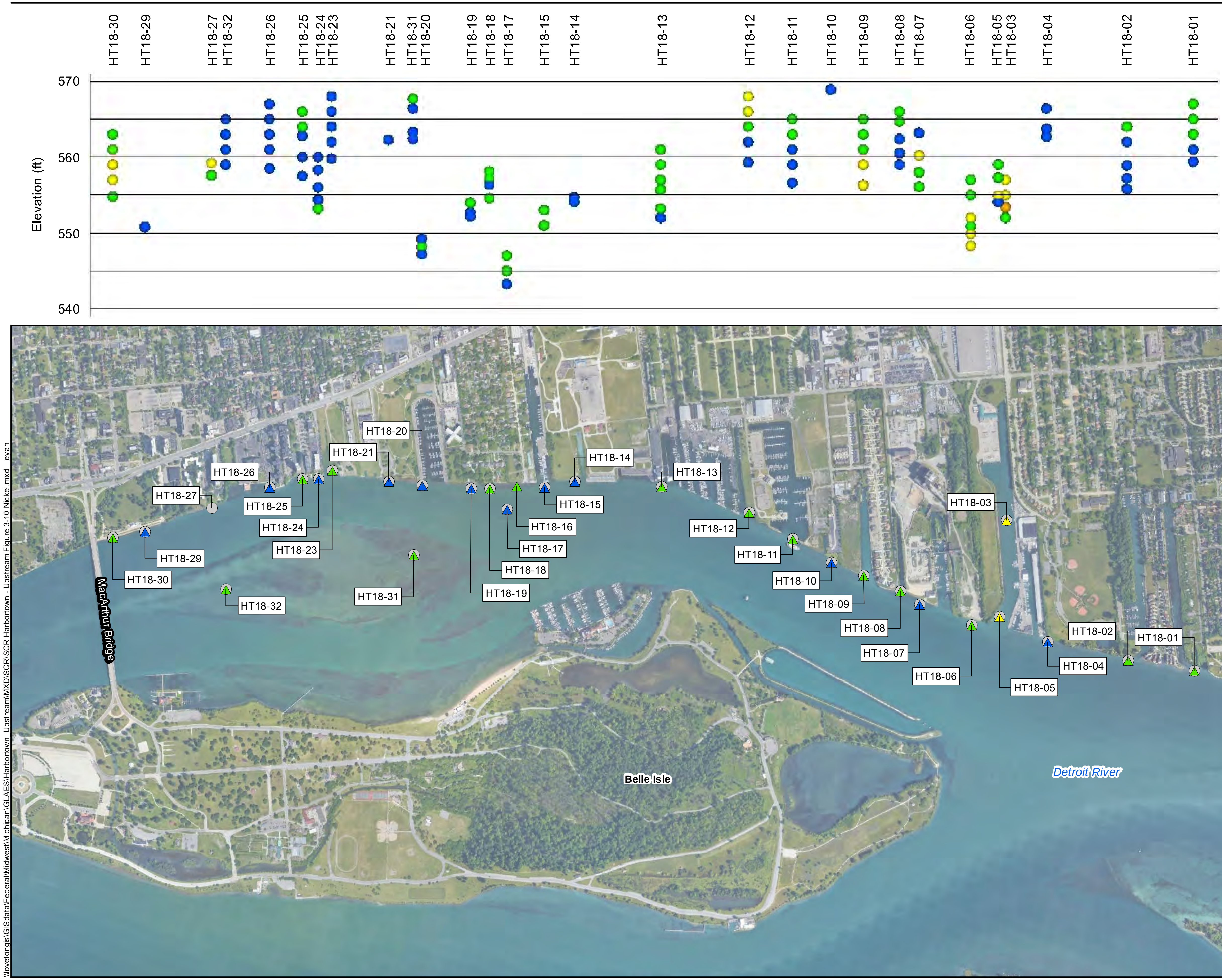
Mercury Concentrations

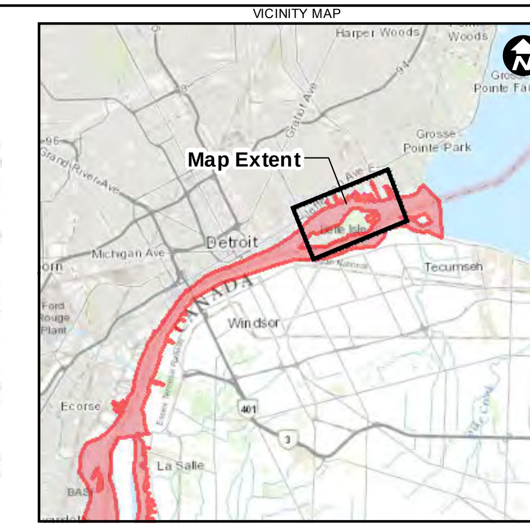
- >3x PEC (3.18 mg/kg)
- >2x PEC (2.12 mg/kg) and ≤3x PEC (3.18 mg/kg)
- >PEC (1.06 mg/kg) and ≤2x PEC (2.12 mg/kg)
- >TEC (0.18 mg/kg) and ≤PEC (1.06 mg/kg)
- ≤TEC (0.18 mg/kg)

Map Date: 6/4/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-9
Mercury Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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)

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-10
Nickel Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

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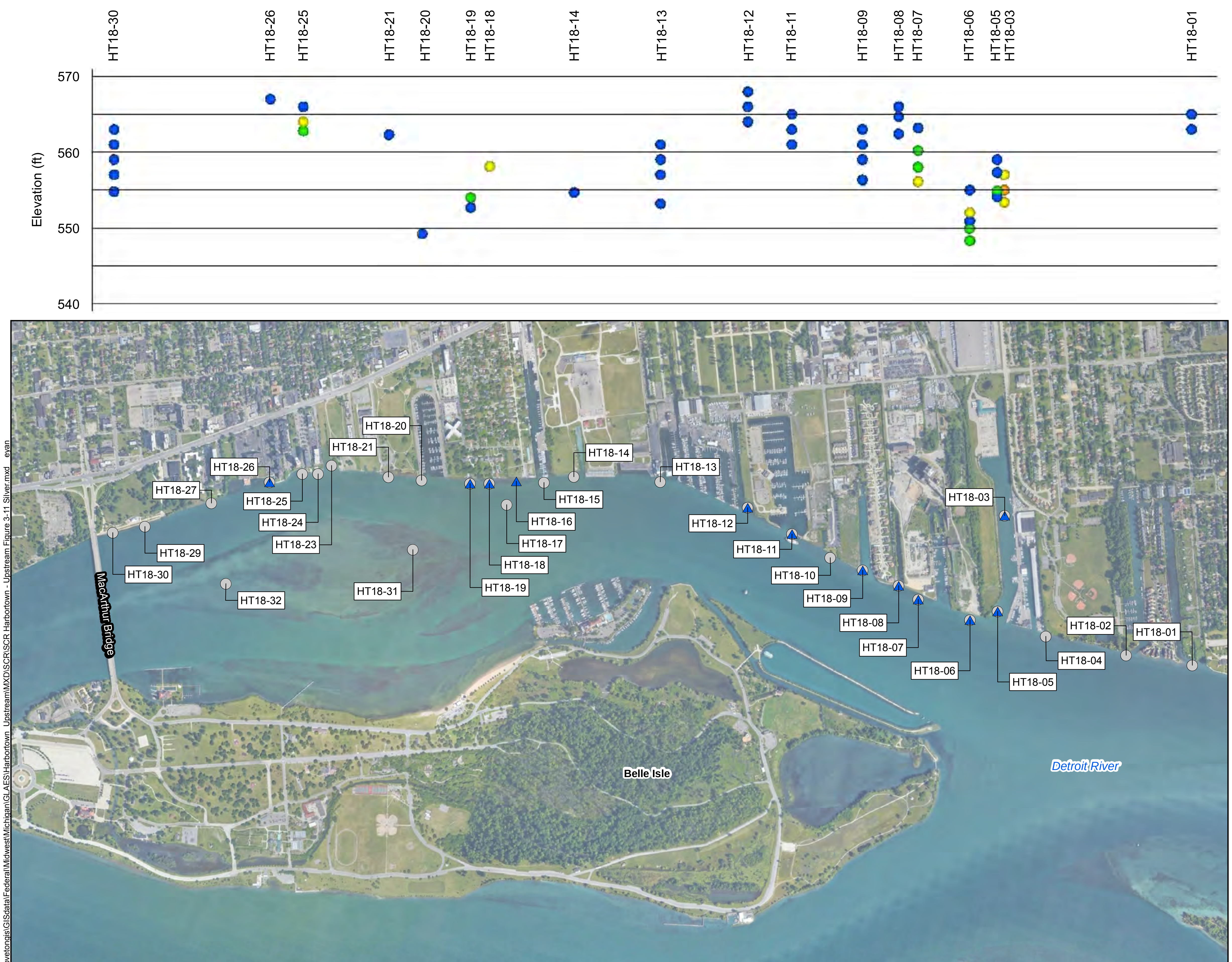
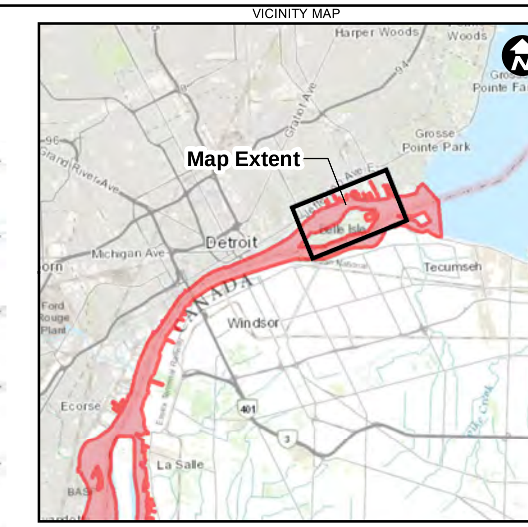




Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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.

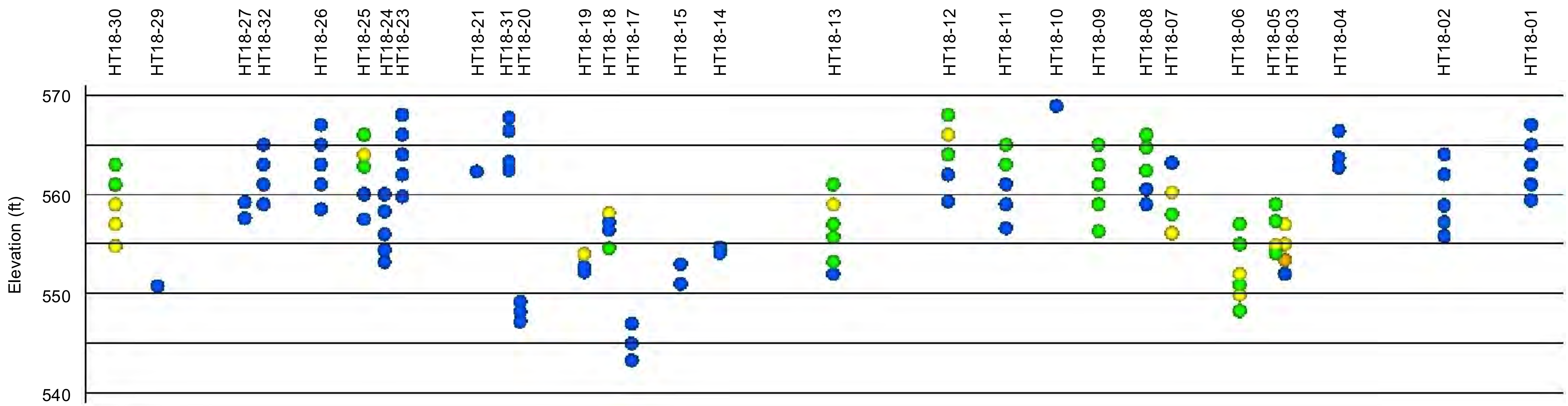
Silver Concentrations

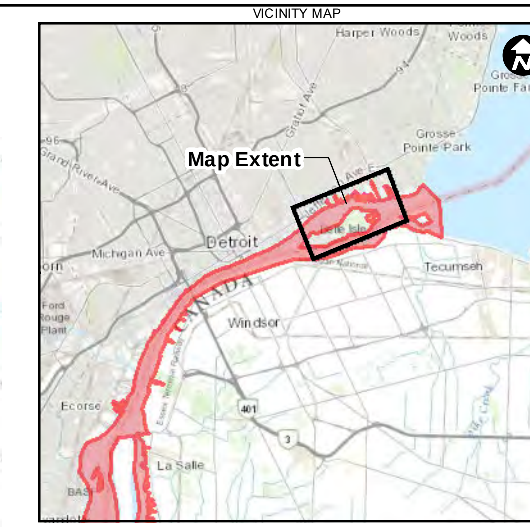
- >3x PEC (6.6 mg/kg)
- >2x PEC (4.4 mg/kg) and ≤3x PEC (6.6 mg/kg)
- >PEC (2.2 mg/kg) and ≤2x PEC (4.4 mg/kg)
- >TEC (1.6 mg/kg) and ≤PEC (2.2 mg/kg)
- ≤TEC (1.6 mg/kg)

Map Date: 6/4/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-11
Silver Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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)

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-12
Zinc Concentrations (mg/kg)
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

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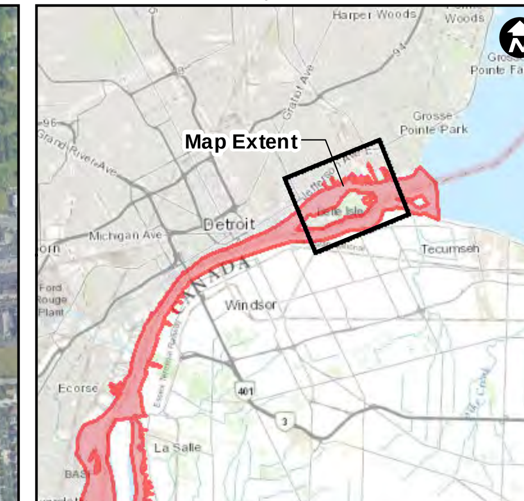
VICINITY MAP



Legend

TPH Concentrations

- >10,000 mg/kg
- ≤ 10,000 mg/kg
- ≤ 5,000 mg/kg
- ≤ 1,000 mg/kg
- ≤ 100 mg/kg
- Detroit River Area of Concern

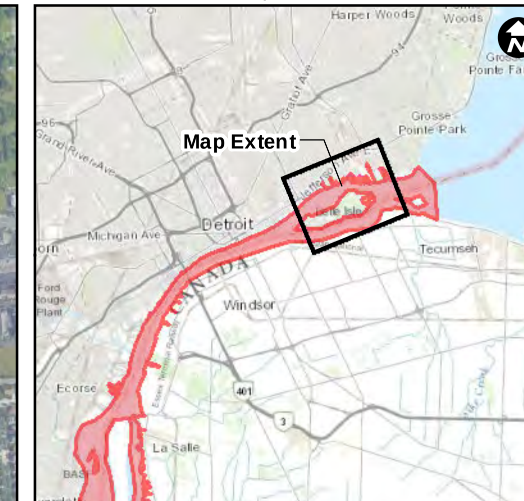
- Colored symbols on the map represent the ponar sample results (0-0.5 feet).

Map Date: 5/6/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-13
Total Petroleum Hydrocarbons (ΣDRO+ORO) (mg/kg)
Harbortown - Upstream Area
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

VICINITY MAP



Legend

Ponar Surface Sample

Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Sample results and SSRSLs are displayed on Table 3-8.
- SSRSL = Site-specific Risk Screening Level

TPH-DRO Concentrations

≥ 3x SSRSL mg/kg

≥ 2x SSRSL mg/kg

≥ 1x SSRSL mg/kg

Does Not Exceed SSRSL

Map Date: 5/6/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-14
Diesel Range Organics (mg/kg)
Harbortown - Upstream Area
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

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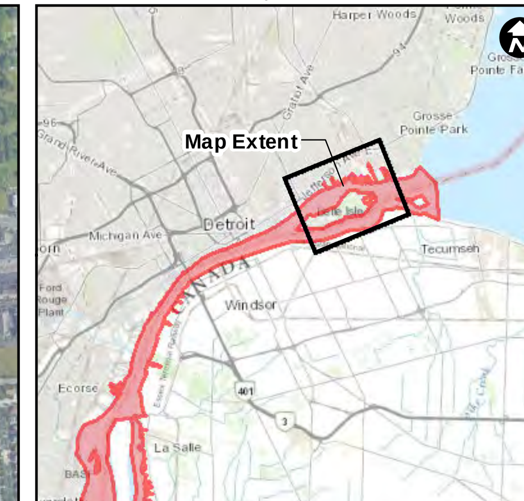
VICINITY MAP



Legend

Ponar Surface Sample

Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Sample results and SSRSLs are displayed on Table 3-8.
- SSRSL = Site-specific Risk Screening Level

TPH-ORO Concentrations

≥ 3x SSRSL mg/kg

≥ 2x SSRSL mg/kg

≥ 1x SSRSL mg/kg

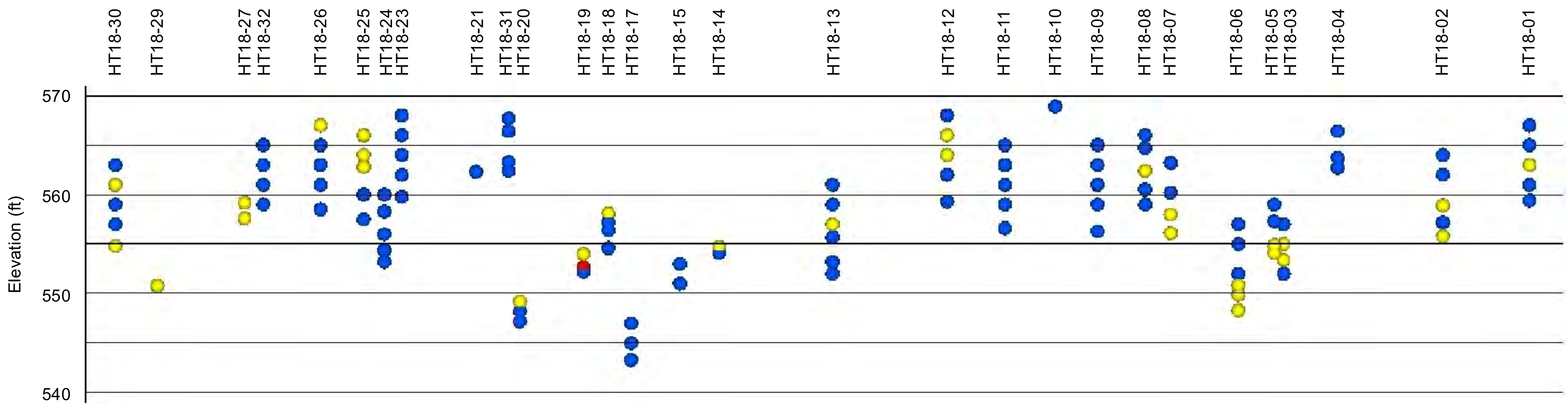
Does Not Exceed SSRSL

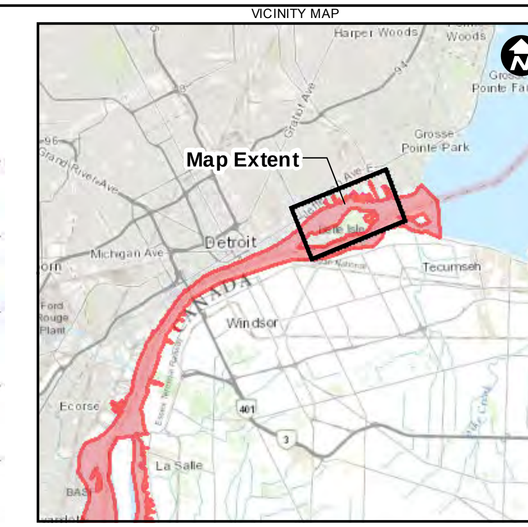
Map Date: 5/6/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 3-15
Oil Range Organics (mg/kg)
Harbortown - Upstream Area
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 3-15 TPH-ORO.mxd evan





\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 4-1 ESBTU PAH.mxd evan

Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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.

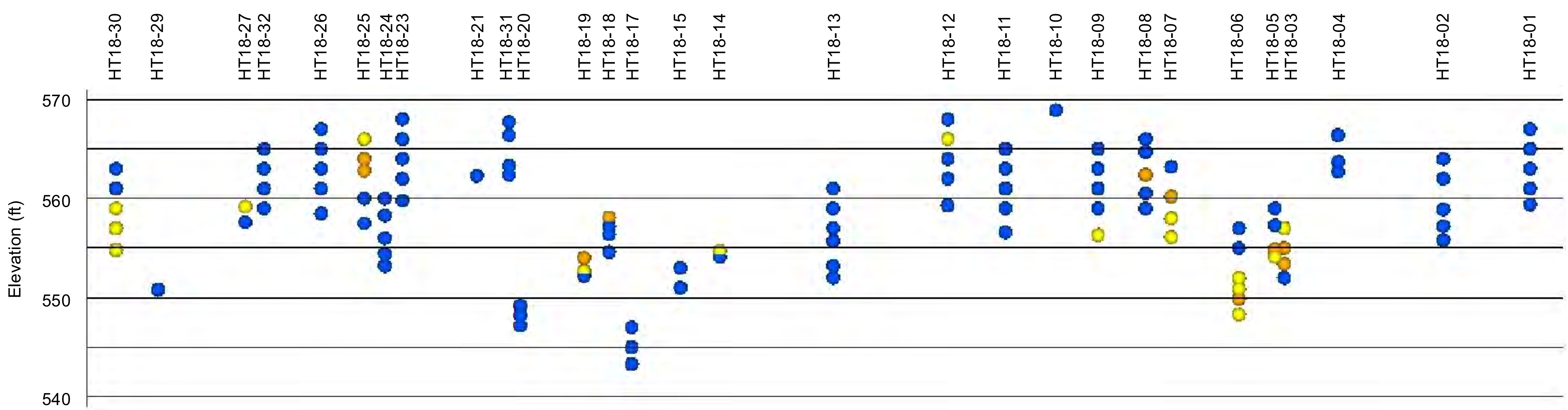
ESBTUs for PAHs

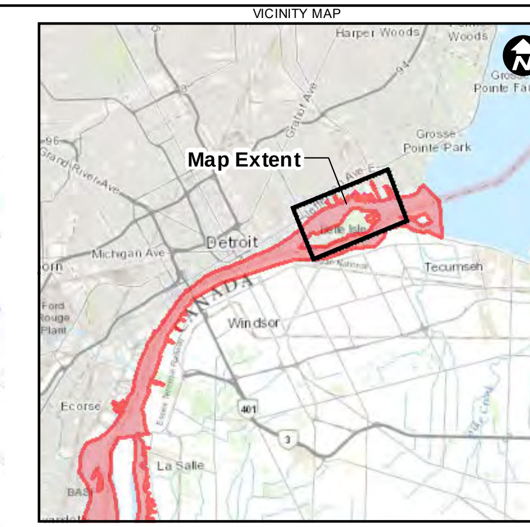
- > 10
- > 7.5 and ≤ 10
- > 1 and ≤ 7.5
- ≤ 1

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 4-1
ESBTUs for PAHs
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan





Legend

- Ponar Surface Sample
- Core Sample Location
- Detroit River Area of Concern

- Colored triangles on the map represent the ponar sample results (0-0.5 feet).
- Colored circles 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.

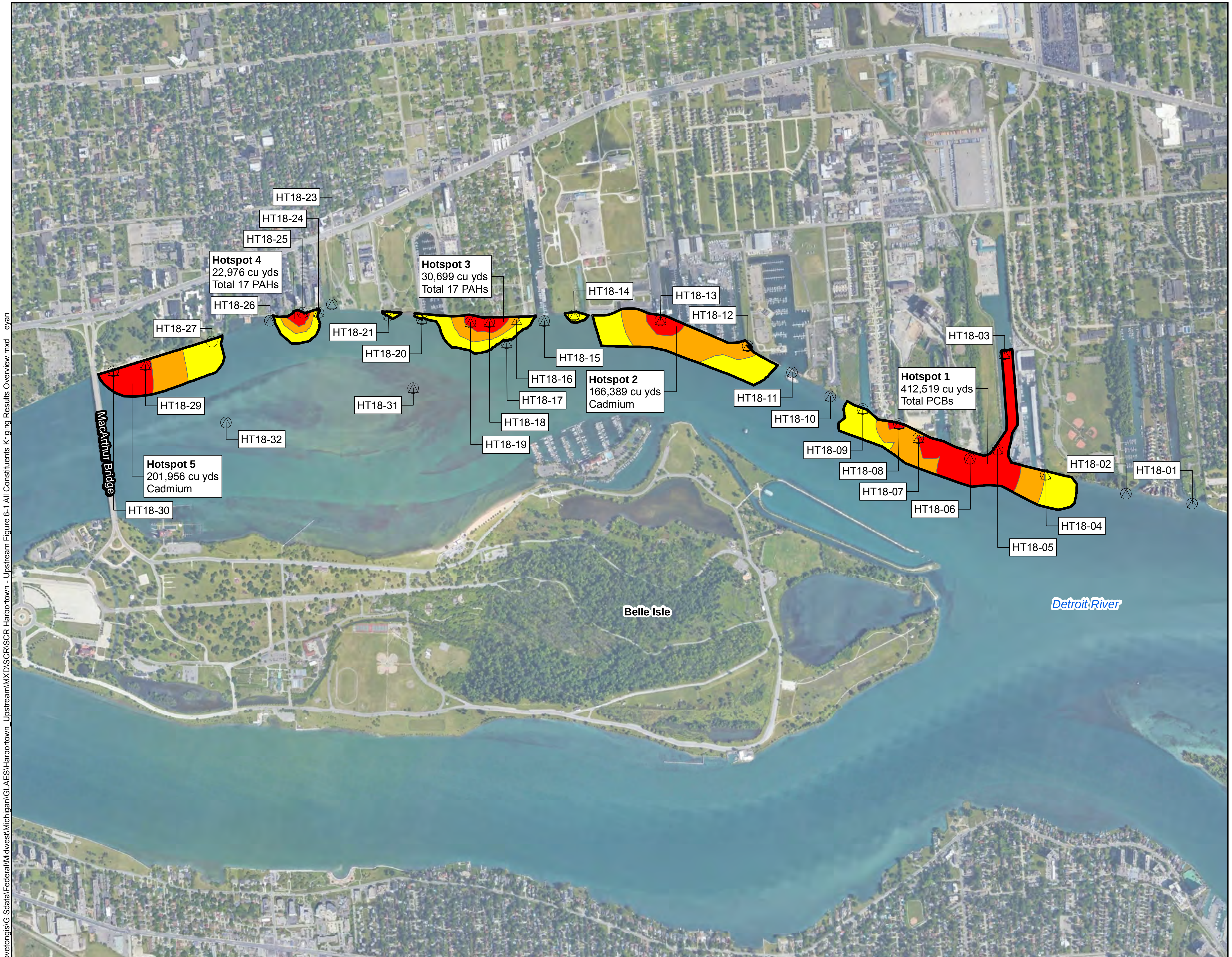
Mean PEC-Q Value (mean PEC-Q metals + PEC-Q Total PAHs + PEC-Q Total PCBs)/3

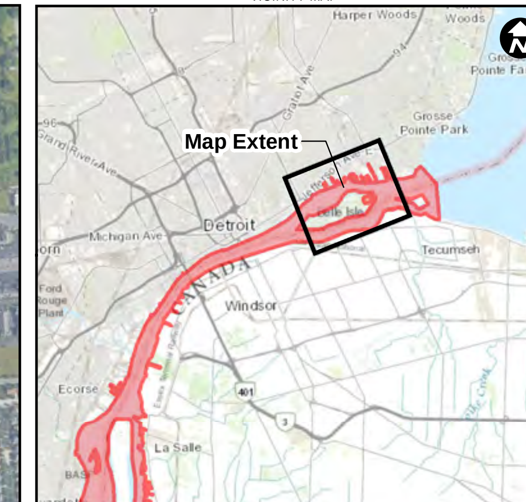
- > 5
- > 1 and ≤ 5
- > 0.5 and ≤ 1
- ≤ 0.5

Map Date: 5/1/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 5-1
PEC-Qs
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan





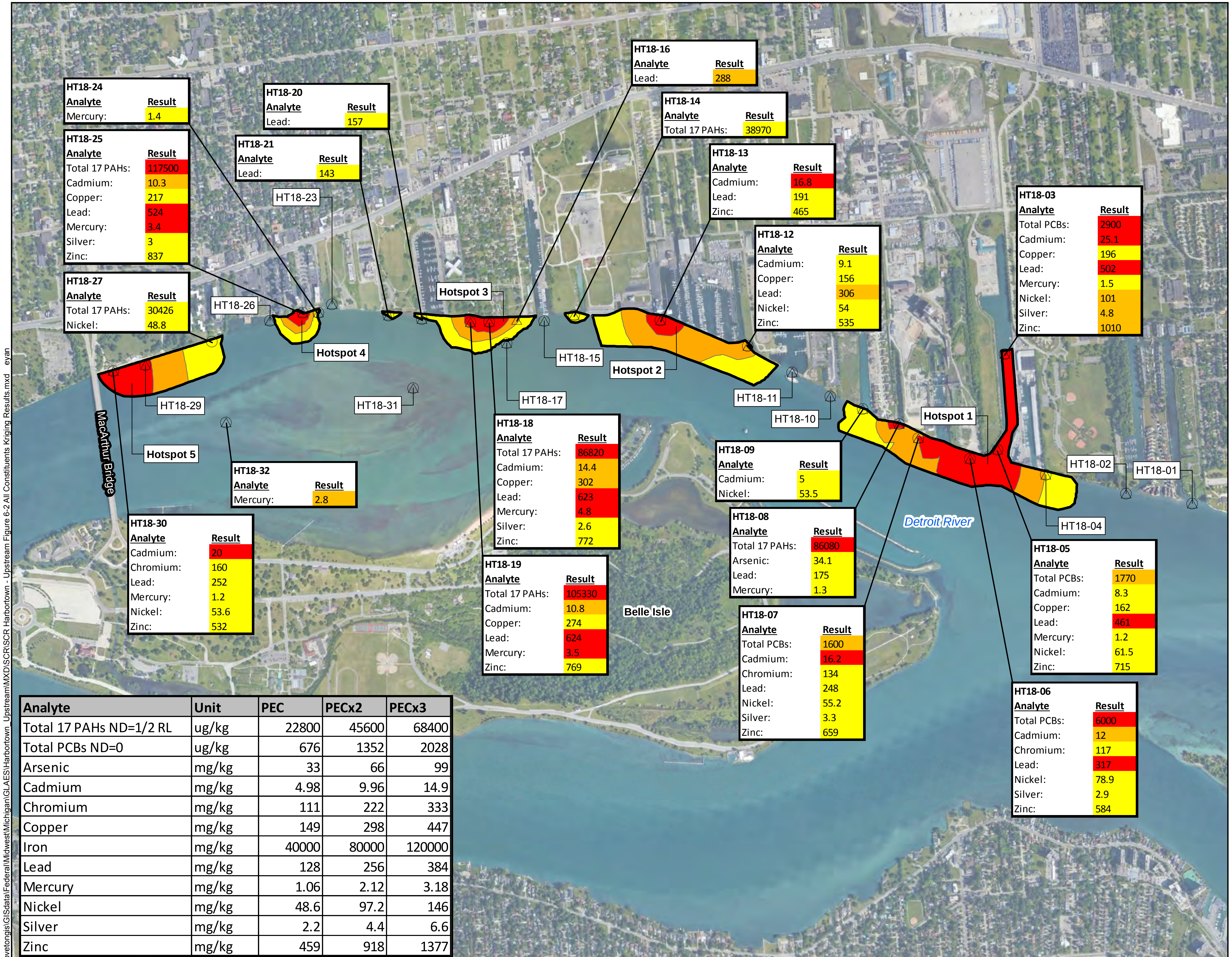
Legend

- ○ Core Sample Location
- △ Ponar Surface Sample
- ≥ 3X PEC
- ≥ 2X PEC
- ≥ PEC
- Hot Spot Boundary All PEC Constituents

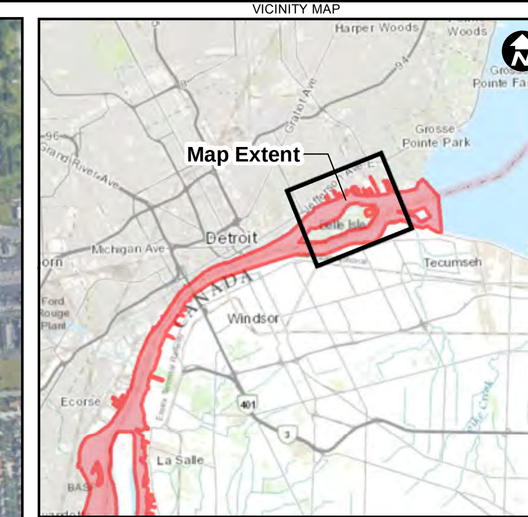
Map Date: 6/4/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

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



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



Legend

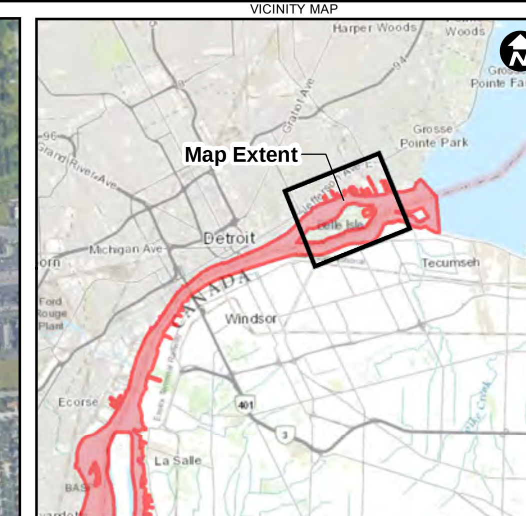
- Core Sample Location
- Ponar Surface Sample
- ≥ 3X PEC
- ≥ 2X PEC
- ≥ PEC
- Hot Spot Boundary All PEC Constituents

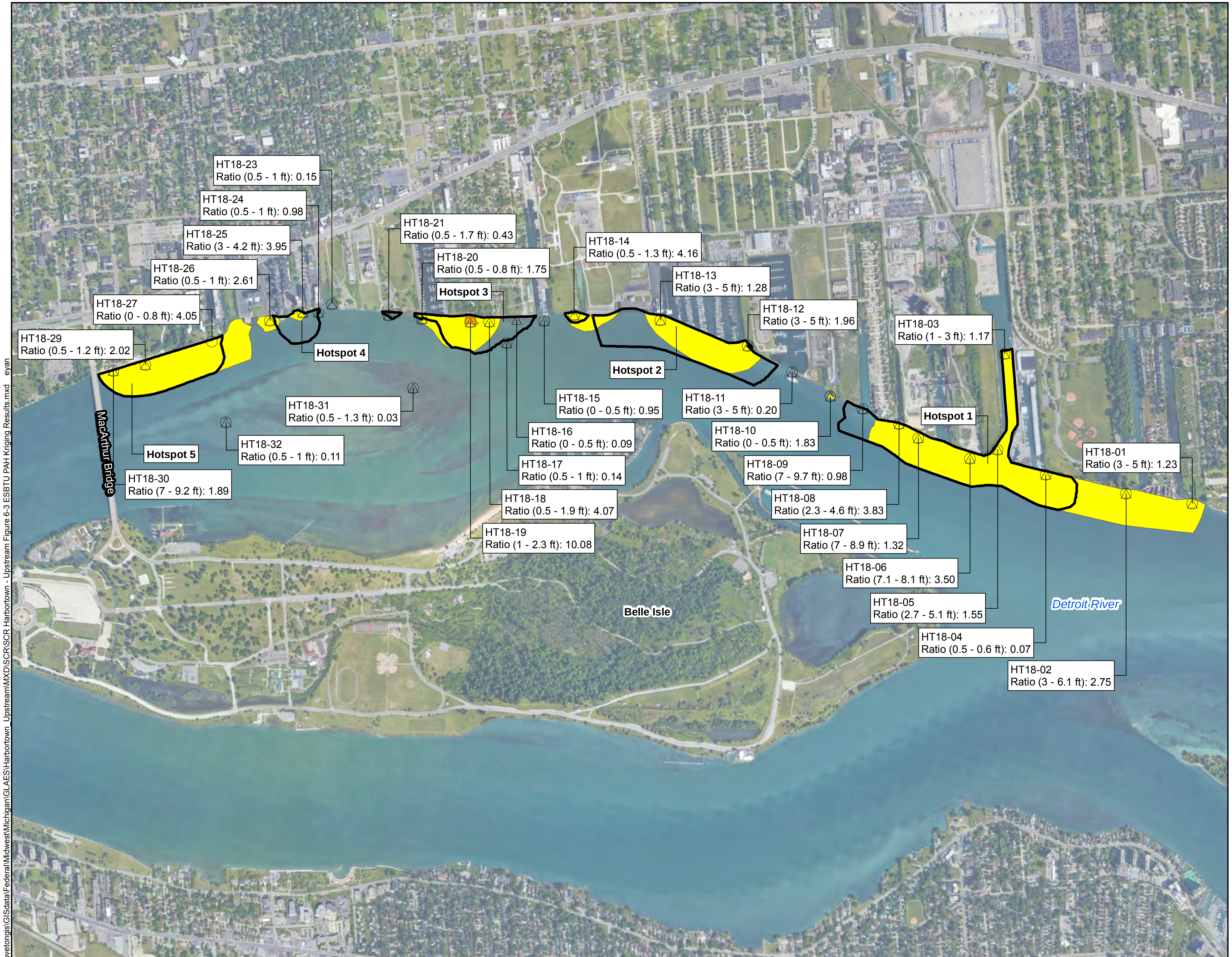
Map Date: 6/4/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 6-2
Spatial Analysis for All Constituents
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\wovetongis\GIS\data\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR Harbortown - Upstream Figure 6-2 All Constituents Kriging Results.mxd eyan





Legend

- ○ Core Sample Location
- △ Ponar Surface Sample
- ESBTU ≥ 10
- 7.5 ≤ ESBTU < 10
- 1 ≤ ESBTU < 7.5
- Hot Spot Boundary All PEC Constituents

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

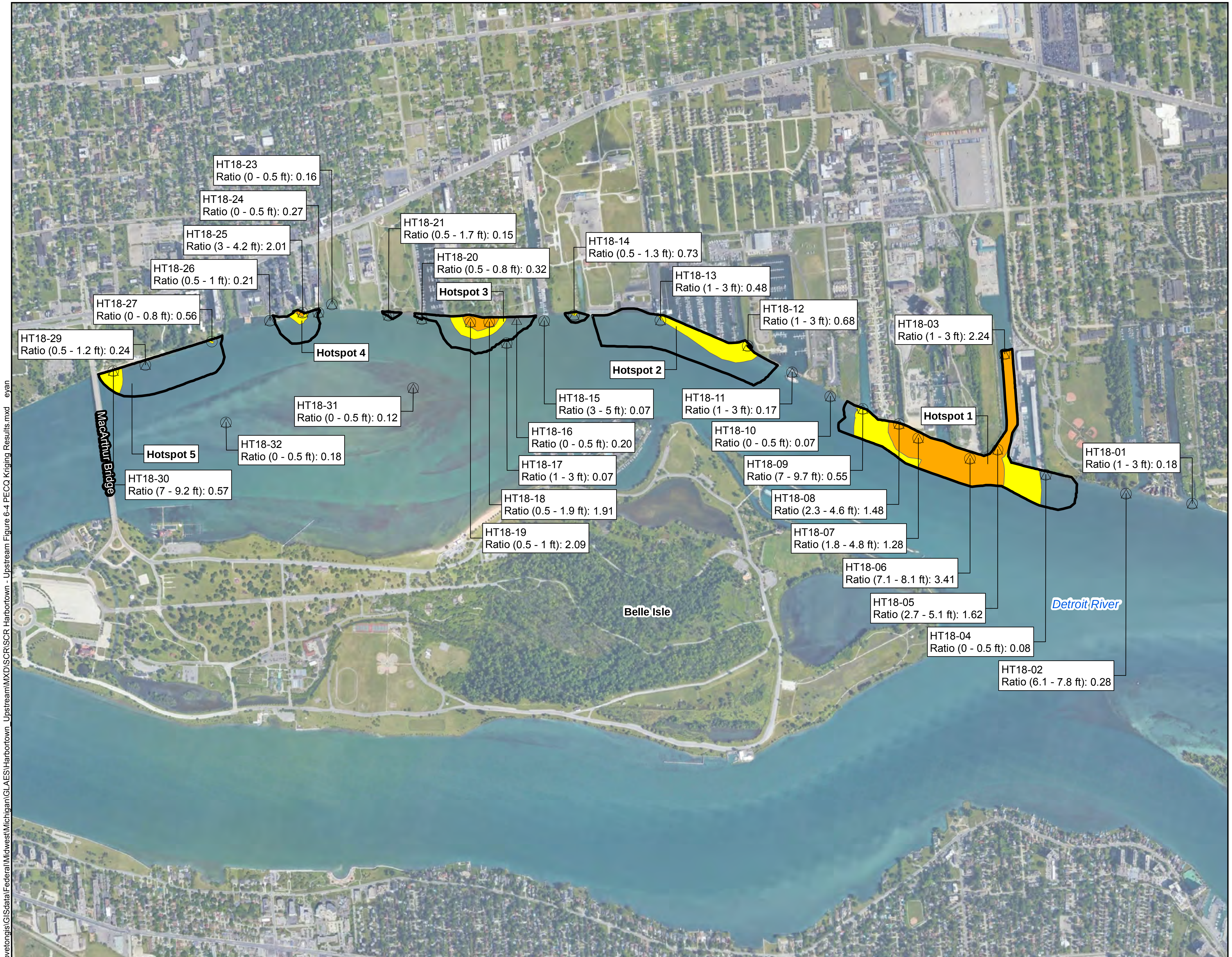
Metals ESBTUs are not shown and were not included as inputs for the spatial analysis.
No values were greater than 130 μmol/g_{oc}.

Map Date: 6/4/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

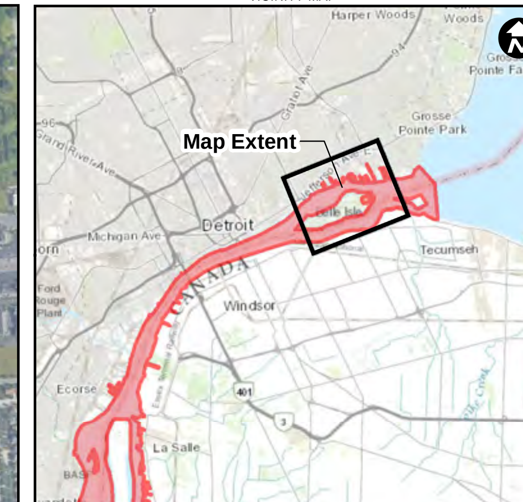
0 1,000 2,000
Feet

Figure 6-3
Spatial Analysis for Total PAH ESBTUs
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GIS\data\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 6-3 ESBTU PAH Kriging Results.mxd eyan



VICINITY MAP



Legend

- ○ Core Sample Location
- △ Ponar Surface Sample
- 1 ≤ PECQ < 5
- 0.5 ≤ PECQ < 1
- Hot Spot Boundary All PEC Constituents

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: 6/4/2019
Source: Google Earth 2017
Projection: NAD 1983 State Plane Michigan South US Feet

0 1,000 2,000
Feet

Figure 6-4
Spatial Analysis for Mean PEC-Qs
Harbortown - Upstream Assessment of Contaminated Sediments
Harbortown - Upstream Area Site Characterization
Wayne County, Michigan

\\lovetongis\GISdata\Federal\Midwest\Michigan\GLAES\Harbortown_Upstream\MXD\SCR\SCR Harbortown - Upstream Figure 6-4 PECQ Kriging Results.mxd eyan

Tables

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TABLE 2-1 HARBORTOWN UPSTREAM AREA SITE CHARACTERIZATION CORE SAMPLE COORDINATES AND FIELD NOTES
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER 2018)

Location ID	Date Sampled	Time Sampled (local)	Target Coordinates		Actual Coordinates		Distance from Target Coordinates[a] (ft)	Field Notes
			Y	X	Y	X		
			NAD83 State Plane Michigan South (US Survey Feet)					
HT18-01	10/29/18	15:10	315192.23	13508075.13	315207.40	13508163.48	90	Location is southeast of Keelson Road Canal. Encountered refusal at 8.75 ft.
HT18-02	10/29/18	15:45	315056.37	13507390.26	314981.93	13507218.00	188	Location is at the southeast corner of Maheras Gentry Park, West of Keelson Road. Shifted east to avoid structures in the water. Did not encounter refusal. Full 10 ft push.
HT18-03	10/29/18	17:20	314907.48	13506492.58	316204.46	13504821.37	2,115	Probing initially indicated rocks were close to outfall so the location was shifted downstream within Conner Creek per EPA's request. Encountered refusal at 6.25 ft. Core material is dark black, has a sewage odor, and appears to be CSO.
HT18-04	10/29/18	11:55	314846.92	13506012.69	314799.27	13506032.74	52	Location is southeast of Bayview Yacht Club and was shifted roughly 50 ft south per EPA's request. Encountered refusal at 6.0 ft.
HT18-05	10/29/18	16:35	314770.01	13505209.76	314875.03	13505246.58	111	Location is at the mouth of Conor Creek. Encountered refusal at 6.5 ft.
HT18-06	10/29/18	11:20	314630.34	13504922.58	314606.83	13504925.14	24	Location was shifted roughly 25 ft southwest and is southeast of Conner Creek power plant. No refusal encountered. Full 10ft push.
HT18-07	10/29/18	10:30	314620.04	13504112.03	314602.34	13504116.64	18	Location is south of Edison Boat Club. No refusal encountered. Full 10 ft push.
HT18-08	10/22/18	17:30	314688.32	13503770.82	314683.26	13503777.78	9	Location is at the mouth of the channel east of Sand Bar Lane houses and west of Connor Creek power plant. No refusal encountered. Full 10 ft push.
HT18-09	10/22/18	16:55	314712.27	13503175.69	314691.28	13503206.11	37	Location is at the mouth of the channel west of Sand Bar Lane houses and east of St. Jean Boat Ramp. No refusal encountered. Full 10 ft push.
HT18-10	10/22/18	15:55	314729.72	13502692.33	314685.39	13502703.88	46	Location is roughly 40 ft east of St. Jean Boat launch. Refusal encountered at 2.0 ft.
HT18-11	10/22/18	15:21	314717.41	13502281.36	314797.63	13502055.71	239	Location was shifted northwest due to a Bolbo boat. Location was taken tied up to a seawall north of Bolbo boat stern. No refusal was encountered. Full 10 ft push.
HT18-12	10/22/18	14:20	314928.71	13501334.14	314913.81	13501317.15	23	Location is at the western edge of Riverside Marina. No refusal encountered. Full 10 ft push.
HT18-13	10/29/18	9:50	314834.39	13499954.07	314783.68	13499999.58	68	Location was shifted roughly 50 ft southeast offshore. Due south of Rooster tail. No refusal encountered. Full 10 ft push.
HT18-14	10/29/18	9:00	314403.97	13498807.97	314381.03	13498806.20	23	Location is south and west of the water treatment plant. First attempt had no recovery. Second attempt had encountered refusal at 3ft. A sheen and odor were observed during core recovery.
HT18-15	10/24/18	16:50	314291.31	13498518.14	314141.47	13498434.92	171	Location was shifted west to avoid a submerged water pipeline. South of Kam marine Jefferson. Encountered refusal at 6.5 ft.

TABLE 2-1 HARBORTOWN UPSTREAM AREA SITE CHARACTERIZATION CORE SAMPLE COORDINATES AND FIELD NOTES
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER 2018)

Location ID	Date Sampled	Time Sampled (local)	Target Coordinates Y	Target Coordinates X	Actual Coordinates Y	Actual Coordinates X	Distance from Target Coordinates[a] (ft)	Field Notes
			NAD83 State Plane Michigan South (US Survey Feet)					
HT18-16	-	-	314055.14	13498098.42	-	-	-	No samples collected here. Penetration less than 1 ft with no recovery after three attempts.
HT18-17	10/24/18	15:00	314020.61	13497949.23	313640.54	13498052.60	394	Location was shifted offshore-south of Manoogian mansion per EPA's request. Encountered refusal at 4.5 ft.
HT18-18	10/24/18	11:45	313873.80	13497665.63	313829.97	13497704.09	58	Location is south of Perry Subdivision, roughly30 ft west of brick boathouse. Encountered refusal at 6.0 ft. Sheen and odor were observed during core recovery.
HT18-19	10/24/18	11:15	313799.15	13497425.99	313724.96	13497447.99	77	Location is due south of white boathouse and dock. Encountered refusal at 3.25 ft. Sheen was observed during core recovery.
HT18-20	10/24/18	10:15	313714.43	13497216.52	313503.46	13496776.66	488	Location was shifted to the west of the marina mouth per EPA's request. Encountered refusal at 3.25 ft.
HT18-21	10/24/18	9:30	313410.84	13496306.40	313369.05	13496309.93	42	Location is south of Burns Dr. No recovery collected on first attempt. The second attempt was collected on a slope and encountered refusal at 2 ft. A hydrocarbon odor from the core was observed
HT18-22	-	-	313282.35	13495915.97	-	-	-	No samples collected here. EPA opted to abandon this location in favor of HT18-31.
HT18-23	10/23/18	17:15	313204.09	13495499.30	313212.97	13495482.52	19	Location is east of 8330 on the river building . The first attempt had 2ft of recovery and sheen on the core but was not used. The second attempt had 4 ft of recovery with a 5 ft tube but was not used. The Third attempt had no refusal. Full 10ft push.
HT18-24	10/23/18	16:10	313044.75	13495316.72	313026.65	13495347.65	36	Location is offshore of 8330 building. The first attempt was using a 5 foot tube, and had no refusal. The second attempt was using a 10 ft tube and encountered refusal at 9.0 ft.
HT18-25	10/23/18	15:00	312956.68	13495101.34	312941.41	13495136.25	38	Location was along seawall, north/south facing. No refusal was encountered. A full 10ft. Push
HT18-26	10/23/18	14:40	312666.39	13494711.65	312652.58	13494738.30	30	Location is south of the UAW building. No refusal was encountered. A full 10ft push. A hydrocarbon odor and sheen were observed from the core.
HT18-27	10/23/18	9:45	312089.78	13494061.39	312054.29	13494070.31	37	Location is offshore of the River Terrace Apartments. The first attempt had no recovery. The second attempt encountered refusal at 3.0ft.
HT18-28	-	-	311631.07	13493556.26	-	-	-	No samples collected here. Probing indicates hard pack sand. EPA opted to abandon this location in favor of HT18-32.
HT18-29	10/22/18	11:35	311374.20	13493269.52	311376.81	13493301.66	32	Location is at the east end of Gabriel Richard Park. Encountered refusal at 1.5 ft.
HT18-30	10/22/18	9:55	311056.45	13492824.80	311119.35	13492902.54	100	Location in found of Gabriel Richard Park, roughly 50 ft east of the MacArthur Bridge. No refusal encountered. Full 10 ft. push.
HT18-31	10/23/18	11:25	-	-	312523.64	13497037.48	New Location	Location is in the center of the channel between Belle Isle and US main land side of the Detroit River. Encountered refusal at 6.75 ft.
HT18-32	10/23/18	10:50	-	-	311044.78	13494702.36	New Location	Location is in the center of the channel between Belle Isle and US main land side of the Detroit River. Encountered refusal at 7 ft.

EPA = U.S. Environmental Protection Agency
NAD83 = North American Datum of 1983

TABLE 2-2 HARBORTOWN UPSTREAM AREA SITE CHARACTERIZATION SURFACE SAMPLE COORDINATES AND DESCRIPTION DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER 2018)

Location ID	Date Sampled	Time Sampled (local)	Actual Coordinates		Surface Sample Description
			Y	X	
			NAD83 State Plane Michigan South (US Survey Feet)		
HT18-01	10/29/18	15:10	315207.40	13508163.48	Gray/brown silt with trace organics.
HT18-02	10/29/18	15:45	314981.93	13507218.00	Dark gray silt with fibrous organics and trace sand, light brown film on top.
HT18-03	10/29/18	17:20	316204.46	13504821.37	black silt, sewage odor.
HT18-04	10/29/18	11:55	314799.27	13506032.74	Gray/brown silt with some sand and trace organics.
HT18-05	10/29/18	16:35	314875.03	13505246.58	Dark brown silt with trace sand and trace organic fibers, light brown film on top, sewage smell.
HT18-06	10/29/18	11:20	314606.83	13504925.14	Dark Gray silt with trace sand and trace organics, and a light brown film on top. PID reading is 0.4 ppm.
HT18-07	10/29/18	10:30	314602.34	13504116.64	Dark gray silt with some fine grained sand and trace organics. Brown film and sheen on top of ponar.
HT18-08	10/22/18	17:30	314683.26	13503777.78	Gray/brown silt with a couple pieces of organic debris.
HT18-09	10/22/18	16:55	314691.28	13503206.11	Gray/brown silt.
HT18-10	10/22/18	15:55	314685.39	13502703.88	Gray/brown sand with a few pieces of SAV. Two attempts consolidated into one tray.
HT18-11	10/22/18	15:21	314797.63	13502055.71	Gray/brown silt with just a few pieces of SAV. No sheen, but silt left slightly greasy markings on gloves.
HT18-12	10/22/18	14:20	314913.81	13501317.15	Dark Gray/brown silt with some SAV. Live juvenile lamprey in grab.
HT18-13	10/29/18	9:50	314783.68	13499999.58	Gray silt with light brown film on top.
HT18-14	10/29/18	9:00	314381.03	13498806.20	Brown sand/silt with gravel and mussel shells. Trace organic wood debris. Two ponar attempts consolidated into one tray.
HT18-15	10/24/18	16:50	314141.47	13498434.92	Gray/brown silt with sand, mussel shells, and a few pieces of SAV.
HT18-16	10/24/18	15:45	314006.21	13498058.48	Gray silt/sand mixt with brown film, a few mussel shells, and SAV.
HT18-17	10/24/18	15:00	313640.54	13498052.60	Gray/brown sand/silt mix with mussel shells and invertebrates.
HT18-18	10/24/18	11:45	313829.97	13497704.09	Gray silt with light brown film and few pieces of SAV.
HT18-19	10/24/18	11:15	313724.96	13497447.99	Gray/brown silt/sand mix with mussel shells and a few pieces of SAV. Native mussel shells present in addition to the dreissenids. Two attempts consolidated into one tray.
HT18-20	10/24/18	10:15	313503.46	13496776.66	Gray/brown silt with sand and mussel shells, and some live invertebrates.
HT18-21	10/24/18	9:30	313369.05	13496309.93	Gray/brown silt, sand, and gravel mix with SAV and one juvenile Goby. Four attempts consolidated into one tray.
HT18-22	-	-	-	-	No samples collected here, location abandoned
HT18-23	10/23/18	17:15	313212.97	13495482.52	Gray silt with SAV.
HT18-24	10/23/18	16:10	313026.65	13495347.65	Gray/brown silt with sand.
HT18-25	10/23/18	15:00	312941.41	13495136.25	Gray/brown silt with some very fine sand and SAV.
HT18-26	10/23/18	14:40	312652.58	13494738.30	Gray/brown silt with sand, mussel shell fragments, and a few pieces of SAV. Two ponar attempts consolidated into on tray.
HT18-27	-	-	-	-	No surface samples collected. First through third attempts contained 90% mussel shells. Moved 10 ft and underwent an additional three attempts that contained mussels and sand.
HT18-28	-	-	-	-	No samples collected here, location abandoned
HT18-29	10/22/18	11:35	311376.81	13493301.66	Sand with lots of mussel shells and some gravel. Three attempts consolidated to get one volume.
HT18-30	10/22/18	9:55	309921.24	13492860.68	Gray silt with brown surface skin layer.
HT18-31	10/23/18	11:25	312523.64	13497037.48	Dark gray silt, light brown microbial layer on tip, a few pieces of SAV.
HT18-32	10/23/18	10:50	311044.78	13494702.36	Dark gray silt with some gray and a few pieces of detritus.

NAD83 = North American Datum of 1983
PID = Photoionization Detector
ppm = parts per million
SAV = submerged aquatic vegetation

TABLE 2-3 HARBORTOWN AREA SITE CHARACTERIZATION CORE DATA
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER 2018)

Location ID	Sample Processing Date	Processing Time (Local)	Water Surface Elevation NAVD88 (ft)	Depth of Water NAVD88 (ft)	Sediment Surface Elevation NAVD88 (ft)	Surface (Ponar) Sample (Y/N)	Sediment Core				
							Penetration Depth (ft)	Sediment Recovery (ft)	Percent Recovery	Collection Method	Collected to Refusal (Y/N)
HT18-01	10/30/2018	9:40	575.3	7.1	568.2	Y	8.8	8.2	94	Sonic Coring	Y
HT18-02	10/30/2018	11:00	575.3	10.1	565.2	Y	10.0	9.0	90	Sonic Coring	N
HT18-03	10/30/2018	13:55	575.3	17.5	557.8	Y	6.3	5.9	94	Sonic Coring	Y
HT18-04	10/29/2018	12:15	575.3	8.4	566.9	Y	6.0	4.2	70	Sonic Coring	Y
HT18-05	10/30/2018	16:30	575.3	15.5	559.8	Y	6.5	5.5	85	Sonic Coring	Y
HT18-06	10/29/2018	14:10	575.4	17.1	558.3	Y	10.0	9.2	92	Sonic Coring	N
HT18-07	10/29/2018	14:30	573.4	10.1	565.3	Y	10.0	8.6	86	Sonic Coring	N
HT18-08	10/23/2018	17:10	575.4	8.8	566.6	Y	10.0	8.0	80	Sonic Coring	N
HT18-09	10/23/2018	13:45	575.4	9.7	565.7	Y	10.0	9.6	96	Sonic Coring	N
HT18-10	10/24/2018	9:40	575.4	5.0	570.4	Y	2.0	1.1	53	Sonic Coring	Y
HT18-11	10/27/2018	8:30	575.4	9.4	566.0	Y	10.0	9.4	94	Sonic Coring	N
HT18-12	10/23/2018	15:40	575.4	6.7	568.7	Y	10.0	9.7	97	Sonic Coring	N
HT18-13	10/29/2018	17:55	575.4	13.6	561.8	Y	10.0	9.6	96	Sonic Coring	N
HT18-14	10/30/2018	8:50	575.4	19.4	556.0	Y	3.0	1.9	63	Sonic Coring	Y
HT18-15	10/25/2018	10:10	575.5	19.4	556.1	Y	6.5	6.6	102	Sonic Coring	Y
HT18-16[a]	10/24/2018	-	-	-	-	Y	-	-	-	-	-
HT18-17	10/25/2018	11:20	575.5	27.1	548.4	Y	4.5	4.6	102	Sonic Coring	Y

TABLE 2-3 HARBORTOWN AREA SITE CHARACTERIZATION CORE DATA
DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER 2018)

Location ID	Sample Processing Date	Processing Time (Local)	Water Surface Elevation NAVD88 (ft)	Depth of Water NAVD88 (ft)	Sediment Surface Elevation NAVD88 (ft)	Surface (Ponar) Sample (Y/N)	Sediment Core				
							Penetration Depth (ft)	Sediment Recovery (ft)	Percent Recovery	Collection Method	Collected to Refusal (Y/N)
HT18-18	10/25/2018	12:05	575.5	15.0	560.5	Y	6.0	5.4	90	Sonic Coring	Y
HT18-19	10/25/2018	14:35	575.5	20.9	554.6	Y	3.3	3.0	92	Sonic Coring	Y
HT18-20	10/25/2018	15:05	575.5	25.9	549.6	Y	3.3	3.0	92	Sonic Coring	Y
HT18-21	10/25/2018	15:45	575.5	11.0	564.5	Y	2.0	1.8	88	Sonic Coring	Y
HT18-22[b]	-	-	-	-	-	-	-	-	-	-	-
HT18-23	10/24/2018	10:15	575.4	6.5	568.9	Y	10.0	9.2	92	Sonic Coring	N
HT18-24	10/24/2018	11:40	575.4	14.7	560.7	Y	9.0	7.8	87	Sonic Coring	Y
HT18-25	10/24/2018	15:10	575.4	8.5	566.9	Y	10.0	9.5	95	Sonic Coring	N
HT18-26	10/24/2018	16:10	575.4	6.9	568.5	Y	10.0	9.5	95	Sonic Coring	N
HT18-27	10/24/2018	17:10	575.3	15.0	560.3	N[c]	3.0	2.0	67	Sonic Coring	Y
HT18-28[b]	-	-	-	-	-	-	-	-	-	-	-
HT18-29	10/23/2018	12:00	575.4	23.4	552.0	Y	1.5	1.2	80	Sonic Coring	Y
HT18-30	10/23/2018	10:35	575.4	11.4	564.0	Y	10.0	9.2	92	Sonic Coring	N
HT18-31	10/25/2018	8:30	575.4	6.3	569.1[d]	Y	6.8	6.6	98	Sonic Coring	Y
HT18-32	10/24/2018	18:00	575.4	9.7	565.7	Y	7.0	7.1	101	Sonic Coring	Y

Note: all samples collected by Cetacean Marine.
a. No Cores collected here, less than 1 ft of recovery, ponar was collected
b. No Samples collected, location abandoned
c. Surface sample was abandonded after 6 ponar attempts without any usable sample material.
d. Estimated Value
ft = Foot (feet).
NAVD88 = North American Vertical Datum of 1988.

TABLE 2-4 HARBORTOWN UPSTREAM AREA SITE CHARACTERIZATION ACTUAL ANALYTICAL PROGRAM DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER 2018)

		Analytical Group and Method										Analytical Interval[3]	
Location ID	Sample Depth Interval (ft)	34 PAHs[1] EPA CLP SOM02.4	Total Michigan Metals + Iron and Nickel EPA CLP ISM02.4	PCB - Aroclors EPA CLP SOM02.4	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	Total Cyanide SW846 9012B	WAD Cyanide SM4500_CN_I	DRO/MRO[2] SW846 8015B	Start of Interval (ft)	End of Interval (ft)
HT18-01	Surface[4]	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0[5]	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
	7.0-8.5	1	1	1	0	1	1	0	0	0	0	7	8.6
HT18-02	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-6.0	1	1	1	0	1	1	0	0	0	0	3	6.1
	6.0-8.0	1	1	1	0	1	1	0	0	0	0	6.1	7.8
	8.0-9.0	1	1	1	0	1	1	0	0	0	0	7.8	9.2
HT18-03	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-4.5	1	1	1	0	1	1	0	0	0	0	3	5
	4.5-6.0	1	1	1	0	1	1	0	0	0	0	4.6	6
HT18-04	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-0.5	1	1	1	0	1	1	0	0	0	0	0	0.6
	0.5-3.0	1	1	1	0	1	1	0	0	0	0	0.6	3.3
	3.0-4.0	1	1	1	0	1	1	0	0	0	0	3.3	4.3
HT18-05	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	2.7
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	2.7	5.1
	5.0-6.0	1	1	1	0	1	1	0	0	0	0	5.1	5.9
HT18-06	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-6.0	1	1	1	0	1	1	0	0	0	0	3	6
	6.0-7.0	1	1	1	0	1	1	0	0	0	0	6	7.1
	7.0-8.0	1	1	1	0	1	1	0	0	0	0	7.1	8.1
	8.0-10	1	1	1	0	1	1	0	0	0	0	8.1	9.7
HT18-07	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-2.0	1	1	1	0	1	1	0	0	0	0	0	1.8
	2.0-5.0	1	1	1	0	1	1	0	0	0	0	1.8	4.8
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	4.8	7
	7.0-9.0	1	1	1	0	1	1	0	0	0	0	7	8.9
HT18-08	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-2.0	1	1	1	0	1	1	0	0	0	0	1	2.3
	2.0-4.5	1	1	1	0	1	1	0	0	0	0	2.3	4.6
	4.5-6.5	1	1	1	0	1	1	0	0	0	0	4.6	6.5
	6.5-8.0	1	1	1	0	1	1	0	0	0	0	6.5	8
HT18-09	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
	7.0-10	1	1	1	0	1	1	0	0	0	0	7	9.7
HT18-10	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1.1
HT18-11	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
	7.0-10	1	1	1	0	1	1	0	0	0	0	7	9.4
HT18-12	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
	7.0-10	1	1	1	0	1	1	0	0	0	0	7	9.7
HT18-13	Surface	1	1	1	1	1	1	1	1	1	1	0	1
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-6.0	1	1	1	0	1	1	0	0	0	0	5	6.3
	6.0-9.0	1	1	1	0	1	1	0	0	0	0	6.3	8.8
	9.0-10	1	1	1	0	1	1	0	0	0	0	8.8	10
HT18-14	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1.3
	1.0-2.0	1	1	1	0	1	1	0	0	0	0	1.3	1.9
HT18-15	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-0.5	1	1	1	0	1	1	0	0	0	0	0	0.5
	0.5-3.0	1	1	1	0	1	1	0	0	0	0	0.5	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5

TABLE 2-4 HARBORTOWN UPSTREAM AREA SITE CHARACTERIZATION ACTUAL ANALYTICAL PROGRAM DETROIT RIVER AREA OF CONCERN, DETROIT, MICHIGAN (OCTOBER 2018)

		Analytical Group and Method										Analytical Interval[3]	
Location ID	Sample Depth Interval (ft)	34 PAHs[1] EPA CLP SOM02.4	Total Michigan Metals + Iron and Nickel EPA CLP ISM02.4	PCB - Aroclors EPA CLP SOM02.4	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	Total Cyanide SW846 9012B	WAD Cyanide SM4500_CN_I	DRO/MRO[2] SW846 8015B	Start of Interval (ft)	End of Interval (ft)
HT18-16	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
HT18-17	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	4.7
HT18-18	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-2.0	1	1	1	0	1	1	0	0	0	0	0	1.9
	2.0-3.0	1	1	1	0	1	1	0	0	0	0	1.9	2.8
	3.0-3.5	1	1	1	0	1	1	0	0	0	0	2.8	3.6
	3.5-5.5	1	1	1	0	1	1	0	0	0	0	3.6	5.4
HT18-19	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-2.0	1	1	1	0	1	1	0	0	0	0	1	2.3
	2.0-3.0	1	1	1	0	1	1	0	0	0	0	2.3	2.8
HT18-20	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	0.8
	1.0-2.0	1	1	1	0	1	1	0	0	0	0	0.8	1.8
	2.0-3.0	1	1	1	0	1	1	0	0	0	0	1.8	2.8
HT18-21	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.5	1	1	1	0	1	1	0	0	0	0	0	1.7
HT18-22	---	---	---	---	---	---	---	---	---	---	---	---	---
HT18-23	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
	7.0-10	1	1	1	0	1	1	0	0	0	0	7	9.2
HT18-24	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-2.5	1	1	1	0	1	1	0	0	0	0	1	2.7
	2.5-5.0	1	1	1	0	1	1	0	0	0	0	2.7	5
	5.0-6.5	1	1	1	0	1	1	0	0	0	0	5	6.6
	6.5-7.5	1	1	1	0	1	1	0	0	0	0	6.6	7.8
HT18-25	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-4.0	1	1	1	0	1	1	0	0	0	0	3	4.2
	4.0-7.0	1	1	1	0	1	1	0	0	0	0	4.2	7
	7.0-10	1	1	1	0	1	1	0	0	0	0	7	9.5
HT18-26	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
	7.0-10	1	1	1	0	1	1	0	0	0	0	7	9.5
HT18-27	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	0.8
	1.0-2.0	1	1	1	0	1	1	0	0	0	0	0.8	2.4
HT18-28	---	---	---	---	---	---	---	---	---	---	---	---	---
HT18-29	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1.2
HT18-30	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
	7.0-10	1	1	1	0	1	1	0	0	0	0	7	9.2
HT18-31	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1.3
	1.0-2.5	1	1	1	0	1	1	0	0	0	0	1.3	2.6
	2.5-5.5	1	1	1	0	1	1	0	0	0	0	2.6	5.7
	5.5-6.5	1	1	1	0	1	1	0	0	0	0	5.7	6.6
HT18-32	Surface	1	1	1	1	1	1	1	1	1	1	0	0.5
	0.0-1.0	1	1	1	0	1	1	0	0	0	0	0	1
	1.0-3.0	1	1	1	0	1	1	0	0	0	0	1	3
	3.0-5.0	1	1	1	0	1	1	0	0	0	0	3	5
	5.0-7.0	1	1	1	0	1	1	0	0	0	0	5	7
Total Sediment Samples		**142**	**142**	**142**	**29**	**142**	**142**	**29**	**29**	**29**	**29**		
Field Quality Control Samples													
Field Duplicate (10% of samples)		**15**	**15**	**15**	**3**	**15**	**15**	**3**	**3**	**3**	**3**		
Matrix Spike/Matrix Spike Duplicate (5% of samples)		**8**	**8**	**8**	**2**	**8**	**0**	**0**	**2**	**2**	**2**		
Total Samples		**165**	**165**	**165**	**33**	**165**	**157**	**32**	**34**	**34**	**34**		

NOTES:

1. 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 chrysenes.

2. DRO includes C10 to C20; MRO includes C20 to C36.

3. Analytical intervals were modified in the field based on consultation with EPA. They were defined by visible lithological changes and signs of contamination in the core.

4. Field duplicate taken at sample intervals marked yellow.

5. Volume collected for Matrix Spike/Matrix Spike Duplicates from the sample intervals and marked green.

--- = no sample collected

CLP = Contract Laboratory Program.

EPA = U.S. Environmental Protection Agency.

PAH = Polycyclic aromatic hydrocarbon.

PCB = Polychlorinated biphenyl.

SEM/AVS = Simultaneously extracted metal/Acid volatile sulfide.

WAD = Weak acid dissociable.

TABLE 3-1 SUMMARY OF EXCEEDANCES, HT

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	Number of TEC Exceedances	Number of PEC Exceedances	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	32	29	28	NA	NA	3	NA	NA	none	NA	NA	**10.3**
PAHs												
Total PAH17 ND=1/2RL	157	142	142	1,610	22,800	NA	81	8	µg/kg	**57.0**	**5.6**	NA
PCB Aroclors												
Total PCBs ND=0	157	142	83	59.8	676	NA	38	9	µg/kg	**26.8**	**6.3**	NA
Metals												
Arsenic	157	142	142	9.79	33	NA	26	1	mg/kg	**18.3**	**0.7**	NA
Barium	157	142	142	NSL	NSL	NA	NSL	NSL	mg/kg	NSL	NSL	NA
Cadmium	157	142	113	0.99	4.98	NA	51	24	mg/kg	**35.9**	**16.9**	NA
Chromium	157	142	142	43.4	111	NA	26	6	mg/kg	**18.3**	**4.2**	NA
Copper	157	142	142	31.6	149	NA	68	7	mg/kg	**47.9**	**4.9**	NA
Iron	157	142	142	20000[(a)]	40000[(a)]	NA	41	0	mg/kg	**28.9**	**0.0**	NA
Lead	157	142	142	35.8	128	NA	71	29	mg/kg	**50.0**	**20.4**	NA
Mercury	157	142	98	0.18	1.06	NA	46	12	mg/kg	**32.4**	**8.5**	NA
Nickel	157	142	142	22.7	48.6	NA	74	17	mg/kg	**52.1**	**12.0**	NA
Selenium	157	142	64	NSL	NSL	NA	NSL	NSL	mg/kg	NSL	NSL	NA
Silver	157	142	62	1.6[(a)]	2.2[(a)]	NA	14	7	mg/kg	**9.9**	**4.9**	NA
Zinc	157	142	142	121	459	NA	60	17	mg/kg	**42.3**	**12.0**	NA

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

NOTES:
µg/kg = micrograms per kilogram.
AVS = Acid volatile sulfides.
FD = Field Duplicate.
mg/kg = milligrams per kilogram.
NA = Not Applicable .
ND = Non-detect.
NSL = No Screening Level.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.
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).

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE, HT

	Location ID:	HT18-01	HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06	HT18-07
	Sample Name:	HT18-01-SURF	HT18-01-SURF-FD	HT18-02-SURF	HT18-03-SURF	HT18-04-SURF	HT18-05-SURF	HT18-06-SURF	HT18-07-SURF
	Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
	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	0.3	0.8	0.2	0	0	0	0
Coarse Sand	%	0	0.1	0.8	0.5	0.8	1.5	0.5	0.4
Medium Sand	%	2.7	1.8	2.6	4.5	1.2	3.4	2	1.8
Fine Sand	%	7.6	7.9	10.8	38.6	40.3	15.7	10.7	54.6
Sand	%	10.3	9.8	14.2	43.6	42.3	20.6	13.2	56.8
Silt	%	62.8	62.6	65.8	37.9	44.8	60.9	62.3	34.5
Clay	%	26.9	27.3	19.2	18.3	12.9	18.5	24.5	8.7
Silt + Clay	%	89.7	89.9	85.0	56.2	57.7	79.4	86.8	43.2
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	100	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size #4 - Percent Finer	% passed	100	99.7	99.2	99.8	100	100	100	100
Sieve Size #10 - Percent Finer	% passed	100	99.6	98.4	99.3	99.2	98.5	99.5	99.6
Sieve Size #20 - Percent Finer	% passed	97.8	98.1	96.8	96.9	98.3	95.9	98	98.7
Sieve Size #40 - Percent Finer	% passed	97.3	97.8	95.8	94.8	98	95.1	97.5	97.8
Sieve Size #60 - Percent Finer	% passed	96.5	97.1	94.3	91.2	96.4	94.1	96.7	91.6
Sieve Size #80 - Percent Finer	% passed	95.6	96.5	93.1	84.1	90.8	93.1	96.1	74.5
Sieve Size #100 - Percent Finer	% passed	95.1	95.8	91.9	76.1	81.4	92	95.3	63.2
Sieve Size #200 - Percent Finer	% passed	89.7	89.9	85	56.2	57.7	79.4	86.8	43.2
Hydrometer Reading 1 - Percent Finer	% passed	57.0	53.9	41.8	50.2	27.9	36.3	44.3	16.4
Hydrometer Reading 2 - Percent Finer	% passed	47.8	44.6	36.5	34.8	24.4	31.9	40.3	14.3
Hydrometer Reading 3 - Percent Finer	% passed	40.0	40.6	29.9	27.8	19.9	27.4	35.1	12.9
Hydrometer Reading 4 - Percent Finer	% passed	33.4	34	24.6	23	16.4	24.4	29.8	10.8
Hydrometer Reading 5 - Percent Finer	% passed	26.9	27.3	19.2	18.3	12.9	18.5	24.5	8.7
Hydrometer Reading 6 - Percent Finer	% passed	19.0	20.6	15.3	11.2	10.2	14.1	17.9	6.6
Hydrometer Reading 7 - Percent Finer	% passed	12.4	14	10	6.5	7.5	8.2	12.6	4.5

Notes:
% = percent passed
FD = Field Duplicate
HT= Harbortown Upstream Area

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE, HT

	Location ID:	HT18-08	HT18-09	HT18-10	HT18-11	HT18-12	HT18-12	HT18-13	HT18-14
	Sample Name:	HT18-08-SURF	HT18-09-SURF	HT18-10-SURF	HT18-11-SURF	HT18-12-SURF	HT18-12-SURF-FD	HT18-13-SURF	HT18-14-SURF
	Sample Date:	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/29/2018	10/29/2018
	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	0	9.1	0	0	0	0	55.8
Coarse Sand	%	0.9	0	0.4	0.6	0.7	1.9	1.1	11.5
Medium Sand	%	1.8	1.9	8.8	3.0	1.6	1.4	1.0	8.8
Fine Sand	%	5.3	2.9	77.5	7.6	16.5	14.3	8.5	14
Sand	%	8.0	4.8	86.7	11.2	18.8	17.6	10.6	34.3
Silt	%	66.5	64.6	2.1	61.1	64.6	66.9	58.5	6.2
Clay	%	25.5	30.6	2.1	27.7	16.6	15.5	30.9	3.7
Silt + Clay	%	92.0	95.2	4.2	88.8	81.2	82.4	89.4	9.9
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	100	100	100	100	100	100
Sieve Size 0.75 inch - Percent Finer	% passed	100	100	100	100	100	100	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	100	100	91.3	100	100	100	100	61.7
Sieve Size #4 - Percent Finer	% passed	100	100	90.9	100	100	100	100	44.2
Sieve Size #10 - Percent Finer	% passed	99.1	100	90.5	99.4	99.3	98.1	98.9	32.7
Sieve Size #20 - Percent Finer	% passed	97.9	98.4	89.6	97	98.4	97.2	98	28.7
Sieve Size #40 - Percent Finer	% passed	97.3	98.1	81.7	96.4	97.7	96.7	97.9	23.9
Sieve Size #60 - Percent Finer	% passed	96.7	97.9	24.3	95.6	95.2	95.8	97.6	17.5
Sieve Size #80 - Percent Finer	% passed	96.1	97.8	10.8	94.7	93.6	94.5	97.2	13.9
Sieve Size #100 - Percent Finer	% passed	95.6	97.5	7.3	93.6	92	92.7	96.4	12.6
Sieve Size #200 - Percent Finer	% passed	92	95.2	4.2	88.8	81.2	82.4	89.4	9.9
Hydrometer Reading 1 - Percent Finer	% passed	48.6	65.6	4.4	57.8	45.1	40.3	58.3	10.5
Hydrometer Reading 2 - Percent Finer	% passed	45.6	53.4	3.5	49.9	38.3	31.6	51.5	7.7
Hydrometer Reading 3 - Percent Finer	% passed	39.4	42.9	3	38.8	28	25.4	46	6.6
Hydrometer Reading 4 - Percent Finer	% passed	31.7	37.6	2.6	34.1	22.3	18	37.7	4.3
Hydrometer Reading 5 - Percent Finer	% passed	25.5	30.6	2.1	27.7	16.6	15.5	30.9	3.7
Hydrometer Reading 6 - Percent Finer	% passed	19.3	21.9	1.6	19.8	10.9	10.5	22.6	2.6
Hydrometer Reading 7 - Percent Finer	% passed	13.1	14.9	1.2	13.5	8.6	6.8	15.8	2

Notes:
% = percent passed
FD = Field Duplicate
HT= Harbortown Upstream Area

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE, HT

Location ID:		HT18-15	HT18-16	HT18-17	HT18-18	HT18-19	HT18-20	HT18-21	HT18-23
Sample Name:		HT18-15-SURF	HT18-16-SURF	HT18-17-SURF	HT18-18-SURF	HT18-19-SURF	HT18-20-SURF	HT18-21-SURF	HT18-23-SURF
Sample Date:		10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/23/2018
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	%	16.9	0	16.4	0.8	6.5	19.3	55.7	0
Coarse Sand	%	7	5.9	6.4	0.9	6.7	1.7	12.5	0.7
Medium Sand	%	8.6	11.7	9.2	2.9	7.9	2.1	9.9	0.5
Fine Sand	%	54.3	16.8	51.4	29	65.4	45.6	9.6	5.4
Sand	%	69.9	34.4	67	32.8	80	49.4	32	6.6
Silt	%	7.0	58.5	10.4	51.0	9.2	20.6	10.4	67.1
Clay	%	6.2	7.1	6.2	15.4	4.3	10.7	1.9	26.3
Silt + Clay	%	13.2	65.6	16.6	66.4	13.5	31.3	12.3	93.4
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	100	74.8	100
Sieve Size 0.375 inch - Percent Finer	% passed	91.3	100	93.8	100	99.1	89.7	58.7	100
Sieve Size #4 - Percent Finer	% passed	83.1	100	83.6	99.2	93.5	80.7	44.3	100
Sieve Size #10 - Percent Finer	% passed	76.1	94.1	77.2	98.3	86.8	79	31.8	99.3
Sieve Size #20 - Percent Finer	% passed	72.7	88.8	72.7	96.2	83.4	77.9	27.2	98.9
Sieve Size #40 - Percent Finer	% passed	67.5	82.4	68	95.4	78.9	76.9	21.9	98.8
Sieve Size #60 - Percent Finer	% passed	50.5	73.1	52.6	92.8	66.8	74.6	17.3	98.7
Sieve Size #80 - Percent Finer	% passed	37.1	68.9	34.6	86.1	50.2	68.8	15.5	98.3
Sieve Size #100 - Percent Finer	% passed	29.5	67.5	26.3	79.4	34.2	59.8	14.3	97.9
Sieve Size #200 - Percent Finer	% passed	13.2	65.6	16.6	66.4	13.5	31.3	12.3	93.4
Hydrometer Reading 1 - Percent Finer	% passed	12.1	21.4	12.1	32.3	9.5	25	4.5	52
Hydrometer Reading 2 - Percent Finer	% passed	10.3	13.1	10.6	29.4	8.4	20.3	3.6	44.9
Hydrometer Reading 3 - Percent Finer	% passed	8.6	11.6	8.6	25.4	7.2	17.1	3.2	40.6
Hydrometer Reading 4 - Percent Finer	% passed	7.4	8.6	7.1	20.4	5.5	13.9	2.4	34.9
Hydrometer Reading 5 - Percent Finer	% passed	6.2	7.1	6.2	15.4	4.3	10.7	1.9	26.3
Hydrometer Reading 6 - Percent Finer	% passed	4.4	4.9	4.7	11.4	3.2	9.1	1.5	19.2
Hydrometer Reading 7 - Percent Finer	% passed	3.3	3.4	3.2	7.5	2	6	0.6	12.1

Notes:
% = percent passed
FD = Field Duplicate
HT= Harbortown Upstream Area

TABLE 3-2 SEDIMENT RESULTS FOR GRAIN SIZE, HT

	Location ID:	HT18-24	HT18-25	HT18-26	HT18-29	HT18-30	HT18-31	HT18-32	HT18-32
	Sample Name:	HT18-24-SURF	HT18-25-SURF	HT18-26-SURF	HT18-29-SURF	HT18-30-SURF	HT18-31-SURF	HT18-32-SURF	HT18-32-SURF-FD
	Sample Date:	10/23/2018	10/23/2018	10/23/2018	10/22/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018
	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	%	8.4	0	0.9	41.6	0	0	1.5	0
Coarse Sand	%	2.8	0.7	0.7	17.1	1.1	1.2	0.8	0.8
Medium Sand	%	4.2	2.4	1.4	10.7	0.9	1.2	1.9	1.6
Fine Sand	%	49.2	14.9	61.8	16.1	6.3	5.5	13	12.6
Sand	%	56.2	18	63.9	43.9	8.3	7.9	15.7	15
Silt	%	27.2	57.8	28.6	13.4	49.7	60.2	61.1	61.9
Clay	%	8.3	24.2	6.6	1.1	42.0	31.9	21.7	23.1
Silt + Clay	%	35.5	82.0	35.2	14.5	91.7	92.1	82.8	85.0
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	100	100	100	100	100
Sieve Size 0.375 inch - Percent Finer	% passed	94.4	100	100	85.9	100	100	100	100
Sieve Size #4 - Percent Finer	% passed	91.6	100	99.1	58.4	100	100	98.5	100
Sieve Size #10 - Percent Finer	% passed	88.8	99.3	98.4	41.3	98.9	98.8	97.7	99.2
Sieve Size #20 - Percent Finer	% passed	87	97.6	97.6	36.8	98.4	98.1	96.5	98.1
Sieve Size #40 - Percent Finer	% passed	84.6	96.9	97	30.6	98	97.6	95.8	97.6
Sieve Size #60 - Percent Finer	% passed	77.2	94.8	94.4	21.1	96.4	96.5	93.2	96.2
Sieve Size #80 - Percent Finer	% passed	60.1	92.3	88.5	17	95.8	95.5	91.6	94.6
Sieve Size #100 - Percent Finer	% passed	48.8	90.4	81.1	15.8	95.4	94.9	90.5	93.3
Sieve Size #200 - Percent Finer	% passed	35.4	82	35.2	14.5	91.7	92.1	82.8	85
Hydrometer Reading 1 - Percent Finer	% passed	14.7	43.6	14.9	1.9	67.9	70.8	58.2	55.2
Hydrometer Reading 2 - Percent Finer	% passed	14	39.5	13.5	1.5	60.1	59.5	48	48.8
Hydrometer Reading 3 - Percent Finer	% passed	12.5	33.9	10.7	1.5	55	45.7	36.9	39.1
Hydrometer Reading 4 - Percent Finer	% passed	9.7	29.8	8.7	1.5	45.9	38.2	26.8	31.6
Hydrometer Reading 5 - Percent Finer	% passed	8.3	24.2	6.6	1.1	42	31.9	21.7	23.1
Hydrometer Reading 6 - Percent Finer	% passed	6.1	18.7	5.2	0.6	31.7	23.2	15.7	16.6
Hydrometer Reading 7 - Percent Finer	% passed	3.9	11.8	3.1	0.2	21.3	15.7	10.6	12.3

Notes:
% = percent passed
FD = Field Duplicate
HT= Harbortown Upstream Area

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01
			Sample Name:	HT18-01-SURF	HT18-01-SURF-FD	HT18-01-0010	HT18-01-1030	HT18-01-3050	HT18-01-5070	HT18-01-5070-FD
			Sample Date:	10/29/2018	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018
			Depth Interval (ft):	0-0.5	0-0.5	0-1	1-3	3-5	5-7	5-7
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	89 U	88 U	61 U	53 U	48 U	43 U	45 U
Aroclor-1221	NSL	NSL	ug/kg	89 U	88 U	61 U	53 U	48 U	43 U	45 U
Aroclor-1232	NSL	NSL	ug/kg	89 U	88 U	61 U	53 U	48 U	43 U	45 U
Aroclor-1242	NSL	NSL	ug/kg	15 J	17 J	28 J	33 J	48 U	43 U	45 U
Aroclor-1248	NSL	NSL	ug/kg	89 U	88 U	61 U	53 U	48 U	43 U	45 U
Aroclor-1254	NSL	NSL	ug/kg	17 J	17 J	22 J	43 J	93	43 U	45 U
Aroclor-1260	NSL	NSL	ug/kg	89 U	88 U	61 U	53 U	48 U	43 U	45 U
Aroclor-1262	NSL	NSL	ug/kg	89 U	88 U	61 U	53 U	48 U	43 U	45 U
Aroclor-1268	NSL	NSL	ug/kg	89 U	88 U	61 U	53 U	48 U	43 U	45 U
Total PCBs ND=0	59.8	676	ug/kg	**32**	**34**	**50**	**76**	**93**	0	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-01	HT18-02	HT18-02	HT18-02	HT18-02	HT18-02	HT18-02
			Sample Name:	HT18-01-7085	HT18-02-SURF	HT18-02-0010	HT18-02-1030	HT18-02-3060	HT18-02-6080	HT18-02-8090
			Sample Date:	10/30/2018	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018
			Depth Interval (ft):	7-8.6	0-0.5	0-1	1-3	3-6.1	6.1-7.8	7.8-9.2
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	43 U	81 U	68 U	44 U	45 U	43 U	41 U
Aroclor-1221	NSL	NSL	ug/kg	43 U	81 U	68 U	44 U	45 U	43 U	41 U
Aroclor-1232	NSL	NSL	ug/kg	43 U	81 U	68 U	44 U	45 U	43 U	41 U
Aroclor-1242	NSL	NSL	ug/kg	43 U	17 J	25 J	44 U	45 U	43 U	41 U
Aroclor-1248	NSL	NSL	ug/kg	43 U	81 U	68 U	44 U	45 U	43 U	41 U
Aroclor-1254	NSL	NSL	ug/kg	43 U	15 J	23 J	44 U	45 U	43 U	41 U
Aroclor-1260	NSL	NSL	ug/kg	43 U	81 U	68 U	44 U	45 U	43 U	41 U
Aroclor-1262	NSL	NSL	ug/kg	43 U	81 U	68 U	44 U	45 U	43 U	41 U
Aroclor-1268	NSL	NSL	ug/kg	43 U	81 U	68 U	44 U	45 U	43 U	41 U
Total PCBs ND=0	59.8	676	ug/kg	0	**32**	**48**	0	0	0	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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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U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-03	HT18-03	HT18-03	HT18-03	HT18-03	HT18-03	HT18-04
			Sample Name:	HT18-03-SURF	HT18-03-0010	HT18-03-1030	HT18-03-1030-FD	HT18-03-3045	HT18-03-4560	HT18-04-SURF
			Sample Date:	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/29/2018
			Depth Interval (ft):	0-0.5	0-1	1-3	1-3	3-4.6	4.6-6	0-0.5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	86 U	85 U	61 U	61 U	52 U	39 U	69 U
Aroclor-1221	NSL	NSL	ug/kg	86 U	85 U	61 U	61 U	52 U	39 U	69 U
Aroclor-1232	NSL	NSL	ug/kg	86 U	85 U	61 U	61 U	52 U	39 U	69 U
Aroclor-1242	NSL	NSL	ug/kg	110 J	240	920	1400	490	39 U	69 U
Aroclor-1248	NSL	NSL	ug/kg	86 U	85 U	61 U	61 U	52 U	39 U	69 U
Aroclor-1254	NSL	NSL	ug/kg	110	85 U	970	1500	510	39 U	11 J
Aroclor-1260	NSL	NSL	ug/kg	86 U	210	61 U	61 U	52 U	39 U	69 U
Aroclor-1262	NSL	NSL	ug/kg	86 U	85 U	61 U	61 U	52 U	39 U	69 U
Aroclor-1268	NSL	NSL	ug/kg	86 U	85 U	61 U	61 U	52 U	39 U	69 U
Total PCBs ND=0	59.8	676	ug/kg	**220**	**450**	**1890**	**2900**	**1000**	0	**11**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

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U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-04	HT18-04	HT18-04	HT18-04	HT18-05	HT18-05	HT18-05
			Sample Name:	HT18-04-0005	HT18-04-0530	HT18-04-0530-FD	HT18-04-3040	HT18-05-SURF	HT18-05-0010	HT18-05-1030
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/30/2018	10/30/2018
			Depth Interval (ft):	0-0.6	0.6-3.3	0.6-3.3	3.3-4.3	0-0.5	0-1	1-2.7
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	96 U	90 U	88 U
Aroclor-1221	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	96 U	90 U	88 U
Aroclor-1232	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	96 U	90 U	88 U
Aroclor-1242	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	40 J	32 J	100
Aroclor-1248	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	96 U	90 U	88 U
Aroclor-1254	NSL	NSL	ug/kg	3.9 J	44 U	44 U	38 U	56 J	65 J	110
Aroclor-1260	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	96 U	90 U	88 U
Aroclor-1262	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	96 U	90 U	88 U
Aroclor-1268	NSL	NSL	ug/kg	42 U	44 U	44 U	38 U	96 U	90 U	88 U
Total PCBs ND=0	59.8	676	ug/kg	**3.9**	0	0	0	**96**	**97**	**210**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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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U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-05	HT18-05	HT18-06	HT18-06	HT18-06	HT18-06	HT18-06
			Sample Name:	HT18-05-3050	HT18-05-5060	HT18-06-SURF	HT18-06-0010	HT18-06-1030	HT18-06-1030-FD	HT18-06-3060
			Sample Date:	10/30/2018	10/30/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	2.7-5.1	5.1-5.9	0-0.5	0-1	1-3	1-3	3-6
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	51 U	45 U	91 U	86 U	72 U	73 U	69 U
Aroclor-1221	NSL	NSL	ug/kg	51 U	45 U	91 U	86 U	72 U	73 U	69 UJ
Aroclor-1232	NSL	NSL	ug/kg	51 U	45 U	91 U	86 U	72 U	73 U	69 UJ
Aroclor-1242	NSL	NSL	ug/kg	920	250	27 J	58 J	86	110	250 J
Aroclor-1248	NSL	NSL	ug/kg	51 U	45 U	91 U	86 U	72 U	73 U	69 UJ
Aroclor-1254	NSL	NSL	ug/kg	850	170	35 J	86 U	240	73 U	69 UJ
Aroclor-1260	NSL	NSL	ug/kg	51 U	45 U	91 U	40 J	72 U	68 J	460 J
Aroclor-1262	NSL	NSL	ug/kg	51 U	45 U	91 U	86 U	72 U	73 U	69 UJ
Aroclor-1268	NSL	NSL	ug/kg	51 U	45 U	91 U	86 U	72 U	73 U	69 UJ
Total PCBs ND=0	59.8	676	ug/kg	**1770**	**420**	**62**	**98**	**326**	**178**	**710**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-06	HT18-06	HT18-06	HT18-07	HT18-07	HT18-07	HT18-07
			Sample Name:	HT18-06-6070	HT18-06-7080	HT18-06-8010	HT18-07-SURF	HT18-07-0020	HT18-07-2050	HT18-07-5070
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	6-7.1	7.1-8.1	8.1-9.7	0-0.5	0-1.8	1.8-4.8	4.8-7
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	46 U	47 U	48 U	58 U	41 U	54 U	48 U
Aroclor-1221	NSL	NSL	ug/kg	46 U	47 U	48 U	58 U	41 U	54 U	48 U
Aroclor-1232	NSL	NSL	ug/kg	46 U	47 U	48 U	58 U	41 U	54 U	48 U
Aroclor-1242	NSL	NSL	ug/kg	690	4100	560	36 J	110	820	150
Aroclor-1248	NSL	NSL	ug/kg	46 U	47 U	48 U	58 U	41 U	54 U	48 U
Aroclor-1254	NSL	NSL	ug/kg	470	1900 J	510	43 J	220	780	570
Aroclor-1260	NSL	NSL	ug/kg	46 U	47 U	48 U	58 U	41 U	54 U	48 U
Aroclor-1262	NSL	NSL	ug/kg	46 U	47 U	48 U	58 U	41 U	54 U	48 U
Aroclor-1268	NSL	NSL	ug/kg	46 U	47 U	48 U	58 U	41 U	54 U	48 U
Total PCBs ND=0	59.8	676	ug/kg	**1160**	**6000**	**1070**	**79**	**330**	**1600**	**720**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-07	HT18-08	HT18-08	HT18-08	HT18-08	HT18-08	HT18-08
			Sample Name:	HT18-07-7090	HT18-08-SURF	HT18-08-0010	HT18-08-1020	HT18-08-1020-FD	HT18-08-2045	HT18-08-4565
			Sample Date:	10/29/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	7-8.9	0-0.5	0-1	1-2.3	1-2.3	2.3-4.6	4.6-6.5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	49 U	110 U	86 U	67 U	70 U	52 UJ	44 U
Aroclor-1221	NSL	NSL	ug/kg	49 U	110 U	86 U	67 U	70 U	52 UJ	44 U
Aroclor-1232	NSL	NSL	ug/kg	49 U	110 U	86 U	67 U	70 U	52 UJ	44 U
Aroclor-1242	NSL	NSL	ug/kg	49 U	17 J	86 U	67 U	70 U	52 UJ	44 U
Aroclor-1248	NSL	NSL	ug/kg	49 U	110 U	86 U	67 U	70 U	52 UJ	44 U
Aroclor-1254	NSL	NSL	ug/kg	210	110 U	28 J	75	52 J	13 J	44 U
Aroclor-1260	NSL	NSL	ug/kg	49 U	16 J	86 U	67 U	70 U	52 UJ	44 U
Aroclor-1262	NSL	NSL	ug/kg	49 U	110 U	86 U	67 U	70 U	52 UJ	44 U
Aroclor-1268	NSL	NSL	ug/kg	49 U	110 U	86 U	67 U	70 U	52 UJ	44 U
Total PCBs ND=0	59.8	676	ug/kg	**210**	**33**	**28**	**75**	**52**	**13**	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

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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 = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-08	HT18-09	HT18-09	HT18-09	HT18-09	HT18-09	HT18-09
			Sample Name:	HT18-08-6580	HT18-09-SURF	HT18-09-0010	HT18-09-1030	HT18-09-3050	HT18-09-3050-FD	HT18-09-5070
			Sample Date:	10/23/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	6.5-8	0-0.5	0-1	1-3	3-5	3-5	5-7
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	40 U	100 U	95 U	73 U	66 U	66 U	71 U
Aroclor-1221	NSL	NSL	ug/kg	40 U	100 U	95 U	73 U	66 U	66 U	71 U
Aroclor-1232	NSL	NSL	ug/kg	40 U	100 U	95 U	73 U	66 U	66 U	71 U
Aroclor-1242	NSL	NSL	ug/kg	40 U	28 J	95 U	39 J	47 J	61 J	92 J
Aroclor-1248	NSL	NSL	ug/kg	40 U	100 U	95 U	73 U	66 U	66 U	71 U
Aroclor-1254	NSL	NSL	ug/kg	40 U	100 U	95 U	73 U	66 U	66 U	71 U
Aroclor-1260	NSL	NSL	ug/kg	40 U	19 J	29 J	26 J	34 J	53 J	56 J
Aroclor-1262	NSL	NSL	ug/kg	40 U	100 U	95 U	73 U	66 U	66 U	71 U
Aroclor-1268	NSL	NSL	ug/kg	40 U	100 U	95 U	73 U	66 U	66 U	71 U
Total PCBs ND=0	59.8	676	ug/kg	0	**47**	**29**	**65**	**81**	**114**	**148**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-09	HT18-10	HT18-10	HT18-11	HT18-11	HT18-11	HT18-11
			Sample Name:	HT18-09-7010	HT18-10-SURF	HT18-10-0010	HT18-11-SURF	HT18-11-0010	HT18-11-1030	HT18-11-3050
			Sample Date:	10/23/2018	10/22/2018	10/24/2018	10/22/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	7-9.7	0-0.5	0-1.1	0-0.5	0-1	1-3	3-5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	55 U	44 U	39 U	110 U	93 U	70 U	53 U
Aroclor-1221	NSL	NSL	ug/kg	55 U	44 U	39 U	110 U	93 U	70 U	53 U
Aroclor-1232	NSL	NSL	ug/kg	55 U	44 U	39 U	110 U	93 U	70 U	53 U
Aroclor-1242	NSL	NSL	ug/kg	55 U	3.8 J	39 U	110 U	93 U	70 U	53 U
Aroclor-1248	NSL	NSL	ug/kg	230 J	44 U	39 U	110 U	24 J	70 U	53 U
Aroclor-1254	NSL	NSL	ug/kg	55 U	4.4 J	39 U	110 U	93 U	70 U	53 U
Aroclor-1260	NSL	NSL	ug/kg	230 J	44 U	39 U	13 J	14 J	31 J	58
Aroclor-1262	NSL	NSL	ug/kg	55 U	44 U	39 U	110 U	93 U	70 U	53 U
Aroclor-1268	NSL	NSL	ug/kg	55 U	44 U	39 U	110 U	93 U	70 U	53 U
Total PCBs ND=0	59.8	676	ug/kg	**460**	**8.2**	0	13	38	31	58

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-11	HT18-11	HT18-12	HT18-12	HT18-12	HT18-12	HT18-12
			Sample Name:	HT18-11-5070	HT18-11-7010	HT18-12-SURF	HT18-12-SURF-FD	HT18-12-0010	HT18-12-1030	HT18-12-3050
			Sample Date:	10/24/2018	10/24/2018	10/22/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	5-7	7-9.4	0-0.5	0-0.5	0-1	1-3	3-5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	43 U	41 U	90 U	90 U	62 U	53 U	42 U
Aroclor-1221	NSL	NSL	ug/kg	43 U	41 U	90 U	90 U	62 U	53 U	42 U
Aroclor-1232	NSL	NSL	ug/kg	43 U	41 U	90 U	90 U	62 U	53 U	42 U
Aroclor-1242	NSL	NSL	ug/kg	43 U	41 U	51 J	56 J	79 J	53 U	42 U
Aroclor-1248	NSL	NSL	ug/kg	43 U	41 U	90 U	90 U	62 U	53 U	42 U
Aroclor-1254	NSL	NSL	ug/kg	43 U	41 U	90 U	90 U	62 U	180 J	42 U
Aroclor-1260	NSL	NSL	ug/kg	43 U	41 U	39 J	37 J	45 J	53 U	42 U
Aroclor-1262	NSL	NSL	ug/kg	43 U	41 U	90 U	90 U	62 U	38 J	42 U
Aroclor-1268	NSL	NSL	ug/kg	43 U	41 U	90 U	90 U	62 U	53 U	42 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	**90**	**93**	**124**	**218**	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-12	HT18-12	HT18-13	HT18-13	HT18-13	HT18-13	HT18-13
			Sample Name:	HT18-12-5070	HT18-12-7010	HT18-13-SURF	HT18-13-0010	HT18-13-1030	HT18-13-3050	HT18-13-5060
			Sample Date:	10/23/2018	10/23/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	5-7	7-9.7	0-0.5	0-1	1-3	3-5	5-6.3
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	43 U	42 U	95 U	63 U	56 U	53 U	57 U
Aroclor-1221	NSL	NSL	ug/kg	43 U	42 U	95 U	63 U	56 U	53 U	57 U
Aroclor-1232	NSL	NSL	ug/kg	43 U	42 U	95 U	63 U	56 U	53 U	57 U
Aroclor-1242	NSL	NSL	ug/kg	43 U	42 U	12 J	63 U	56 U	53 U	57 U
Aroclor-1248	NSL	NSL	ug/kg	43 U	42 U	95 U	63 U	56 U	53 U	57 U
Aroclor-1254	NSL	NSL	ug/kg	43 U	42 U	16 J	150	80	7.8 J	57 U
Aroclor-1260	NSL	NSL	ug/kg	43 U	42 U	95 U	63 U	56 U	53 U	57 U
Aroclor-1262	NSL	NSL	ug/kg	43 U	42 U	95 U	63 U	56 U	53 U	57 U
Aroclor-1268	NSL	NSL	ug/kg	43 U	42 U	95 U	63 U	56 U	5.9 J	57 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	28	**150**	**80**	13.7	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-13	HT18-13	HT18-13	HT18-14	HT18-14	HT18-14	HT18-15
			Sample Name:	HT18-13-6090	HT18-13-6090-FD	HT18-13-9010	HT18-14-SURF	HT18-14-0010	HT18-14-1020	HT18-15-SURF
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/30/2018	10/30/2018	10/24/2018
			Depth Interval (ft):	6.3-8.8	6.3-8.8	8.8-10	0-0.5	0-1.3	1.3-1.9	0-0.5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	45 U	46 U	40 U	49 U	42 U	44 U	60 U
Aroclor-1221	NSL	NSL	ug/kg	45 U	46 U	40 U	49 U	42 U	44 U	60 U
Aroclor-1232	NSL	NSL	ug/kg	45 U	46 U	40 U	49 U	42 U	44 U	60 U
Aroclor-1242	NSL	NSL	ug/kg	45 U	46 U	40 U	9.2 J	42 U	44 U	60 U
Aroclor-1248	NSL	NSL	ug/kg	45 U	46 U	40 U	49 U	42 U	44 U	60 U
Aroclor-1254	NSL	NSL	ug/kg	45 U	46 U	40 U	11 J	130	9.5 J	49 J
Aroclor-1260	NSL	NSL	ug/kg	45 U	46 U	40 U	49 U	42 U	44 U	60 U
Aroclor-1262	NSL	NSL	ug/kg	45 U	46 U	40 U	49 U	42 U	4.7 J	60 U
Aroclor-1268	NSL	NSL	ug/kg	45 U	46 U	40 U	49 U	42 U	44 U	60 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	0	20.2	**130**	14.2	49

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-15	HT18-15	HT18-15	HT18-15	HT18-16	HT18-17	HT18-17
			Sample Name:	HT18-15-0005	HT18-15-0530	HT18-15-3050	HT18-15-3050-FD	HT18-16-SURF	HT18-17-SURF	HT18-17-0010
			Sample Date:	10/25/2018	10/25/2018	10/25/2018	10/25/2018	10/24/2018	10/24/2018	10/25/2018
			Depth Interval (ft):	0-0.5	0.5-3	3-5	3-5	0-0.5	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Aroclor-1221	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Aroclor-1232	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Aroclor-1242	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Aroclor-1248	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Aroclor-1254	NSL	NSL	ug/kg	3.9 J	39 U	39 U	39 U	18 J	11 J	38 U
Aroclor-1260	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Aroclor-1262	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Aroclor-1268	NSL	NSL	ug/kg	38 U	39 U	39 U	39 U	82 U	48 U	38 U
Total PCBs ND=0	59.8	676	ug/kg	3.9	0	0	0	18	11	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-17	HT18-17	HT18-18	HT18-18	HT18-18	HT18-18	HT18-18
			Sample Name:	HT18-17-1030	HT18-17-3050	HT18-18-SURF	HT18-18-0020	HT18-18-2030	HT18-18-3035	HT18-18-3555
			Sample Date:	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/25/2018
			Depth Interval (ft):	1-3	3-4.7	0-0.5	0-1.9	1.9-2.8	2.8-3.6	3.6-5.4
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	38 U	39 U	80 U	56 U	40 U	38 U	39 U
Aroclor-1221	NSL	NSL	ug/kg	38 U	39 U	80 U	56 U	40 U	38 U	39 U
Aroclor-1232	NSL	NSL	ug/kg	38 U	39 U	80 U	56 U	40 U	38 U	39 U
Aroclor-1242	NSL	NSL	ug/kg	38 U	39 U	80 U	56 U	40 U	38 U	39 U
Aroclor-1248	NSL	NSL	ug/kg	38 U	39 U	80 U	56 U	40 U	38 U	39 U
Aroclor-1254	NSL	NSL	ug/kg	38 U	39 U	24 J	56 U	40 U	38 U	39 U
Aroclor-1260	NSL	NSL	ug/kg	38 U	39 U	80 U	6.2 J	40 U	38 U	39 U
Aroclor-1262	NSL	NSL	ug/kg	38 U	39 U	80 U	56 U	40 U	38 U	39 U
Aroclor-1268	NSL	NSL	ug/kg	38 U	39 U	80 U	56 U	40 U	38 U	39 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	24	6.2	0	0	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-19	HT18-19	HT18-19	HT18-19	HT18-20	HT18-20	HT18-20
			Sample Name:	HT18-19-SURF	HT18-19-0010	HT18-19-1020	HT18-19-2030	HT18-20-SURF	HT18-20-0010	HT18-20-1020
			Sample Date:	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/25/2018
			Depth Interval (ft):	0-0.5	0-1	1-2.3	2.3-2.8	0-0.5	0-0.8	0.8-1.8
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Aroclor-1221	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Aroclor-1232	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Aroclor-1242	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Aroclor-1248	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Aroclor-1254	NSL	NSL	ug/kg	22 J	53 U	41 U	39 U	15 J	210	40 U
Aroclor-1260	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Aroclor-1262	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Aroclor-1268	NSL	NSL	ug/kg	54 U	53 U	41 U	39 U	67 U	41 U	40 U
Total PCBs ND=0	59.8	676	ug/kg	22	0	0	0	15	**210**	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-20	HT18-20	HT18-21	HT18-21	HT18-23	HT18-23	HT18-23
			Sample Name:	HT18-20-2030	HT18-20-2030-FD	HT18-21-SURF	HT18-21-0015	HT18-23-SURF	HT18-23-0010	HT18-23-1030
			Sample Date:	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/23/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	1.8-2.8	1.8-2.8	0-0.5	0-1.7	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	41 U	39 U	48 U	38 U	110 U	44 U	41 U
Aroclor-1221	NSL	NSL	ug/kg	41 U	39 U	48 U	38 U	110 U	44 U	41 U
Aroclor-1232	NSL	NSL	ug/kg	41 U	39 U	48 U	38 U	110 U	44 U	41 U
Aroclor-1242	NSL	NSL	ug/kg	41 U	39 U	48 U	38 U	110 U	44 U	41 U
Aroclor-1248	NSL	NSL	ug/kg	41 U	39 U	48 U	38 U	110 U	44 U	41 U
Aroclor-1254	NSL	NSL	ug/kg	41 U	39 U	8.3 J	38 U	12 J	24 J	41 U
Aroclor-1260	NSL	NSL	ug/kg	41 U	39 U	48 U	25 J	110 U	44 U	41 U
Aroclor-1262	NSL	NSL	ug/kg	41 U	39 U	48 U	38 U	110 U	44 U	41 U
Aroclor-1268	NSL	NSL	ug/kg	41 U	39 U	48 U	38 U	110 U	44 U	41 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	8.3	25	12	24	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-23	HT18-23	HT18-23	HT18-24	HT18-24	HT18-24	HT18-24
			Sample Name:	HT18-23-3050	HT18-23-5070	HT18-23-7010	HT18-24-SURF	HT18-24-0010	HT18-24-1025	HT18-24-2550
			Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	3-5	5-7	7-9.2	0-0.5	0-1	1-2.7	2.7-5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Aroclor-1221	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Aroclor-1232	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Aroclor-1242	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Aroclor-1248	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Aroclor-1254	NSL	NSL	ug/kg	44 U	43 U	46 U	29 J	42 U	42 U	44 U
Aroclor-1260	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Aroclor-1262	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Aroclor-1268	NSL	NSL	ug/kg	44 U	43 U	46 U	73 U	42 U	42 U	44 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	0	29	0	0	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-24	HT18-24	HT18-24	HT18-25	HT18-25	HT18-25	HT18-25
			Sample Name:	HT18-24-5065	HT18-24-5065-FD	HT18-24-6575	HT18-25-SURF	HT18-25-0010	HT18-25-1030	HT18-25-3040
			Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	5-6.6	5-6.6	6.6-7.8	0-0.5	0-1	1-3	3-4.2
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	43 U	40 U	39 U	99 U	56 U	65 U	54 U
Aroclor-1221	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	56 U	65 U	54 U
Aroclor-1232	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	56 U	65 U	54 U
Aroclor-1242	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	56 U	65 U	54 U
Aroclor-1248	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	56 U	65 U	54 U
Aroclor-1254	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	15 J	65 U	54 U
Aroclor-1260	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	56 U	65 U	54 U
Aroclor-1262	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	6.3 J	65 U	54 U
Aroclor-1268	NSL	NSL	ug/kg	43 U	40 U	39 U	99 UJ	56 U	65 U	54 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	0	0	21.3	0	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-25	HT18-25	HT18-26	HT18-26	HT18-26	HT18-26	HT18-26
			Sample Name:	HT18-25-4070	HT18-25-7010	HT18-26-SURF	HT18-26-0010	HT18-26-1030	HT18-26-3050	HT18-26-3050-FD
			Sample Date:	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	4.2-7	7-9.5	0-0.5	0-1	1-3	3-5	3-5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Aroclor-1221	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Aroclor-1232	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Aroclor-1242	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Aroclor-1248	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Aroclor-1254	NSL	NSL	ug/kg	45 U	43 U	50 J	41 U	40 U	43 U	43 U
Aroclor-1260	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Aroclor-1262	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Aroclor-1268	NSL	NSL	ug/kg	45 U	43 U	62 U	41 U	40 U	43 U	43 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	50	0	0	0	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-26	HT18-26	HT18-27	HT18-27	HT18-29	HT18-29	HT18-30
			Sample Name:	HT18-26-5070	HT18-26-7010	HT18-27-0010	HT18-27-1020	HT18-29-SURF	HT18-29-0010	HT18-30-SURF
			Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/22/2018	10/23/2018	10/22/2018
			Depth Interval (ft):	5-7	7-9.5	0-0.8	0.8-2.4	0-0.5	0-1.2	0-0.5
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	41 U	40 U	85 U
Aroclor-1221	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	41 U	40 U	85 U
Aroclor-1232	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	41 U	40 U	85 U
Aroclor-1242	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	41 U	40 U	22 J
Aroclor-1248	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	41 U	40 U	85 U
Aroclor-1254	NSL	NSL	ug/kg	44 U	43 U	18 J	41 U	41 U	40 U	85 U
Aroclor-1260	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	25 J	22 J	8.6 J
Aroclor-1262	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	41 U	40 U	85 U
Aroclor-1268	NSL	NSL	ug/kg	44 U	43 U	43 U	41 U	41 U	40 U	85 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	18	0	25	22	30.6

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-30	HT18-30	HT18-30	HT18-30	HT18-30	HT18-31	HT18-31
			Sample Name:	HT18-30-0010	HT18-30-1030	HT18-30-3050	HT18-30-5070	HT18-30-7010	HT18-31-SURF	HT18-31-0010
			Sample Date:	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/25/2018
			Depth Interval (ft):	0-1	1-3	3-5	5-7	7-10	0-0.5	0-1.3
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	75 U	61 U	57 UJ	53 U	57 U	91 U	57 U
Aroclor-1221	NSL	NSL	ug/kg	75 U	61 U	57 UJ	53 U	57 U	91 U	57 U
Aroclor-1232	NSL	NSL	ug/kg	75 U	61 U	57 UJ	53 U	57 U	91 U	57 U
Aroclor-1242	NSL	NSL	ug/kg	75 U	61 U	57 UJ	53 U	57 U	15 J	57 U
Aroclor-1248	NSL	NSL	ug/kg	75 U	61 U	57 UJ	35 J	57 U	91 U	57 U
Aroclor-1254	NSL	NSL	ug/kg	75 U	120 J	47 J-	53 U	12 J	8.3 J	41 J
Aroclor-1260	NSL	NSL	ug/kg	11 J	61 U	57 UJ	19 J	8.2 J	91 U	57 U
Aroclor-1262	NSL	NSL	ug/kg	75 U	61 U	18 J-	53 U	57 U	91 U	57 U
Aroclor-1268	NSL	NSL	ug/kg	75 U	61 U	57 UJ	15 J	9.2 J	91 U	57 U
Total PCBs ND=0	59.8	676	ug/kg	11	**120**	**65**	**69**	29.4	23.3	41

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-31	HT18-31	HT18-31	HT18-32	HT18-32	HT18-32	HT18-32
			Sample Name:	HT18-31-1025	HT18-31-2555	HT18-31-5565	HT18-32-SURF	HT18-32-SURF-FD	HT18-32-0010	HT18-32-0010-FD
			Sample Date:	10/25/2018	10/25/2018	10/25/2018	10/23/2018	10/23/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	1.3-2.6	2.6-5.7	5.7-6.6	0-0.5	0-0.5	0-1	0-1
Analyte	**TEC**	**PEC**	**Unit**							
Aroclor-1016	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	66 U	48 U	46 U
Aroclor-1221	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	66 U	48 U	46 U
Aroclor-1232	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	66 U	48 U	46 U
Aroclor-1242	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	15 J	48 U	46 U
Aroclor-1248	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	66 U	48 U	46 U
Aroclor-1254	NSL	NSL	ug/kg	69 U	39 U	38 U	6.3 J	66 U	22 J	20 J
Aroclor-1260	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	8.6 J	48 U	46 U
Aroclor-1262	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	66 U	48 U	46 U
Aroclor-1268	NSL	NSL	ug/kg	69 U	39 U	38 U	68 U	66 U	48 U	46 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	0	6.3	23.6	22	20

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-3 SEDIMENT RESULTS FOR PCB AROCLORS, HT

			Location ID:	HT18-32	HT18-32	HT18-32
			Sample Name:	HT18-32-1030	HT18-32-3050	HT18-32-5070
			Sample Date:	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	1-3	3-5	5-7
Analyte	**TEC**	**PEC**	**Unit**			
Aroclor-1016	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1221	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1232	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1242	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1248	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1254	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1260	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1262	NSL	NSL	ug/kg	44 U	45 U	46 U
Aroclor-1268	NSL	NSL	ug/kg	44 U	45 U	46 U
Total PCBs ND=0	59.8	676	ug/kg	0	0	0

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream 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).

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected.

P = The relative percent difference between the two columns is greater than 40% between the two analytical results.

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

Analyte	TEC	PEC	Unit	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-02	HT18-02	HT18-02
			Sample Name:	HT18-01-SURF	HT18-01-SURF-FD	HT18-01-0010	HT18-01-1030	HT18-01-3050	HT18-01-5070	HT18-01-5070-FD	HT18-01-7085	HT18-02-SURF	HT18-02-0010	HT18-02-1030
			Sample Date:	10/29/2018	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/29/2018	10/30/2018	10/30/2018
			Depth Interval (ft):	0-0.5	0-0.5	0-1	1-3	3-5	5-7	5-7	7-8.6	0-0.5	0-1	1-3
1-Methylnaphthalene	NSL	NSL	ug/kg	8 J	4.6 J	6.7 J	7.7 J	8.3 J	3.3 J	21 J	10 J	9 J	5.9 J	16 J
2-Methylnaphthalene[a]	20.2	NSL	ug/kg	7.6 J	4.2 J	80 U	7.9 J	48 J	22 J	90 J	9.6 J	8.4 J	33 J	45 J
Acenaphthene[a][b]	6.71	NSL	ug/kg	7.3 J	6.2 J	30 J	37 J	35 J	21 J	91	57	22 J	13 J	79
Acenaphthylene[a][b]	5.87	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	2.6 J	12 J	44 U	8.7 J	33 U	45 U
Anthracene[a][b]	57.2	845	ug/kg	13 J	11 J	29 J	90	63	36	170	69	67	26 J	110
Benzo(a)anthracene[a][b]	108	1,050	ug/kg	120	72	220	250	210	94	400	180	210	120	190
Benzo(a)pyrene[a][b]	150	1,450	ug/kg	160	92	80 J	160	110	64	280	130	170	99	160
Benzo(b)fluoranthene[a][b]	10,400	NSL	ug/kg	290	170	300	290	190	73	310	130	280	190	140
Benzo(e)pyrene[b]	150	1,450	ug/kg	200	120	220	200	140	56	240	96	180	140	110
Benzo(g,h,i)perylene[a][b]	170	NSL	ug/kg	170	96	210	140	130	54	230	44 J	140	150	98
Benzo(k)fluoranthene[a][b]	240	NSL	ug/kg	220	120	300	240	200	82	350	130	220	170	160
C1 Chrysenes[b]	NSL	NSL	ug/kg	68 J	40 J	80 U	97 J	90 J	40 J	180 J	64 J	96 J	59 J	81 J
C1 Fluorenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	22 U	90 U	44 U	53 U	33 U	45 U
C1-Fluoranthenes/Pyrenes[b]	NSL	NSL	ug/kg	160 J	92 J	260 J	290 J	250 J	120 J	530 J	200 J	230 J	150 J	240 J
C1-Naphthalenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	22 U	90 U	44 U	53 U	33 U	45 U
C1-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	75 J	45 J	110 J	160 J	130 J	70 J	340 J	140 J	140 J	70 J	160 J
C2 Chrysenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	22 U	90 U	44 U	53 U	33 U	45 U
C2 Fluorenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	22 U	90 U	44 U	53 U	33 U	45 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	98 J	56 J	130 J	140 J	120 J	50 J	240 J	82 J	110 J	84 J	100 J
C2-Naphthalenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	22 U	130 J	44 U	53 U	33 U	62 J
C2-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	59 J	36 J	80 U	120 J	91 J	42 J	250 J	79 J	83 J	51 J	84 J
C3 Chrysenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	22 U	90 U	44 U	53 U	33 U	45 U
C3 Fluorenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	49 J	22 U	99 J	44 U	53 U	38 J	45 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	51 J	22 U	91 J	44 U	53 U	33 U	45 U
C3-Naphthalenes[b]	NSL	NSL	ug/kg	54 J	33 J	80 U	79 J	49 J	25 J	210 J	46 J	58 J	46 J	48 J
C3-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	88 J	70 J	22 U	160 J	44 U	53 U	33 J	45 U
C4 Chrysenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	66 U	48 U	22 U	90 U	44 U	53 U	33 U	45 U
C4-Naphthalenes[b]	NSL	NSL	ug/kg	71 J	43 J	80 U	85 J	51 J	22 U	190 J	44 U	59 J	48 J	45 U
C4-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	45 U	29 U	80 U	69 J	51 J	22 U	100 J	44 U	53 U	33 U	45 U
Chrysene[a][b]	166	1,290	ug/kg	270	150	340	320	240	100	430	170	280	200	200
Dibenzo(a,h)anthracene[a][b]	33	NSL	ug/kg	47	26 J	73 J	53 J	50	21 J	87 J	32 J	47 J	47	39 J
Fluoranthene[a][b]	423	2,230	ug/kg	530	310	710	810	540	230 J	1100 J	440	660	360	490
Fluorene[a][b]	77	536	ug/kg	16 J	10 J	40 J	54 J	37 J	16 J	80 J	45	37 J	19 J	58
Indeno(1,2,3-cd)pyrene[a][b]	200	NSL	ug/kg	170	96	200	150	120	53	230	84	150	140	97
Naphthalene[a][b]	176	561	ug/kg	8.3 J	5 J	80 J	8.3 J	48 J	22 J	90 J	14 J	8.5 J	33 J	45 J
Perylene[b]	NSL	NSL	ug/kg	51	31	19 J	65 J	47 J	24	120	53	58	49	49
Phenanthrene[a][b]	204	1,170	ug/kg	180	120	400	530	350	170 J	750 J	390	360	170	470
Pyrene[a][b]	195	1,520	ug/kg	330	200	550	560	440	200 J	870 J	360	440	270	420
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	2562	1503	3642	3733	2835	1261	5570	2307	3109	2057	2824
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	3517	2084	4771	5242	3973	1737	8299	3217	4269	2840	3838

NOTES:
Detected values are Bolded
Bolded and Shaded detected values exceed 3XPEC screening value
Bolded and Shaded detected values exceed 2XPEC screening value
Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-02	HT18-02	HT18-02	HT18-03	HT18-03	HT18-03	HT18-03	HT18-03	HT18-03	HT18-04	HT18-04
			Sample Name:	HT18-02-3060	HT18-02-6080	HT18-02-8090	HT18-03-SURF	HT18-03-0010	HT18-03-1030	HT18-03-1030-FD	HT18-03-3045	HT18-03-4560	HT18-04-SURF	HT18-04-0005
			Sample Date:	10/30/2018	10/30/2018	10/30/2018	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	3-6.1	6.1-7.8	7.8-9.2	0-0.5	0-1	1-3	1-3	3-4.6	4.6-6	0-0.5	0-0.6
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**62 J**	**40 J**	**16 J**	**23 J**	**51 J**	**360**	**350**	**520**	3.8 U	**1.8 J**	**1.1 J**
2-Methylnaphthalene(a)	20.2	NSL	ug/kg	**220 J**	**210 J**	**100 J**	**30 J**	**340 J**	**300 J**	**300 J**	**260 J**	3.8 U	**2 J**	**0.87 J**
Acenaphthene(a)(b)	6.71	NSL	ug/kg	**440**	**170 J**	**83 J**	**31 J**	**77 J**	**230 J**	**240 J**	**240 J**	3.8 U	**2.7 J**	**1.8 J**
Acenaphthylene(a)(b)	5.87	NSL	ug/kg	**33 J**	**35 J**	**12 J**	170 U	340 U	**53 J**	**48 J**	**47 J**	3.8 U	8.7 U	**0.56 J**
Anthracene(a)(b)	57.2	845	ug/kg	**690**	**240**	**150**	**60 J**	**150 J**	**220 J**	**350**	**270**	3.8 U	**6.8 J**	**2.9 J**
Benzo(a)anthracene(a)(b)	108	1,050	ug/kg	**940**	**990**	**350**	**560**	**960**	**950**	**990**	**720**	**0.83 J**	**32**	**15**
Benzo(a)pyrene(a)(b)	150	1,450	ug/kg	**800**	**380**	**210**	**450**	**1100**	**840**	**870**	**550**	3.8 U	**31**	**17**
Benzo(b)fluoranthene(a)(b)	10,400	NSL	ug/kg	**650**	**720**	**260**	**1000**	**1400**	**1000**	**930**	**680**	3.8 U	**47**	**25**
Benzo(e)pyrene(b)	150	1,450	ug/kg	**520**	**530**	**200**	**730**	**1100**	**750**	**780**	**580**	**1.8 J**	**33**	**14**
Benzo(g,h,i)perylene(a)(b)	170	NSL	ug/kg	**470**	**470**	**190**	**580**	**1200**	**690**	**690**	**480**	**3.2 J**	**26**	**2.7 J**
Benzo(k)fluoranthene(a)(b)	240	NSL	ug/kg	**750**	**870**	**280**	**860**	**1300**	**910**	**1000**	**770**	**0.48 J**	**38**	**22**
C1 Chrysenes(b)	NSL	NSL	ug/kg	**400 J**	**420 J**	**160 J**	**240 J**	**540 J**	**920 J**	**940 J**	**820 J**	**5.1 J**	**15 J**	**7.8 J**
C1 Fluorenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	170 U	340 U	**580 J**	**550 J**	**600 J**	3.8 U	8.7 U	4.2 U
C1-Fluoranthenes/Pyrenes(b)	NSL	NSL	ug/kg	**1300 J**	**1300 J**	**450 J**	**670 J**	**1200 J**	**1900 J**	**1900 J**	**1700 J**	**7.1 J**	**29 J**	**18 J**
C1-Naphthalenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	170 U	340 U	**350 J**	**330 J**	**440 J**	3.8 U	8.7 U	4.2 U
C1-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**1000 J**	**680 J**	**300 J**	**330 J**	**570 J**	**3000 J**	**2800 J**	**2900 J**	**15 J**	**18 J**	**9.7 J**
C2 Chrysenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	170 U	340 U	**640 J**	**630 J**	**590 J**	**4.8 J**	8.7 U	**4.3 J**
C2 Fluorenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	170 U	340 U	**1600 J**	**1500 J**	**1600 J**	**6.5 J**	8.7 U	4.2 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**490 J**	**540 J**	**190 J**	**400 J**	**790 J**	**1600 J**	**1600 J**	**1500 J**	**11 J**	**21 J**	**11 J**
C2-Naphthalenes(b)	NSL	NSL	ug/kg	**470 J**	210 U	100 U	**170 J**	**360 J**	**3800 J**	**3600 J**	**4700 J**	**17 J**	8.7 U	**4.9 J**
C2-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**490 J**	**380 J**	**160 J**	**380 J**	**730 J**	**4400 J**	**4200 J**	**4300 J**	**20 J**	**12 J**	**9.2 J**
C3 Chrysenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	170 U	340 U	**480 J**	**460 J**	**440 J**	**4.1 J**	8.7 U	4.2 U
C3 Fluorenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	**230 J**	**540 J**	**2100 J**	**2000 J**	**2100 J**	**9.8 J**	8.7 U	**4.5 J**
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	220 U	210 U	100 U	**210 J**	**380 J**	**1100 J**	**1100 J**	**1100 J**	**7.7 J**	8.7 U	**5.2 J**
C3-Naphthalenes(b)	NSL	NSL	ug/kg	**370 J**	**210 J**	100 U	**270 J**	**510 J**	**5900 J**	**5600 J**	**6900 J**	**38 J**	**9 J**	**8.7 J**
C3-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	**330 J**	**740 J**	**4000 J**	**3800 J**	**3800 J**	**17 J**	8.7 U	**6.5 J**
C4 Chrysenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	170 U	340 U	300 U	300 U	260 U	3.8 U	8.7 U	4.2 U
C4-Naphthalenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	**350 J**	**670 J**	**5100 J**	**5300 J**	**5700 J**	**56 J**	**12 J**	**13 J**
C4-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	220 U	210 U	100 U	**260 J**	**570 J**	**2900 J**	**2700 J**	**2600 J**	**12 J**	8.7 U	**4.7 J**
Chrysene(a)(b)	166	1,290	ug/kg	**970**	**1100**	**370**	**1000**	**1600**	**1400**	**1400**	**1100**	**4**	**47**	**23**
Dibenzo(a,h)anthracene(a)(b)	33	NSL	ug/kg	**180 J**	**210**	**73 J**	**170**	**380**	**250 J**	**260 J**	**170 J**	3.8 U	**7.7 J**	**5.2**
Fluoranthene(a)(b)	423	2,230	ug/kg	**2300**	**2400**	**890**	**2200**	**2900**	**2800**	**2700**	**2200**	**1.3 J**	**100**	**47**
Fluorene(a)(b)	77	536	ug/kg	**370**	**180 J**	**86 J**	**53 J**	**85 J**	**230 J**	**220 J**	**230 J**	**1 J**	**4.2 J**	**2.5 J**
Indeno(1,2,3-cd)pyrene(a)(b)	200	NSL	ug/kg	**460**	**500**	**190**	**580**	**1100**	**650**	**650**	**450**	**0.6 J**	**26**	**15**
Naphthalene(a)(b)	176	561	ug/kg	**220 J**	**210 J**	**100 J**	**25 J**	**340 J**	**300 J**	**300 J**	**260 J**	3.8 U	**2.6 J**	**0.66 J**
Perylene(b)	NSL	NSL	ug/kg	**220**	**150 J**	**98 J**	**160 J**	**310 J**	**270 J**	**270 J**	**190 J**	**2.6 J**	**11**	**7.4**
Phenanthrene(a)(b)	204	1,170	ug/kg	**2200**	**1600**	**730**	**740**	**1100**	**1800**	**1800**	**1700**	**5.4**	**45**	**16**
Pyrene(a)(b)	195	1,520	ug/kg	**2000**	**1900**	**760**	**1400**	**2000**	**2000**	**2100**	**1700**	**2.5 J**	**68**	**32**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**13693**	**12185**	**4834**	**9824**	**16202**	**14623**	**14848**	**11827**	**34.5**	**490**	**229**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**19343**	**16800**	**6702**	**14424**	**24722**	**53163**	**52058**	**51657**	**255**	**671**	**352**

NOTES:
Detected values are Bolded
Bolded and Shaded detected values exceed 3XPEC screening value
Bolded and Shaded detected values exceed 2XPEC screening value
Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-04	HT18-04	HT18-04	HT18-05	HT18-05	HT18-05	HT18-05	HT18-05	HT18-06	HT18-06	HT18-06
			Sample Name:	HT18-04-0530	HT18-04-0530-FD	HT18-04-3040	HT18-05-SURF	HT18-05-0010	HT18-05-1030	HT18-05-3050	HT18-05-5060	HT18-06-SURF	HT18-06-0010	HT18-06-1030
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	0.6-3.3	0.6-3.3	3.3-4.3	0-0.5	0-1	1-2.7	2.7-5.1	5.1-5.9	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**0.5 J**	**0.45 J**	**0.31 J**	**19 J**	**10 J**	**25 J**	**130 J**	**97 J**	**4.1 J**	**6.4 J**	**17 J**
2-Methylnaphthalene[a]	20.2	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**23 J**	**45 J**	**87 J**	**500 J**	**220 J**	**4.9 J**	**6.6 J**	**23 J**
Acenaphthene[a][b]	6.71	NSL	ug/kg	**0.34 J**	4.3 U	3.8 U	**43 J**	**13 J**	**27 J**	**560**	**220**	**5.8 J**	**7.2 J**	**13 J**
Acenaphthylene[a][b]	5.87	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	45 U	87 U	500 U	**28 J**	37 U	29 U	**6.8 J**
Anthracene[a][b]	57.2	845	ug/kg	4.4 U	4.3 U	3.8 U	**95 J**	**19 J**	**33 J**	**600**	**300**	**14 J**	**12 J**	**23 J**
Benzo(a)anthracene[a][b]	108	1,050	ug/kg	4.4 U	4.3 U	3.8 U	**660**	**170**	**260**	**1600**	**1200**	**100**	**91**	**140**
Benzo(a)pyrene[a][b]	150	1,450	ug/kg	4.4 U	4.3 U	3.8 U	**690**	**160**	**280**	**1200**	**830**	**120**	**110**	**150**
Benzo(b)fluoranthene[a][b]	10,400	NSL	ug/kg	**1.5 J**	**0.86 J**	**0.66 J**	**1000**	**290**	**420**	**1200**	**1100**	**170**	**180**	**250**
Benzo(e)pyrene[b]	150	1,450	ug/kg	**0.88 J**	**0.64 J**	**0.49 J**	**700**	**210**	**310**	**870**	**820**	**120**	**100**	**150**
Benzo(g,h,i)perylene[a][b]	170	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**560**	**210**	**310**	**680**	**830**	**96**	**24 J**	**50**
Benzo(k)fluoranthene[a][b]	240	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**810**	**250**	**380**	**1300**	**1100**	**140**	**130**	**190**
C1 Chrysenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**350 J**	**140 J**	**170 J**	**830 J**	**690 J**	**64 J**	**43 J**	**83 J**
C1 Fluorenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	45 U	87 U	500 U	220 U	37 U	29 U	48 U
C1-Fluoranthenes/Pyrenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**680 J**	**210 J**	**390 J**	**2300 J**	**1400 J**	**110 J**	**110 J**	**200 J**
C1-Naphthalenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	45 U	87 U	500 U	220 U	37 U	29 U	48 U
C1-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**310 J**	**89 J**	**200 J**	**1700 J**	**790 J**	**52 J**	**52 J**	**160 J**
C2 Chrysenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	45 U	87 U	500 U	**340 J**	37 U	29 U	48 U
C2 Fluorenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	45 U	**94 J**	**680 J**	220 U	37 U	29 U	**91 J**
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**390 J**	**130 J**	**230 J**	**1100 J**	**830 J**	**66 J**	**65 J**	**120 J**
C2-Naphthalenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	**55 J**	**180 J**	**1600 J**	**500 J**	37 U	**29 J**	**130 J**
C2-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**270 J**	**85 J**	**250 J**	**1900 J**	**800 J**	**52 J**	**54 J**	**190 J**
C3 Chrysenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	45 U	87 U	500 U	220 U	37 U	29 U	48 U
C3 Fluorenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**190 J**	**76 J**	**170 J**	**810 J**	**400 J**	**37 J**	29 U	**99 J**
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**160 J**	**53 J**	**110 J**	**580 J**	**440 J**	37 U	29 U	**63 J**
C3-Naphthalenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**170 J**	**82 J**	**260 J**	**2600 J**	**590 J**	**38 J**	**50 J**	**230 J**
C3-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**210 J**	**72 J**	**230 J**	**1600 J**	**770 J**	**38 J**	**39 J**	**160 J**
C4 Chrysenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	160 U	45 U	87 U	500 U	220 U	37 U	29 U	48 U
C4-Naphthalenes[b]	NSL	NSL	ug/kg	**7.8 J**	**6.8 J**	**5 J**	**210 J**	**99 J**	**280 J**	**2500 J**	**550 J**	**52 J**	**80 J**	**330 J**
C4-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**160 J**	**52 J**	**210 J**	**1100 J**	**710 J**	37 U	**29 J**	**120 J**
Chrysene[a][b]	166	1,290	ug/kg	**2 J**	**1.5 J**	**1.1 J**	**1000**	**300**	**480**	**1800**	**1400**	**170**	**160**	**240**
Dibenzo(a,h)anthracene[a][b]	33	NSL	ug/kg	4.4 U	4.3 U	3.8 U	**170**	**63**	**94**	**310 J**	**350**	**28 J**	**29**	**41 J**
Fluoranthene[a][b]	423	2,230	ug/kg	**1.8 J**	**1.2 J**	**0.68 J**	**2300**	**530**	**830**	**4100**	**2600**	**360**	**310**	**510**
Fluorene[a][b]	77	536	ug/kg	4.4 U	4.3 U	3.8 U	**62 J**	**19 J**	**40 J**	**420 J**	**240**	**9.2 J**	**11 J**	**23 J**
Indeno(1,2,3-cd)pyrene[a][b]	200	NSL	ug/kg	**0.51 J**	4.3 U	3.8 U	**570**	**190**	**280**	**740**	**820**	**94**	**96**	**130**
Naphthalene[a][b]	176	561	ug/kg	4.4 U	4.3 U	3.8 U	**23 J**	**45 J**	**87 J**	**500 J**	**260**	**4.7 J**	**5.7 J**	**12 J**
Perylene[b]	NSL	NSL	ug/kg	**3.2 J**	**3 J**	**2.2 J**	**200**	**58**	**92**	**320 J**	**280**	**36 J**	**24 J**	**40 J**
Phenanthrene[a][b]	204	1,170	ug/kg	**1 J**	**0.91 J**	3.8 U	**840**	**210**	**380**	**3000**	**1800**	**120**	**110**	**230**
Pyrene[a][b]	195	1,520	ug/kg	**1.7 J**	**1.3 J**	**0.73 J**	**1400**	**420**	**670**	**3500**	**2100**	**220**	**220**	**350**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**30.9**	**31.6**	**27.9**	**10326**	**2957**	**4702**	**22260**	**15398**	**1675**	**1517**	**2382**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**73.5**	**72.1**	**62.2**	**14313**	**4275**	**7668**	**41820**	**24368**	**2417**	**2222**	**4462**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

Location ID:				HT18-06	HT18-06	HT18-06	HT18-06	HT18-06	HT18-07	HT18-07	HT18-07	HT18-07	HT18-07	HT18-08
Sample Name:				HT18-06-1030-FD	HT18-06-3060	HT18-06-6070	HT18-06-7080	HT18-06-8010	HT18-07-SURF	HT18-07-0020	HT18-07-2050	HT18-07-5070	HT18-07-7090	HT18-08-SURF
Sample Date:				10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/22/2018
Depth Interval (ft):				1-3	3-6	6-7.1	7.1-8.1	8.1-9.7	0-0.5	0-1.8	1.8-4.8	4.8-7	7-8.9	0-0.5
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**15 J**	**88 J**	**170**	**490**	**450**	**2.7 J**	**11 J**	**110 J**	**150**	**360**	**12 J**
2-Methylnaphthalene[(a)]	20.2	NSL	ug/kg	**20 J**	**130 J**	**150**	**550**	**550**	**3.3 J**	**14 J**	**64 J**	**150**	**520**	**9.7 J**
Acenaphthene[(a)(b)]	6.71	NSL	ug/kg	**11 J**	**49 J**	**110**	**130**	**150 J**	**5.8 J**	**26 J**	**77 J**	**73 J**	**100 J**	**8.5 J**
Acenaphthylene[(a)(b)]	5.87	NSL	ug/kg	**5.3 J**	**32 J**	**34 J**	**48 J**	**49 J**	23 U	83 U	**47 J**	**31 J**	**54 J**	**6.4 J-**
Anthracene[(a)(b)]	57.2	845	ug/kg	**17 J**	**86 J**	**160**	**160**	**150 J**	**20 J**	**52 J**	**120 J**	**110 J**	**120**	**21 J-**
Benzo(a)anthracene[(a)(b)]	108	1,050	ug/kg	**110**	**440**	**430**	**460**	**470**	**83**	**220**	**490**	**400**	**380**	**140 J-**
Benzo(a)pyrene[(a)(b)]	150	1,450	ug/kg	**130**	**430**	**400**	**370**	**390**	**77**	**190**	**420**	**350**	**320**	**60**
Benzo(b)fluoranthene[(a)(b)]	10,400	NSL	ug/kg	**220**	**650**	**520**	**550**	**540**	**110**	**240**	**540**	**460**	**430**	**270**
Benzo(e)pyrene[(b)]	150	1,450	ug/kg	**130**	**390**	**340**	**350**	**340**	**75**	**150**	**350**	**280**	**260**	**45**
Benzo(g,h,i)perylene[(a)(b)]	170	NSL	ug/kg	**39**	**120 J**	**110**	**100**	**100 J**	**54**	**44 J**	**99 J**	**87 J**	**63 J**	28 UJ
Benzo(k)fluoranthene[(a)(b)]	240	NSL	ug/kg	**150**	**480**	**420**	**400**	**420**	**91**	**200**	**490**	**340**	**330**	**170**
C1 Chrysenes[(b)]	NSL	NSL	ug/kg	**61 J**	**230 J**	**300 J**	**510 J**	**460 J**	**31 J**	**87 J**	**610 J**	**330 J**	**560 J**	**69 J**
C1 Fluorenes[(b)]	NSL	NSL	ug/kg	**29 J**	**240 J**	**520 J**	**720 J**	**560 J**	23 U	83 U	**300 J**	**230 J**	**440 J**	28 U
C1-Fluoranthenes/Pyrenes[(b)]	NSL	NSL	ug/kg	**160 J**	**660 J**	**810 J**	**1100 J**	**1000 J**	**85 J**	**250 J**	**1200 J**	**750 J**	**1000 J**	**190 J**
C1-Naphthalenes[(b)]	NSL	NSL	ug/kg	29 U	**140 J**	**200 J**	**690 J**	**630 J**	23 U	83 U	130 U	**210 J**	**600 J**	28 U
C1-Phenanthrenes/Anthracenes[(b)]	NSL	NSL	ug/kg	**120 J**	**570 J**	**1600 J**	**2400 J**	**2200 J**	**45 J**	**180 J**	**1800 J**	**1200 J**	**2000 J**	**88 J**
C2 Chrysenes[(b)]	NSL	NSL	ug/kg	**37 J**	140 U	**250 J**	**440 J**	**380 J**	23 U	83 U	**470 J**	**280 J**	**570 J**	**49 J**
C2 Fluorenes[(b)]	NSL	NSL	ug/kg	**73 J**	**630 J**	**1300 J**	**1700 J**	**1300 J**	23 U	83 U	**1100 J**	**710 J**	**1300 J**	**28 J**
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**97 J**	**410 J**	**620 J**	**960 J**	**780 J**	**49 J**	**140 J**	**1000 J**	**560 J**	**1100 J**	**130 J**
C2-Naphthalenes[(b)]	NSL	NSL	ug/kg	**110 J**	**800 J**	**2500 J**	**4100 J**	**4300 J**	23 U	**120 J**	**1900 J**	**1800 J**	**4500 J**	**48 J**
C2-Phenanthrenes/Anthracenes[(b)]	NSL	NSL	ug/kg	**150 J**	**800 J**	**2200 J**	**3400 J**	**3200 J**	**40 J**	**210 J**	**3600 J**	**2000 J**	**3800 J**	**90 J**
C3 Chrysenes[(b)]	NSL	NSL	ug/kg	29 U	140 U	**140 J**	**210 J**	240 U	23 U	83 U	**300 J**	**150 J**	**330 J**	**34 J**
C3 Fluorenes[(b)]	NSL	NSL	ug/kg	**84 J**	**600 J**	**1500 J**	**1900 J**	**1400 J**	**27 J**	**99 J**	**1300 J**	**810 J**	**1700 J**	28 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**62 J**	**220 J**	**500 J**	**700 J**	**690 J**	**25 J**	83 U	**960 J**	**470 J**	**1000 J**	**55 J**
C3-Naphthalenes[(b)]	NSL	NSL	ug/kg	**190 J**	**1400 J**	**4600 J**	**6500 J**	**6500 J**	**34 J**	**250 J**	**4000 J**	**2900 J**	**6000 J**	**81 J**
C3-Phenanthrenes/Anthracenes[(b)]	NSL	NSL	ug/kg	**130 J**	**540 J**	**1700 J**	**2700 J**	**2700 J**	**30 J**	**170 J**	**3400 J**	**1800 J**	**3700 J**	**67 J**
C4 Chrysenes[(b)]	NSL	NSL	ug/kg	29 U	140 U	89 U	**96 J**	240 U	23 U	83 U	130 U	120 U	**120 J**	28 U
C4-Naphthalenes[(b)]	NSL	NSL	ug/kg	**280 J**	**1900 J**	**4500 J**	**6300 J**	**6400 J**	**38 J**	**280 J**	**4700 J**	**3200 J**	**5900 J**	**130 J**
C4-Phenanthrenes/Anthracenes[(b)]	NSL	NSL	ug/kg	**100 J**	**320 J**	**1200 J**	**1900 J**	**1900 J**	23 U	**120 J**	**2500 J**	**1200 J**	**2800 J**	**48 J**
Chrysene[(a)(b)]	166	1,290	ug/kg	**200**	**680**	**600**	**700**	**700**	**120**	**280**	**740**	**570**	**630**	**210 J-**
Dibenzo(a,h)anthracene[(a)(b)]	33	NSL	ug/kg	**32**	**99 J**	**86 J**	**95**	**83 J**	**20 J**	**45 J**	**93 J**	**75 J**	**61 J**	**42**
Fluoranthene[(a)(b)]	423	2,230	ug/kg	**400**	**1500**	**1400**	**1500**	**1700**	**270**	**690**	**1500**	**1300**	**1200**	**440**
Fluorene[(a)(b)]	77	536	ug/kg	**20 J**	**110 J**	**200**	**220**	**220 J**	**10 J**	**31 J**	**120 J**	**110 J**	**190**	**17 J**
Indeno(1,2,3-cd)pyrene[(a)(b)]	200	NSL	ug/kg	**110**	**340**	**260**	**240**	**250**	**58**	**120**	**260**	**210**	**180**	**66 J-**
Naphthalene[(a)(b)]	176	561	ug/kg	**11 J**	**25 J**	**110**	**140**	**43 J**	**3.1 J**	83 U	**22 J**	**26 J**	**23 J**	**6 J**
Perylene[(b)]	NSL	NSL	ug/kg	**38**	**92 J**	**99**	**94 J**	**88 J**	**23**	**48 J**	**110 J**	**82 J**	**71 J**	**6.7 J**
Phenanthrene[(a)(b)]	204	1,170	ug/kg	**170**	**790**	**1200**	**1300**	**1400**	**120**	**380**	**930**	**920**	**1000**	**150**
Pyrene[(a)(b)]	195	1,520	ug/kg	**270**	**1000**	**980**	**1000**	**1300**	**180**	**540**	**1100**	**930**	**900**	**180 J-**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**1915**	**6961**	**7170**	**7963**	**8515**	**1237**	**3155**	**7112**	**6142**	**6501**	**1811**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**3631**	**16353**	**30824**	**42523**	**41563**	**1753**	**5354**	**34818**	**23984**	**41632**	**2831**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
PEC = Probable 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 = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-08	HT18-08	HT18-08	HT18-08	HT18-08	HT18-08	HT18-09	HT18-09	HT18-09	HT18-09	HT18-09
			Sample Name:	HT18-08-0010	HT18-08-1020	HT18-08-1020-FD	HT18-08-2045	HT18-08-4565	HT18-08-6580	HT18-09-SURF	HT18-09-0010	HT18-09-1030	HT18-09-3050	HT18-09-3050-FD
			Sample Date:	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	0-1	1-2.3	1-2.3	2.3-4.6	4.6-6.5	6.5-8	0-0.5	0-1	1-3	3-5	3-5
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	7.3 J	38 J	29 J	440 J	3.4 J	1.1 J	5.6 J	9.6 J	12 J	5.7 J	18 J
2-Methylnaphthalene(a)	20.2	NSL	ug/kg	7.7 J	45 J	35 J	500 J	5.1 J	0.85 J	5.3 J	11 J	13 J	6.6 J	22 J
Acenaphthene(a)(b)	6.71	NSL	ug/kg	7.1 J	120 J	86 J	1600	6.3 J	0.61 J	51 U	7.9 J	14 J	8.1 J	37 J
Acenaphthylene(a)(b)	5.87	NSL	ug/kg	43 U	220 U	16 J	1000 U	3.1 J	4.1 U	51 R	39 U	6.8 J	33 U	10 J
Anthracene(a)(b)	57.2	845	ug/kg	6.9 J	180 J	140	3900	12	4.1 U	10 J-	18 J	20 J	25 J	71
Benzo(a)anthracene(a)(b)	108	1,050	ug/kg	100	850	690	6500	60	2 J	110 J-	140	170	100 J	320 J
Benzo(a)pyrene(a)(b)	150	1,450	ug/kg	62	550	460	4000	34	1.5 J	140	190	180	110	320
Benzo(b)fluoranthene(a)(b)	10,400	NSL	ug/kg	260	920	780	4200	51	3.2 J	230	330	320	150	450
Benzo(e)pyrene(b)	150	1,450	ug/kg	180	650	510	3100	37	2.6 J	160	230	220	100	290
Benzo(g,h,i)perylene(a)(b)	170	NSL	ug/kg	180	570	500	2200	33	4.1 U	110 J-	240	190	93	270
Benzo(k)fluoranthene(a)(b)	240	NSL	ug/kg	200	840	620	4300	39	1.7 J	180	250	250	120	320
C1 Chrysenes(b)	NSL	NSL	ug/kg	58 J	310 J	250 J	3200 J	110 J	5 J	51 U	68 J	90 J	52 J	130 J
C1 Fluorenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 U	1000 U	14 J	4.1 U	51 U	39 U	37 U	33 U	66 U
C1-Fluoranthenes/Pyrenes(b)	NSL	NSL	ug/kg	150 J	870 J	680 J	9500 J	130 J	8 J	150 J	180 J	230 J	120 J	350 J
C1-Naphthalenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 U	1000 U	8.7 U	4.1 U	51 U	39 U	37 U	33 U	66 U
C1-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	67 J	440 J	330 J	5800 J	110 J	7.7 J	61 J	80 J	120 J	72 J	220 J
C2 Chrysenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 U	2100 J	110 J	4.2 J	51 U	51 J	50 J	33 U	73 J
C2 Fluorenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 U	1500 J	50 J	4.2 J	51 U	39 U	71 J	33 J	110 J
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	95 J	460 J	370 J	5100 J	140 J	8.3 J	86 J	120 J	130 J	68 J	220 J
C2-Naphthalenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 J	2100 J	35 J	5 J	51 U	47 J	110 J	46 J	130 J
C2-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	75 J	320 J	260 J	5800 J	270 J	15 J	55 J	79 J	150 J	78 J	220 J
C3 Chrysenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 U	1100 J	77 J	4.1 U	51 U	39 U	37 U	33 U	66 U
C3 Fluorenes(b)	NSL	NSL	ug/kg	63 J	220 U	140 J	1200 J	110 J	5.1 J	51 U	62 J	37 U	50 J	170 J
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	46 J	220 U	140 J	3100 J	110 J	6.5 J	51 U	51 J	68 J	33 J	96 J
C3-Naphthalenes(b)	NSL	NSL	ug/kg	75 J	220 J	170 J	2700 J	87 J	10 J	51 U	80 J	180 J	78 J	210 J
C3-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	66 J	230 J	180 J	6000 J	340 J	14 J	51 U	63 J	120 J	61 J	170 J
C4 Chrysenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 U	1000 U	24 J	4.1 U	51 U	39 U	37 U	33 U	66 U
C4-Naphthalenes(b)	NSL	NSL	ug/kg	98 J	220 J	170 J	4400 J	150 J	20 J	83 J	100 J	200 J	86 J	240 J
C4-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	43 U	220 U	140 J	4700 J	300 J	12 J	51 U	46 J	89 J	52 J	140 J
Chrysene(a)(b)	166	1,290	ug/kg	220	1100	850	6600	83	5	210 J-	280	300	150	440
Dibenzo(a,h)anthracene(a)(b)	33	NSL	ug/kg	41 J	190 J	170	840 J	11	0.46 J	36 J	61	49	29 J	87
Fluoranthene(a)(b)	423	2,230	ug/kg	410	2300	1800	16000	110	5.1	380	500	570	300 J	920 J
Fluorene(a)(b)	77	536	ug/kg	13 J	130 J	95 J	2200	6.5 J	1.2 J	12 J	17 J	26 J	14 J	52 J
Indeno(1,2,3-cd)pyrene(a)(b)	200	NSL	ug/kg	150	530	480	2100	28	1.2 J	130 J-	220	170	87	250
Naphthalene(a)(b)	176	561	ug/kg	4.4 J	47 J	34 J	640 J	3.4 J	0.85 J	51 U	7.9 J	9.8 J	3.6 J	23 J
Perylene(b)	NSL	NSL	ug/kg	42 J	210 J	170	1100	16	6.9	44 J	61	67	35	100
Phenanthrene(a)(b)	204	1,170	ug/kg	130	1400	930	16000	52	3.2 J	150	180	230	130 J	500 J
Pyrene(a)(b)	195	1,520	ug/kg	270	1700	1300	14000	88	4.9	310 J-	350	430	200 J	640 J
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	2084	11582	8986	86080	625	37.92	2115	2822	2949	1543	4732
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	3122	15997	12511	141380	2595	164.97	2969	4056	4725	2482	7395

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
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U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

Location ID:				HT18-09	HT18-09	HT18-10	HT18-10	HT18-11	HT18-11	HT18-11	HT18-11	HT18-11	HT18-11	HT18-12
Sample Name:				HT18-09-5070	HT18-09-7010	HT18-10-SURF	HT18-10-0010	HT18-11-SURF	HT18-11-0010	HT18-11-1030	HT18-11-3050	HT18-11-5070	HT18-11-7010	HT18-12-SURF
Sample Date:				10/23/2018	10/23/2018	10/22/2018	10/24/2018	10/22/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/22/2018
Depth Interval (ft):				5-7	7-9.7	0-0.5	0-1.1	0-0.5	0-1	1-3	3-5	5-7	7-9.4	0-0.5
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**27 J**	**130**	**6.7 J**	**1.1 J**	**10 J**	**5.1 J**	**12 J**	**6.6 J**	**0.78 J**	**1.1 J**	**14 J**
2-Methylnaphthalene(a)	20.2	NSL	ug/kg	**37 J**	**160**	**6.5 J**	**1.1 J**	**7.3 J**	**5.8 J**	**12 J**	**6.2 J**	**0.7 J**	**0.71 J**	**13 J**
Acenaphthene(a)(b)	6.71	NSL	ug/kg	**20 J**	**64 J**	**48**	**4.5**	**11 J**	**18 J**	**17 J**	**12 J**	**0.66 J**	4.1 U	**19 J**
Acenaphthylene(a)(b)	5.87	NSL	ug/kg	**16 J**	**40 J**	**44 R**	**2 J**	**5.2 J-**	18 U	**8.9 J**	**4.8 J**	4.3 U	4.1 U	**15 J-**
Anthracene(a)(b)	57.2	845	ug/kg	**48**	**160**	**99 J-**	**3.3 J**	**19 J-**	**8 J**	**33 J**	**21**	**0.58 J**	4.1 U	**40 J-**
Benzo(a)anthracene(a)(b)	108	1,050	ug/kg	**210**	**520**	**200 J-**	**14**	**120 J-**	**64**	**190**	**110**	**2.4 J**	4.1 U	**220 J-**
Benzo(a)pyrene(a)(b)	150	1,450	ug/kg	**240**	**490**	**67**	**12**	**83**	**87**	**200**	**110**	**2.2 J**	**0.56 J**	**110**
Benzo(b)fluoranthene(a)(b)	10,400	NSL	ug/kg	**350**	**700**	**140**	**19**	**230**	**150**	**280**	**130**	**3.7 J**	**1.8 J**	**250**
Benzo(e)pyrene(b)	150	1,450	ug/kg	**240**	**470**	**37 J**	**14**	**74**	**100**	**190**	**95**	**2.5 J**	**1.6 J**	**84**
Benzo(g,h,i)perylene(a)(b)	170	NSL	ug/kg	**230**	**290**	44 UJ	**11**	**20 J-**	**94**	**180**	**82**	**2.4 J**	4.1 U	**19 J-**
Benzo(k)fluoranthene(a)(b)	240	NSL	ug/kg	**280**	**510**	**110**	**15**	**150**	**120**	**240**	**120**	4.3 U	**0.86 J**	**190**
C1 Chrysenes(b)	NSL	NSL	ug/kg	**130 J**	**390 J**	**84 J**	**20 J**	**60 J**	**30 J**	**88 J**	**66 J**	4.3 U	4.1 U	**110 J**
C1 Fluorenes(b)	NSL	NSL	ug/kg	**79 J**	**400 J**	44 U	3.9 U	28 U	18 U	46 U	21 U	4.3 U	4.1 U	45 U
C1-Fluoranthenes/Pyrenes(b)	NSL	NSL	ug/kg	**280 J**	**880 J**	**250 J**	**30 J**	**150 J**	**85 J**	**230 J**	**140 J**	**5.4 J**	**4.3 J**	**260 J**
C1-Naphthalenes(b)	NSL	NSL	ug/kg	47 U	**200 J**	44 U	3.9 U	28 U	18 U	46 U	21 U	4.3 U	4.1 U	45 U
C1-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**220 J**	**1400 J**	**190 J**	**21 J**	**88 J**	**41 J**	**140 J**	**85 J**	**4.7 J**	**5.4 J**	**160 J**
C2 Chrysenes(b)	NSL	NSL	ug/kg	**64 J**	**380 J**	**48 J**	**19 J**	**35 J**	**23 J**	**52 J**	**30 J**	4.3 U	4.1 U	**61 J**
C2 Fluorenes(b)	NSL	NSL	ug/kg	**250 J**	**1100 J**	44 U	**7.3 J**	28 U	**24 J**	**74 J**	**35 J**	4.3 U	4.1 U	45 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**190 J**	**740 J**	**110 J**	**28 J**	**110 J**	**55 J**	**140 J**	**82 J**	**4.3 J**	**4.7 J**	**170 J**
C2-Naphthalenes(b)	NSL	NSL	ug/kg	**270 J**	**1700 J**	**64 J**	**8.4 J**	**42 J**	**24 J**	**92 J**	**48 J**	4.3 U	**4.8 J**	**72 J**
C2-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**290 J**	**2100 J**	**130 J**	**38 J**	**84 J**	**41 J**	**150 J**	**99 J**	**7.2 J**	**9.3 J**	**160 J**
C3 Chrysenes(b)	NSL	NSL	ug/kg	47 U	**200 J**	44 U	**9.2 J**	28 U	18 U	46 U	21 U	4.3 U	4.1 U	45 U
C3 Fluorenes(b)	NSL	NSL	ug/kg	**300 J**	**1500 J**	44 U	**16 J**	28 U	18 U	**110 J**	**56 J**	4.3 U	4.1 U	45 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**91 J**	**580 J**	**48 J**	**25 J**	**44 J**	**26 J**	**73 J**	**43 J**	4.3 U	4.1 U	**77 J**
C3-Naphthalenes(b)	NSL	NSL	ug/kg	**450 J**	**3500 J**	**79 J**	**20 J**	**69 J**	**39 J**	**160 J**	**89 J**	**6.7 J**	**11 J**	**120 J**
C3-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**220 J**	**1800 J**	**62 J**	**43 J**	**60 J**	**30 J**	**120 J**	**86 J**	**6 J**	**7.5 J**	**120 J**
C4 Chrysenes(b)	NSL	NSL	ug/kg	47 U	110 U	44 U	3.9 U	28 U	18 U	46 U	21 U	4.3 U	4.1 U	45 U
C4-Naphthalenes(b)	NSL	NSL	ug/kg	**460 J**	**3900 J**	**74 J**	**26 J**	**110 J**	**48 J**	**150 J**	**100 J**	**9.5 J**	**17 J**	**160 J**
C4-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**200 J**	**1500 J**	44 U	**34 J**	**39 J**	**21 J**	**100 J**	**66 J**	**4.6 J**	**6.2 J**	**78 J**
Chrysene(a)(b)	166	1,290	ug/kg	**340**	**770**	**170 J-**	**22**	**190 J-**	**130**	**280**	**150**	**4.3**	**2.8 J**	**240 J-**
Dibenzo(a,h)anthracene(a)(b)	33	NSL	ug/kg	**66**	**120**	**27 J**	**3.8 J**	**39**	**27**	**56**	**28**	**0.53 J**	4.1 U	**45**
Fluoranthene(a)(b)	423	2,230	ug/kg	**690**	**1500**	**430**	**38**	**370**	**240**	**570**	**290**	**7**	**2.7 J**	**550**
Fluorene(a)(b)	77	536	ug/kg	**46 J**	**140**	**61**	**2.8 J**	**18 J**	**7.9 J**	**28 J**	**17 J**	**0.75 J**	**0.86 J**	**34 J**
Indeno(1,2,3-cd)pyrene(a)(b)	200	NSL	ug/kg	**200**	**330**	**42 J-**	**10**	**79 J-**	**92**	**170**	**81**	**1.6 J**	**0.62 J**	**87 J-**
Naphthalene(a)(b)	176	561	ug/kg	**10 J**	**54 J**	**4.6 J**	**1.4 J**	**4.4 J**	**5.4 J**	**11 J**	**5.7 J**	**1 J**	**0.65 J**	**11 J**
Perylene(b)	NSL	NSL	ug/kg	**68**	**150**	**10 J**	**14**	**17 J**	**28**	**62**	**45**	**12**	**24**	**20 J**
Phenanthrene(a)(b)	204	1,170	ug/kg	**320**	**950**	**360**	**22**	**160**	**87**	**270**	**150**	**3.8 J**	**2.4 J**	**260**
Pyrene(a)(b)	195	1,520	ug/kg	**460**	**1100**	**240 J-**	**29**	**200 J-**	**170**	**380**	**220**	**5.6**	**2.4 J**	**310 J-**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**3563**	**7898**	**2071**	**211**	**1706**	**1315**	**2926**	**1538**	**41.52**	**28.66**	**2413**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**7118**	**29363**	**3247**	**536**	**2611**	**1888**	**4724**	**2614**	**118.77**	**135.45**	**3940**

NOTES:
Detected values are Bolded
Bolded and Shaded detected values exceed 3XPEC screening value
Bolded and Shaded detected values exceed 2XPEC screening value
Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-12	HT18-12	HT18-12	HT18-12	HT18-12	HT18-12	HT18-13	HT18-13	HT18-13	HT18-13	HT18-13
			Sample Name:	HT18-12-SURF-FD	HT18-12-0010	HT18-12-1030	HT18-12-3050	HT18-12-5070	HT18-12-7010	HT18-13-SURF	HT18-13-0010	HT18-13-1030	HT18-13-3050	HT18-13-5060
			Sample Date:	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	0-0.5	0-1	1-3	3-5	5-7	7-9.7	0-0.5	0-1	1-3	3-5	5-6.3
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**14 J**	**32 J**	**68 J**	**220**	**1.1 J**	**1.2 J**	**3 J**	**16 J**	**28 J**	**27 J**	**12 J**
2-Methylnaphthalene[a]	20.2	NSL	ug/kg	**14 J**	**32 J**	**88 J**	**79 J**	**0.73 J**	**0.82 J**	**3.1 J**	**22 J**	**35 J**	**33 J**	**18 J**
Acenaphthene[a][b]	6.71	NSL	ug/kg	**20 J**	**62 J**	**190 J**	**330**	**6**	4.2 U	**2.9 J**	**41 J**	**59 J**	**53 J**	**27 J**
Acenaphthylene[a][b]	5.87	NSL	ug/kg	**12 J-**	**22 J**	**66 J**	**51 J**	**1.1 J**	4.2 U	**1.9 J**	**23 J**	**36 J**	**27 J**	**11 J**
Anthracene[a][b]	57.2	845	ug/kg	**52 J-**	**180**	**280**	**350**	**4.3**	4.2 U	**6.7 J**	**70 J**	**100 J**	**110**	**55**
Benzo(a)anthracene[a][b]	108	1,050	ug/kg	**230 J-**	**620**	**1200**	**1200**	**17**	4.2 U	**48**	**380**	**510**	**430**	**210**
Benzo(a)pyrene[a][b]	150	1,450	ug/kg	**75**	**480**	**790**	**490**	**8**	4.2 U	**53**	**360**	**450**	**350**	**180**
Benzo(b)fluoranthene[a][b]	10,400	NSL	ug/kg	**260**	**550**	**1200**	**1000**	**16**	**1.6 J**	**90**	**420**	**590**	**440**	**200**
Benzo(e)pyrene[b]	150	1,450	ug/kg	**47**	**400**	**870**	**730**	**11**	**1.2 J**	**62**	**280**	**380**	**280**	**150**
Benzo(g,h,i)perylene[a][b]	170	NSL	ug/kg	**5.2 J-**	**310**	**670**	**560**	**10**	4.2 U	**50**	**69 J**	**110**	**59 J**	**42**
Benzo(k)fluoranthene[a][b]	240	NSL	ug/kg	**200**	**460**	**1000**	**880**	**13**	**0.69 J**	**70**	**400**	**390**	**380**	**190**
C1 Chrysenes[b]	NSL	NSL	ug/kg	**120 J**	**270 J**	**770 J**	**510 J**	**9 J**	4.2 U	**30 J**	**280 J**	**510 J**	**680 J**	**300 J**
C1 Fluorenes[b]	NSL	NSL	ug/kg	46 U	120 U	270 U	210 U	4.3 U	4.2 U	12 U	**82 J**	**140 J**	**120 J**	**51 J**
C1-Fluoranthenes/Pyrenes[b]	NSL	NSL	ug/kg	**270 J**	**640 J**	**1700 J**	**1500 J**	**22 J**	4.2 U	**56 J**	**650 J**	**1000 J**	**1000 J**	**510 J**
C1-Naphthalenes[b]	NSL	NSL	ug/kg	46 U	120 U	270 U	210 U	4.3 U	4.2 U	12 U	79 U	110 U	77 U	38 U
C1-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**160 J**	**520 J**	**1500 J**	**1200 J**	**17 J**	**5.2 J**	**31 J**	**550 J**	**1000 J**	**980 J**	**370 J**
C2 Chrysenes[b]	NSL	NSL	ug/kg	**64 J**	**180 J**	**660 J**	**310 J**	**5.1 J**	4.2 U	**17 J**	**170 J**	**370 J**	**650 J**	**240 J**
C2 Fluorenes[b]	NSL	NSL	ug/kg	46 U	**160 J**	**600 J**	210 U	4.3 U	4.2 U	12 U	**280 J**	**560 J**	**390 J**	**150 J**
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**170 J**	**470 J**	**1300 J**	**860 J**	**13 J**	**4.4 J**	**35 J**	**440 J**	**830 J**	**1000 J**	**450 J**
C2-Naphthalenes[b]	NSL	NSL	ug/kg	**77 J**	**200 J**	**740 J**	**780 J**	**11 J**	**4.9 J**	**15 J**	**220 J**	**380 J**	**370 J**	**180 J**
C2-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**160 J**	**510 J**	**2300 J**	**920 J**	**18 J**	**8.3 J**	**31 J**	**1100 J**	**2300 J**	**2200 J**	**690 J**
C3 Chrysenes[b]	NSL	NSL	ug/kg	46 U	120 U	**480 J**	210 U	4.3 U	4.2 U	12 U	**100 J**	**220 J**	**360 J**	**160 J**
C3 Fluorenes[b]	NSL	NSL	ug/kg	**74 J**	**290 J**	**1100 J**	**340 J**	**6 J**	4.2 U	**19 J**	**430 J**	**1000 J**	**630 J**	**240 J**
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**73 J**	**220 J**	**1000 J**	**360 J**	**6.1 J**	4.2 U	**16 J**	**350 J**	**790 J**	**930 J**	**400 J**
C3-Naphthalenes[b]	NSL	NSL	ug/kg	**130 J**	**360 J**	**1700 J**	**650 J**	**14 J**	**11 J**	**27 J**	**820 J**	**1200 J**	**980 J**	**400 J**
C3-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**120 J**	**450 J**	**2600 J**	**640 J**	**16 J**	**7 J**	**23 J**	**1100 J**	**2500 J**	**2600 J**	**810 J**
C4 Chrysenes[b]	NSL	NSL	ug/kg	46 U	120 U	270 U	210 U	4.3 U	4.2 U	12 U	79 U	110 U	**170 J**	**68 J**
C4-Naphthalenes[b]	NSL	NSL	ug/kg	**140 J**	**460 J**	**2100 J**	**450 J**	**13 J**	**16 J**	**36 J**	**1300 J**	**2100 J**	**1500 J**	**530 J**
C4-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**94 J**	**360 J**	**2200 J**	**500 J**	**13 J**	**5.3 J**	**15 J**	**800 J**	**1900 J**	**2200 J**	**710 J**
Chrysene[a][b]	166	1,290	ug/kg	**260 J-**	**670**	**1500**	**1300**	**19**	**2.5 J**	**87**	**520**	**710**	**590**	**260**
Dibenzo(a,h)anthracene[a][b]	33	NSL	ug/kg	**57**	**110 J**	**250 J**	**210**	**3.1 J**	4.2 U	**14**	**78 J**	**100 J**	**82**	**38**
Fluoranthene[a][b]	423	2,230	ug/kg	**530**	**1500**	**3000**	**3200**	**45**	**2.2 J**	**180**	**1100**	**1400**	**1100**	**480**
Fluorene[a][b]	77	536	ug/kg	**35 J**	**72 J**	**190 J**	**460**	**3.6 J**	**0.77 J**	**5.3 J**	**66 J**	**89 J**	**83**	**44**
Indeno(1,2,3-cd)pyrene[a][b]	200	NSL	ug/kg	**77 J-**	**290**	**620**	**540**	**9.1**	4.2 U	**51**	**220**	**270**	**210**	**110**
Naphthalene[a][b]	176	561	ug/kg	**14 J**	**28 J**	**80 J**	**120 J**	**0.84 J**	**0.78 J**	**3 J**	**14 J**	**26 J**	**22 J**	**12 J**
Perylene[b]	NSL	NSL	ug/kg	**8 J**	**150**	**290**	**210**	**18**	**23**	**18**	**87**	**110**	**83**	**42**
Phenanthrene[a][b]	204	1,170	ug/kg	**260**	**960**	**1900**	**3100**	**34**	**2.2 J**	**54**	**550**	**700**	**570**	**280**
Pyrene[a][b]	195	1,520	ug/kg	**250 J-**	**1200**	**2400**	**2600**	**32**	**1.9 J**	**100**	**850**	**1100**	**790**	**410**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**2351.2**	**7546**	**15424**	**16470**	**222.77**	**30.26**	**819.9**	**5183**	**6675**	**5329**	**2567**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**3916.2**	**12704**	**35351**	**25656**	**405.89**	**130.24**	**1226.8**	**13489**	**22420**	**20527.5**	**8169**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate

HT = Harbortown Upstream Area

ug/kg = Microgram per kilogram

ND = Non-detect

NSL = No Screening Level

PAH = Polycyclic aromatic hydrocarbon

RL = Reporting limit

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).

B = Compound was found in the blank and sample

D = Sample was analyzed at a higher dilution factor

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

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

U = Indicates the analyte was analyzed but not detected

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

(a) Analytes inlcuded in Total 17 PAH calculations

(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-13	HT18-13	HT18-13	HT18-14	HT18-14	HT18-14	HT18-15	HT18-15	HT18-15	HT18-15	HT18-15
			Sample Name:	HT18-13-6090	HT18-13-6090-FD	HT18-13-9010	HT18-14-SURF	HT18-14-0010	HT18-14-1020	HT18-15-SURF	HT18-15-0005	HT18-15-0530	HT18-15-3050	HT18-15-3050-FD
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/30/2018	10/30/2018	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/25/2018
			Depth Interval (ft):	6.3-8.8	6.3-8.8	8.8-10	0-0.5	0-1.3	1.3-1.9	0-0.5	0-0.5	0.5-3	3-5	3-5
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**5 J**	**5.9 J**	**3.5 J**	**3.9 J**	**560 J**	**20 J**	**61 J**	**1.1 J-**	**4.1**	**3.3 J**	**3.5 J**
2-Methylnaphthalene[a]	20.2	NSL	ug/kg	**7.6 J**	**9.5 J**	**3 J**	**5.1 J**	**840 J**	**88 J**	**66 J**	**1.2 J-**	**5.2**	**3.8 J**	**4.1**
Acenaphthene[a][b]	6.71	NSL	ug/kg	**18**	**21 J**	**14 J**	**8.4 J**	**680 J**	**100**	**180**	**2.8 J-**	3.8 U	3.9 U	3.9 U
Acenaphthylene[a][b]	5.87	NSL	ug/kg	**3.4 J**	**4.7 J**	**3.1 J**	**5.4 J**	840 U	**12 J**	120 U	**0.51 J-**	3.8 U	3.9 U	3.9 U
Anthracene[a][b]	57.2	845	ug/kg	**21**	**29**	**31**	**27**	**1100**	**120**	**310**	**3.3 J-**	3.8 U	3.9 U	3.9 U
Benzo(a)anthracene[a][b]	108	1,050	ug/kg	**61**	**86**	**77**	**170**	**2800**	**360**	**480**	**7.2 J-**	**0.51 J**	**0.6 J**	**0.65 J**
Benzo(a)pyrene[a][b]	150	1,450	ug/kg	**36**	**62**	**65**	**100**	**2200**	**240**	**250**	**4.3 J-**	**0.62 J**	**0.55 J**	**0.63 J**
Benzo(b)fluoranthene[a][b]	10,400	NSL	ug/kg	**59**	**88**	**68**	**180**	**2000**	**250**	**320**	**7.7 J-**	**1.6 J**	**1.5 J**	**1.6 J**
Benzo(e)pyrene[b]	150	1,450	ug/kg	**44**	**61**	**42**	**120**	**1600**	**210**	**190**	**6.2 J-**	**2 J**	**2 J**	**2.1 J**
Benzo(g,h,i)perylene[a][b]	170	NSL	ug/kg	**26**	**36**	**10 J**	**83**	**1200**	**170**	**48 J**	**5.9 J-**	**3.3 J**	**2.9 J**	**3.2 J**
Benzo(k)fluoranthene[a][b]	240	NSL	ug/kg	**49**	**67**	**63**	**150**	**2600**	**300**	**320**	**7.1 J-**	**1.1 J**	**1.1 J**	**0.92 J**
C1 Chrysenes[b]	NSL	NSL	ug/kg	**110 J**	**160 J**	**35 J**	**74 J**	**1600 J**	**220 J**	**180 J**	**9.2 J-**	**4.5 J**	**4.3 J**	**4.9 J**
C1 Fluorenes[b]	NSL	NSL	ug/kg	**22 J**	**28 J**	20 U	25 U	840 U	88 U	120 U	**4 J-**	**3.8 J**	3.9 U	**4 J**
C1-Fluoranthenes/Pyrenes[b]	NSL	NSL	ug/kg	**140 J**	**190 J**	**96 J**	**160 J**	**4500 J**	**650 J**	**450 J**	**16 J-**	**7.2 J**	**7 J**	**8 J**
C1-Naphthalenes[b]	NSL	NSL	ug/kg	15 U	23 U	20 U	25 U	**890 J**	88 U	120 U	3.8 UJ	**6.4 J**	**4.8 J**	**5.2 J**
C1-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**160 J**	**210 J**	**66 J**	**75 J**	**2900 J**	**430 J**	**490 J**	**16 J-**	**15 J**	**16 J**	**16 J**
C2 Chrysenes[b]	NSL	NSL	ug/kg	**89 J**	**150 J**	20 U	**31 J**	840 U	**100 J**	120 U	**7.7 J-**	**4.7 J**	**4.8 J**	**4.9 J**
C2 Fluorenes[b]	NSL	NSL	ug/kg	**60 J**	**79 J**	20 U	25 U	840 U	**90 J**	120 U	**8.6 J-**	**5.7 J**	**6 J**	**6.8 J**
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**150 J**	**200 J**	**42 J**	**81 J**	**2300 J**	**310 J**	**210 J**	**13 J-**	**9.8 J**	**9.9 J**	**11 J**
C2-Naphthalenes[b]	NSL	NSL	ug/kg	**79 J**	**99 J**	**20 J**	25 U	**2100 J**	**130 J**	**230 J**	**9.1 J-**	**21 J**	**19 J**	**20 J**
C2-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**300 J**	**410 J**	**48 J**	**50 J**	**2800 J**	**390 J**	**220 J**	**25 J-**	**21 J**	**22 J**	**22 J**
C3 Chrysenes[b]	NSL	NSL	ug/kg	**61 J**	**91 J**	20 U	25 U	840 U	88 U	120 U	**4.1 J-**	3.8 U	3.9 U	3.9 U
C3 Fluorenes[b]	NSL	NSL	ug/kg	**120 J**	**160 J**	20 U	25 U	**980 J**	**120 J**	120 U	**12 J-**	**8.7 J**	**9 J**	**10 J**
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**130 J**	**150 J**	20 U	**36 J**	**1100 J**	**150 J**	120 U	**9.4 J-**	**9.1 J**	**8.8 J**	**9.4 J**
C3-Naphthalenes[b]	NSL	NSL	ug/kg	**170 J**	**210 J**	**30 J**	**26 J**	**2400 J**	**240 J**	**160 J**	**25 J-**	**41 J**	**41 J**	**43 J**
C3-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**350 J**	**490 J**	**27 J**	**29 J**	**2200 J**	**310 J**	120 U	**25 J-**	**18 J**	**19 J**	**20 J**
C4 Chrysenes[b]	NSL	NSL	ug/kg	**22 J**	**30 J**	20 U	25 U	840 U	88 U	120 U	3.8 UJ	3.8 U	3.9 U	3.9 U
C4-Naphthalenes[b]	NSL	NSL	ug/kg	**200 J**	**260 J**	**35 J**	**26 J**	**2200 J**	**270 J**	120 U	**43 J-**	**62 J**	**65 J**	**68 J**
C4-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**310 J**	**430 J**	20 U	25 U	**1500 J**	**230 J**	120 U	**20 J-**	**13 J**	**13 J**	**14 J**
Chrysene[a][b]	166	1,290	ug/kg	**83**	**120**	**79**	**190**	**3200**	**400**	**460**	**12 J-**	**3.4 J**	**3.6 J**	**3.9**
Dibenzo(a,h)anthracene[a][b]	33	NSL	ug/kg	**9.5 J**	**13 J**	**14 J**	**35**	**540 J**	**68 J**	**64 J**	**1.5 J-**	3.8 U	3.9 U	3.9 U
Fluoranthene[a][b]	423	2,230	ug/kg	**200**	**280**	**200**	**400**	**7000**	**960**	**1400**	**27 J-**	**1.5 J**	**1.1 J**	**1.3 J**
Fluorene[a][b]	77	536	ug/kg	**25**	**30**	**17 J**	**16 J**	**790 J**	**65 J**	**240**	**2.4 J-**	**1.2 J**	**1.1 J**	**1.1 J**
Indeno(1,2,3-cd)pyrene[a][b]	200	NSL	ug/kg	**27**	**38**	**38**	**93**	**1200**	**170**	**170**	**4.2 J-**	**0.58 J**	**0.49 J**	**0.48 J**
Naphthalene[a][b]	176	561	ug/kg	**4.8 J**	**6.1 J**	**3.9 J**	**7.9 J**	**1000**	**88 J**	**86 J**	**0.87 J-**	**5.3**	**3.2 J**	**3.7 J**
Perylene[b]	NSL	NSL	ug/kg	**11 J**	**17 J**	**29**	**37**	**570 J**	**93**	**62 J**	**6.2 J-**	**2.4 J**	**2.4 J**	**2.6 J**
Phenanthrene[a][b]	204	1,170	ug/kg	**160**	**190**	**130**	**150**	**5300**	**760**	**1600**	**11 J-**	**5.4**	**5**	**5.3**
Pyrene[a][b]	195	1,520	ug/kg	**130**	**180**	**150**	**280**	**6100**	**840**	**910**	**19 J-**	**2.5 J**	**2.4 J**	**2.7 J**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**920.3**	**1260.3**	**966**	**1900.8**	**38970**	**4991**	**6964**	**117.98**	**39.81**	**35.14**	**37.38**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**3168.2**	**4337.3**	**1471**	**2623.7**	**66470**	**8562**	**9480**	**357.68**	**274.81**	**272.49**	**288.68**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-16	HT18-17	HT18-17	HT18-17	HT18-17	HT18-18	HT18-18	HT18-18	HT18-18	HT18-18	HT18-19
			Sample Name:	HT18-16-SURF	HT18-17-SURF	HT18-17-0010	HT18-17-1030	HT18-17-3050	HT18-18-SURF	HT18-18-0020	HT18-18-2030	HT18-18-3035	HT18-18-3555	HT18-19-SURF
			Sample Date:	10/24/2018	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/25/2018	10/24/2018
			Depth Interval (ft):	0-0.5	0-0.5	0-1	1-3	3-4.7	0-0.5	0-1.9	1.9-2.8	2.8-3.6	3.6-5.4	0-0.5
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**4.7 J**	**1.5 J**	**5.9**	**5**	**5.3**	**10 J**	**490 J**	**7.2**	**3.8 J**	**5.2**	**14 J**
2-Methylnaphthalene(a)	20.2	NSL	ug/kg	**5.6 J**	**1.7 J**	**6.6**	**5.5**	**5.7**	**9.9 J**	**340 J**	**7.7**	**4.1 J**	**6**	180 U
Acenaphthene(a)(b)	6.71	NSL	ug/kg	**8.6 J**	**5.1 J**	**3.9**	3.9 U	3.8 U	**32 J**	**1100 J**	**13**	**13**	4 U	**85 J**
Acenaphthylene(a)(b)	5.87	NSL	ug/kg	**4.4 J**	9.4 U	**0.44 J**	3.9 U	3.8 U	81 U	**140 J**	**3.9**	**2.6 J**	4 U	**130 J**
Anthracene(a)(b)	57.2	845	ug/kg	**17 J**	**5.7 J**	**9.3**	3.9 U	3.8 U	**73 J**	**1800**	**17**	**19**	4 U	**190**
Benzo(a)anthracene(a)(b)	108	1,050	ug/kg	**100**	**29**	**19**	**0.82 J**	**0.97 J**	**320**	**6900**	**11**	**46**	**0.82 J**	**1200**
Benzo(a)pyrene(a)(b)	150	1,450	ug/kg	**100**	**11**	**16**	**0.62 J**	**1.2 J**	**270**	**4800**	**8.4**	**36**	**1.1 J**	**1000**
Benzo(b)fluoranthene(a)(b)	10,400	NSL	ug/kg	**150**	**37**	**16**	**2.2 J**	**2.7 J**	**350**	**6400**	**7.1**	**37**	**2.4 J**	**1200**
Benzo(e)pyrene(b)	150	1,450	ug/kg	**110**	**25**	**12**	**2.5 J**	**3.4 J**	**250**	**4300**	**7**	**27**	**3.1 J**	**970**
Benzo(g,h,i)perylene(a)(b)	170	NSL	ug/kg	**48**	**12**	**12**	**4**	**4.9**	**150**	**3100**	**11**	**20**	**4.8**	**580**
Benzo(k)fluoranthene(a)(b)	240	NSL	ug/kg	**130**	**35**	**14**	**1.1 J**	**1.2 J**	**330**	**5100**	**6.4**	**30**	**1.4 J**	**1200**
C1 Chrysenes(b)	NSL	NSL	ug/kg	**54 J**	**15 J**	**14 J**	**5.8 J**	**6.8 J**	**150 J**	**3300 J**	**13 J**	**30 J**	**6.6 J**	**560 J**
C1 Fluorenes(b)	NSL	NSL	ug/kg	27 U	9.4 U	**8.8 J**	**5 J**	**6.4 J**	81 U	**1100 J**	**14 J**	**12 J**	**5.3 J**	180 U
C1-Fluoranthenes/Pyrenes(b)	NSL	NSL	ug/kg	**110 J**	**28 J**	**35 J**	**9.6 J**	**13 J**	**300 J**	**10000 J**	**28 J**	**71 J**	**11 J**	**870 J**
C1-Naphthalenes(b)	NSL	NSL	ug/kg	27 U	9.4 U	**8.6 J**	**7.2 J**	**7.6 J**	81 U	1100 U	**10 J**	9.4 U	**7.6 J**	180 U
C1-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**56 J**	**18 J**	**37 J**	**20 J**	**24 J**	**170 J**	**8100 J**	**65 J**	**67 J**	**22 J**	**380 J**
C2 Chrysenes(b)	NSL	NSL	ug/kg	**36 J**	9.4 U	**8.5 J**	**6.1 J**	**7.5 J**	81 U	**2300 J**	**11 J**	**15 J**	**7 J**	**380 J**
C2 Fluorenes(b)	NSL	NSL	ug/kg	27 U	9.4 U	**15 J**	**7.8 J**	**9.9 J**	81 U	**2800 J**	**19 J**	**20 J**	**9.1 J**	180 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**84 J**	**19 J**	**24 J**	**13 J**	**17 J**	**170 J**	**5400 J**	**21 J**	**39 J**	**14 J**	**560 J**
C2-Naphthalenes(b)	NSL	NSL	ug/kg	**37 J**	9.4 U	**32 J**	**26 J**	**28 J**	81 U	**4600 J**	**60 J**	**34 J**	**30 J**	180 U
C2-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**52 J**	**14 J**	**43 J**	**27 J**	**32 J**	**120 J**	**11000 J**	**62 J**	**74 J**	**30 J**	**260 J**
C3 Chrysenes(b)	NSL	NSL	ug/kg	27 U	9.4 U	**5.4 J**	**4.1 J**	**5.5 J**	81 U	**1100 J**	**7.1 J**	9.4 U	**4.9 J**	**250 J**
C3 Fluorenes(b)	NSL	NSL	ug/kg	**49 J**	**11 J**	**20 J**	**12 J**	**15 J**	81 U	**4100 J**	**23 J**	**26 J**	**13 J**	180 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**41 J**	9.4 U	**17 J**	**11 J**	**14 J**	**81 J**	**3700 J**	**18 J**	**24 J**	**13 J**	**360 J**
C3-Naphthalenes(b)	NSL	NSL	ug/kg	**70 J**	**12 J**	**67 J**	**54 J**	**62 J**	81 U	**11000 J**	**120 J**	**83 J**	**61 J**	180 U
C3-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**41 J**	**9.9 J**	**35 J**	**23 J**	**28 J**	81 U	**8900 J**	**45 J**	**55 J**	**26 J**	180 U
C4 Chrysenes(b)	NSL	NSL	ug/kg	27 U	9.4 U	3.9 U	3.9 U	3.8 U	81 U	1100 U	3.9 U	9.4 U	4 U	180 U
C4-Naphthalenes(b)	NSL	NSL	ug/kg	**81 J**	**15 J**	**100 J**	**83 J**	**100 J**	**84 J**	**9000 J**	**170 J**	**100 J**	**87 J**	180 U
C4-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**28 J**	9.4 U	**25 J**	**16 J**	**20 J**	81 U	**6000 J**	**31 J**	**37 J**	**18 J**	180 U
Chrysene(a)(b)	166	1,290	ug/kg	**170**	**40**	**23**	**4.7**	**5.6**	**400**	**8100**	**15**	**53**	**5.1**	**1300**
Dibenzo(a,h)anthracene(a)(b)	33	NSL	ug/kg	**32**	**8.2 J**	**3.7 J**	**0.49 J**	**0.62 J**	**79 J**	**1300**	**1.8 J**	**7.8 J**	**0.6 J**	**260**
Fluoranthene(a)(b)	423	2,230	ug/kg	**370**	**100**	**57**	**1.6 J**	**2 J**	**950**	**18000**	**32**	**110**	**2.3 J**	**2700**
Fluorene(a)(b)	77	536	ug/kg	**11 J**	**5.1 J**	**4.5**	**1.5 J**	**2 J**	**41 J**	**1100**	**12**	**12**	**1.7 J**	**100 J**
Indeno(1,2,3-cd)pyrene(a)(b)	200	NSL	ug/kg	**97**	**24**	**8.6**	**0.63 J**	**0.81 J**	**220**	**3400**	**4.1**	**20**	**0.81 J**	**990**
Naphthalene(a)(b)	176	561	ug/kg	**4.3 J**	**1.4 J**	**5.2**	**4.4**	**5.3**	**13 J**	**240 J**	**7.8**	**4.6 J**	**4.9**	180 U
Perylene(b)	NSL	NSL	ug/kg	**25 J**	**6.1 J**	**7.6**	**2.9 J**	**3.5 J**	**85**	**1400**	**4.5**	**14**	**3.5 J**	**330**
Phenanthrene(a)(b)	204	1,170	ug/kg	**160**	**57**	**30**	**6.9**	**8.9**	**500**	**11000**	**58**	**81**	**8.1**	**1100**
Pyrene(a)(b)	195	1,520	ug/kg	**230**	**64**	**47**	**3.3 J**	**4.3**	**560**	**14000**	**31**	**95**	**3.8 J**	**1800**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**1637.9**	**440.9**	**276.24**	**43.61**	**51.9**	**4338.4**	**86820**	**247.2**	**591.1**	**49.83**	**14015**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**2448.8**	**630.8**	**745.49**	**352.06**	**420.7**	**5933**	**176580**	**931.05**	**1266.1**	**390.93**	**18825**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
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PAH = Polycyclic aromatic hydrocarbon
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B = Compound was found in the blank and 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 = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-19	HT18-19	HT18-19	HT18-20	HT18-20	HT18-20	HT18-20	HT18-20	HT18-21	HT18-21	HT18-23
			Sample Name:	HT18-19-0010	HT18-19-1020	HT18-19-2030	HT18-20-SURF	HT18-20-0010	HT18-20-1020	HT18-20-2030	HT18-20-2030-FD	HT18-21-SURF	HT18-21-0015	HT18-23-SURF
			Sample Date:	10/25/2018	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/23/2018
			Depth Interval (ft):	0-1	1-2.3	2.3-2.8	0-0.5	0-0.8	0.8-1.8	1.8-2.8	1.8-2.8	0-0.5	0-1.7	0-0.5
Analyte	**TEC**	**PEC**	**Unit**											
1-Methylnaphthalene	NSL	NSL	ug/kg	**260 J**	820 U	**1.6 J**	**8.8 J**	**14 J**	**1.8 J**	**1.5 J**	**2.3 J**	**10 J**	**8.1 J**	**6.6 J**
2-Methylnaphthalene(a)	20.2	NSL	ug/kg	**410 J**	820 U	**1.9 J**	**10 J**	**18 J**	**2.6 J**	**1.9 J**	**2.6 J**	**16 J**	**14 J**	**6.4 J**
Acenaphthene(a)(b)	6.71	NSL	ug/kg	**2100 J**	**820 J**	**9.7 J**	**44 J**	**82 J**	**13**	**17**	**22**	**33 J**	**15 J**	**10 J**
Acenaphthylene(a)(b)	5.87	NSL	ug/kg	2100 U	820 U	9.7 U	**8 J**	**14 J**	4 U	**1.4 J**	**2.4 J**	48 U	**3.9 J**	54 U
Anthracene(a)(b)	57.2	845	ug/kg	**2100**	**1300**	**14**	**86**	**100**	**5.3**	**18**	**34**	**110**	**18**	**22 J**
Benzo(a)anthracene(a)(b)	108	1,050	ug/kg	**8100**	**3300**	**43**	**330**	**400**	**8.6**	**38**	**67**	**200**	**73**	**150**
Benzo(a)pyrene(a)(b)	150	1,450	ug/kg	**5400**	**2400**	**35**	**270**	**260**	**6.7**	**30**	**50**	**140**	**64**	**170**
Benzo(b)fluoranthene(a)(b)	10,400	NSL	ug/kg	**6900**	**2700**	**37**	**340**	**400**	**6.4**	**28**	**45**	**160**	**80**	**240**
Benzo(e)pyrene(b)	150	1,450	ug/kg	**5000**	**2000**	**28**	**220**	**280**	**4.4**	**22**	**35**	**160**	**150**	**180**
Benzo(g,h,i)perylene(a)(b)	170	NSL	ug/kg	**3800**	**1600**	**27**	**71**	**210**	**3.5 J**	**18**	**29**	**35 J**	**86**	**140**
Benzo(k)fluoranthene(a)(b)	240	NSL	ug/kg	**6100**	**2600**	**35**	**310**	**350**	**7.1**	**30**	**52**	**120**	**68**	**220**
C1 Chrysenes(b)	NSL	NSL	ug/kg	**5100 J**	**1300 J**	**22 J**	**120 J**	**170 J**	**4.5 J**	**18 J**	**31 J**	**160 J**	**180 J**	**69 J**
C1 Fluorenes(b)	NSL	NSL	ug/kg	2100 U	820 U	9.7 U	68 U	82 U	4 U	**8.6 J**	16 U	48 U	15 U	54 U
C1-Fluoranthenes/Pyrenes(b)	NSL	NSL	ug/kg	**12000 J**	**3800 J**	**59 J**	**280 J**	**480 J**	**11 J**	**56 J**	**94 J**	**360 J**	**310 J**	**160 J**
C1-Naphthalenes(b)	NSL	NSL	ug/kg	2100 U	820 U	9.7 U	68 U	82 U	4 U	8.1 U	16 U	48 U	**15 J**	54 U
C1-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**11000 J**	**2300 J**	**48 J**	**170 J**	**250 J**	**9.5 J**	**46 J**	**70 J**	**190 J**	**110 J**	**78 J**
C2 Chrysenes(b)	NSL	NSL	ug/kg	**3200 J**	820 U	**14 J**	68 U	82 U	4 U	8.1 U	16 U	**220 J**	**330 J**	54 U
C2 Fluorenes(b)	NSL	NSL	ug/kg	**3800 J**	820 U	**12 J**	68 U	82 U	4 U	8.1 U	16 U	48 U	**39 J**	54 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**6800 J**	**1400 J**	**29 J**	**150 J**	**230 J**	**6.1 J**	**22 J**	**37 J**	**440 J**	**550 J**	**91 J**
C2-Naphthalenes(b)	NSL	NSL	ug/kg	**5700 J**	820 U	**19 J**	68 U	82 U	**6.7 J**	**13 J**	**18 J**	**73 J**	**63 J**	54 U
C2-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**15000 J**	**1700 J**	**53 J**	**96 J**	**210 J**	**5.8 J**	**31 J**	**45 J**	**130 J**	**220 J**	**62 J**
C3 Chrysenes(b)	NSL	NSL	ug/kg	2100 U	820 U	9.7 U	68 U	82 U	4 U	8.1 U	16 U	**200 J**	**260 J**	54 U
C3 Fluorenes(b)	NSL	NSL	ug/kg	**5300 J**	820 U	**18 J**	68 U	**85 J**	4 U	8.1 U	16 U	48 U	**77 J**	54 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**5100 J**	820 U	**18 J**	68 U	**97 J**	4 U	**9.7 J**	16 U	**290 J**	**480 J**	54 U
C3-Naphthalenes(b)	NSL	NSL	ug/kg	**16000 J**	**930 J**	**44 J**	68 U	**110 J**	**5.4 J**	**21 J**	**28 J**	**78 J**	**78 J**	54 U
C3-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**13000 J**	**1100 J**	**42 J**	68 U	**130 J**	4 U	**16 J**	**24 J**	**140 J**	**350 J**	54 U
C4 Chrysenes(b)	NSL	NSL	ug/kg	2100 U	820 U	9.7 U	68 U	82 U	4 U	8.1 U	16 U	**89 J**	**130 J**	54 U
C4-Naphthalenes(b)	NSL	NSL	ug/kg	**15000 J**	**830 J**	**44 J**	68 U	**100 J**	4 U	**22 J**	**26 J**	**51 J**	**89 J**	**62 J**
C4-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**7700 J**	820 U	**33 J**	68 U	82 U	4 U	**11 J**	**20 J**	**130 J**	**340 J**	54 U
Chrysene(a)(b)	166	1,290	ug/kg	**9300**	**3500**	**49**	**390**	**460**	**8.9**	**40**	**68**	**220**	**130**	**260**
Dibenzo(a,h)anthracene(a)(b)	33	NSL	ug/kg	**1500 J**	**580 J**	**8.8 J**	**74**	**74 J**	**1.4 J**	**6.2 J**	**11 J**	**38 J**	**25**	**51 J**
Fluoranthene(a)(b)	423	2,230	ug/kg	**22000**	**8900**	**110**	**950**	**1100**	**20**	**100**	**170**	**580**	**150**	**570**
Fluorene(a)(b)	77	536	ug/kg	**1500 J**	**470 J**	**6.5 J**	**49 J**	**62 J**	**5.7**	**4.3 J**	**8.5 J**	**48**	**17**	**17 J**
Indeno(1,2,3-cd)pyrene(a)(b)	200	NSL	ug/kg	**3800**	**1600**	**24**	**200**	**210**	**3.6 J**	**18**	**32**	**97**	**58**	**160**
Naphthalene(a)(b)	176	561	ug/kg	**270 J**	820 U	**2.1 J**	**18 J**	**25 J**	**5.3**	**2.7 J**	**3.7 J**	**7.8 J**	**9.8 J**	54 U
Perylene(b)	NSL	NSL	ug/kg	**1600 J**	**730 J**	**21**	**68**	**94**	**14**	**35**	**35**	**33 J**	**21**	**53 J**
Phenanthrene(a)(b)	204	1,170	ug/kg	**13000**	**6500**	**71**	**540**	**600**	**27**	**88**	**130**	**510**	**120**	**210**
Pyrene(a)(b)	195	1,520	ug/kg	**18000**	**7500**	**89**	**630**	**840**	**15**	**85**	**140**	**400**	**150**	**340**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**105330**	**45000**	**567.85**	**4320**	**5205**	**142.1**	**526.5**	**867.2**	**2738.8**	**1081.7**	**2620.4**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**228520**	**62970**	**1042.35**	**5672**	**7424**	**220.8**	**848.5**	**1346.6**	**4832.8**	**3837.2**	**3575**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

Analyte	TEC	PEC	Unit	HT18-23	HT18-23	HT18-23	HT18-23	HT18-23	HT18-24	HT18-24	HT18-24	HT18-24	HT18-24	HT18-24
Sample Name:				HT18-23-0010	HT18-23-1030	HT18-23-3050	HT18-23-5070	HT18-23-7010	HT18-24-SURF	HT18-24-0010	HT18-24-1025	HT18-24-2550	HT18-24-5065	HT18-24-5065-FD
Sample Date:				10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018
Depth Interval (ft):				0-1	1-3	3-5	5-7	7-9.2	0-0.5	0-1	1-2.7	2.7-5	5-6.6	5-6.6
1-Methylnaphthalene	NSL	NSL	ug/kg	**1.8 J**	4.1 U	**0.4 J**	**0.65 J**	**1.9 J**	140 U	69 U	**0.47 J**	**0.59 J**	**0.45 J**	**0.63 J**
2-Methylnaphthalene(a)	20.2	NSL	ug/kg	**2 J**	4.1 U	4.3 U	**0.52 J**	**1.1 J**	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
Acenaphthene(a)(b)	6.71	NSL	ug/kg	**3.6 J**	4.1 U	4.3 U	**0.39 J**	**0.44 J**	**56 J**	**43 J**	4.2 U	4.5 U	4.3 U	4.1 U
Acenaphthylene(a)(b)	5.87	NSL	ug/kg	**1.5 J**	4.1 U	4.3 U	4.4 U	4.5 U	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
Anthracene(a)(b)	57.2	845	ug/kg	**7 J**	4.1 U	4.3 U	4.4 U	4.5 U	**150**	**77**	4.2 U	4.5 U	4.3 U	4.1 U
Benzo(a)anthracene(a)(b)	108	1,050	ug/kg	**46**	4.1 U	4.3 U	4.4 U	**0.81 J**	**600**	**340**	**0.57 J**	**0.85 J**	4.3 U	4.1 U
Benzo(a)pyrene(a)(b)	150	1,450	ug/kg	**39**	4.1 U	4.3 U	4.4 U	**0.93 J**	**450**	**160**	4.2 U	**0.5 J**	4.3 U	4.1 U
Benzo(b)fluoranthene(a)(b)	10,400	NSL	ug/kg	**67**	**0.81 J**	**1 J**	**1.6 J**	**3.5 J**	**570**	**350**	**1.3 J**	**1.6 J**	**0.74 J**	**1.2 J**
Benzo(e)pyrene(b)	150	1,450	ug/kg	**43**	**0.51 J**	**0.74 J**	**1.2 J**	**3 J**	**390**	**230**	**0.81 J**	**1.4 J**	**0.52 J**	**0.62 J**
Benzo(g,h,i)perylene(a)(b)	170	NSL	ug/kg	**37**	**0.61 J**	**0.82 J**	**1.3 J**	4.5 U	**270**	**180**	**1.4 J**	**0.87 J**	4.3 U	4.1 U
Benzo(k)fluoranthene(a)(b)	240	NSL	ug/kg	**51**	4.1 U	4.3 U	4.4 U	**1 J**	**550**	**280**	**0.84 J**	**0.92 J**	4.3 U	**0.73 J**
C1 Chrysenes(b)	NSL	NSL	ug/kg	**20 J**	4.1 U	4.3 U	4.4 U	**5.8 J**	**180 J**	**110 J**	4.2 U	4.5 U	4.3 U	4.1 U
C1 Fluorenes(b)	NSL	NSL	ug/kg	11 U	4.1 U	4.3 U	4.4 U	4.5 U	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C1-Fluoranthenes/Pyrenes(b)	NSL	NSL	ug/kg	**60 J**	4.1 U	4.3 U	4.4 U	**9.4 J**	**470 J**	**350 J**	4.2 U	4.5 U	4.3 U	4.1 U
C1-Naphthalenes(b)	NSL	NSL	ug/kg	11 U	4.1 U	4.3 U	4.4 U	4.5 U	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C1-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**33 J**	4.1 U	4.3 U	**4.8 J**	**12 J**	**230 J**	**200 J**	4.2 U	**4.5 J**	4.3 U	4.1 U
C2 Chrysenes(b)	NSL	NSL	ug/kg	**13 J**	4.1 U	4.3 U	4.4 U	4.5 U	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C2 Fluorenes(b)	NSL	NSL	ug/kg	**12 J**	4.1 U	4.3 U	4.4 U	**5.3 J**	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**36 J**	4.1 U	4.3 U	4.4 U	**9.7 J**	**190 J**	**110 J**	4.2 U	4.5 U	4.3 U	4.1 U
C2-Naphthalenes(b)	NSL	NSL	ug/kg	**12 J**	4.1 U	4.3 U	4.4 U	**8.4 J**	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C2-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**58 J**	4.1 U	4.3 U	**7.6 J**	**21 J**	140 U	**110 J**	**7.2 J**	**7 J**	**5.4 J**	**7.3 J**
C3 Chrysenes(b)	NSL	NSL	ug/kg	11 U	4.1 U	4.3 U	4.4 U	4.5 U	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C3 Fluorenes(b)	NSL	NSL	ug/kg	**22 J**	4.1 U	4.3 U	4.4 U	**6.6 J**	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**19 J**	4.1 U	4.3 U	4.4 U	**7.6 J**	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C3-Naphthalenes(b)	NSL	NSL	ug/kg	**27 J**	4.1 U	4.3 U	**7.6 J**	**21 J**	140 U	69 U	**7.7 J**	**8.8 J**	**6.3 J**	**8.6 J**
C3-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**40 J**	4.1 U	4.3 U	**6.4 J**	**16 J**	140 U	69 U	**4.9 J**	**5.1 J**	4.3 U	**5.5 J**
C4 Chrysenes(b)	NSL	NSL	ug/kg	11 U	4.1 U	4.3 U	4.4 U	4.5 U	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
C4-Naphthalenes(b)	NSL	NSL	ug/kg	**40 J**	**4.1 J**	**7.2 J**	**13 J**	**37 J**	140 U	69 U	**17 J**	**16 J**	**13 J**	**18 J**
C4-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**26 J**	4.1 U	4.3 U	4.4 U	**11 J**	140 U	69 U	4.2 U	4.5 U	4.3 U	**4.4 J**
Chrysene(a)(b)	166	1,290	ug/kg	**64**	**0.84 J**	**1.4 J**	**2.3 J**	**5.4**	**740**	**420**	**1.9 J**	**2.5 J**	**1.4 J**	**1.9 J**
Dibenzo(a,h)anthracene(a)(b)	33	NSL	ug/kg	**12**	4.1 U	4.3 U	4.4 U	4.5 U	**120 J**	**73**	4.2 U	4.5 U	4.3 U	4.1 U
Fluoranthene(a)(b)	423	2,230	ug/kg	**130**	**0.58 J**	**1 J**	**1.2 J**	**3.2 J**	**2200**	**1100**	4.2 U	4.5 U	4.3 U	4.1 U
Fluorene(a)(b)	77	536	ug/kg	**3.8 J**	4.1 U	4.3 U	**0.68 J**	**1.8 J**	**85 J**	**34 J**	**0.69 J**	**0.84 J**	**0.46 J**	**0.58 J**
Indeno(1,2,3-cd)pyrene(a)(b)	200	NSL	ug/kg	**35**	4.1 U	4.3 U	4.4 U	**1 J**	**340**	**200**	**0.58 J**	**0.73 J**	4.3 U	4.1 U
Naphthalene(a)(b)	176	561	ug/kg	**1.9 J**	4.1 U	**0.58 J**	**0.78 J**	**0.74 J**	140 U	69 U	4.2 U	4.5 U	4.3 U	4.1 U
Perylene(b)	NSL	NSL	ug/kg	**19**	**2.2 J**	**3.6 J**	**4.7**	**9.9**	**130 J**	**64 J**	**1.7 J**	**3.2 J**	**1.3 J**	**1.3 J**
Phenanthrene(a)(b)	204	1,170	ug/kg	**57**	**0.5 J**	**1.5 J**	**2.2 J**	**3.6 J**	**1200**	**580**	4.2 U	4.5 U	4.3 U	4.1 U
Pyrene(a)(b)	195	1,520	ug/kg	**110**	**0.67 J**	**1.2 J**	**1.8 J**	**4.3 J**	**1200**	**660**	4.2 U	4.5 U	4.3 U	4.1 U
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**667.8**	**26.56**	**29**	**28.17**	**36.82**	**8741**	**4600.5**	**28.28**	**29.06**	**32.7**	**31.06**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**1112.8**	**62.07**	**70.64**	**97.15**	**213.37**	**10981**	**6044**	**90.69**	**97.56**	**85.02**	**97.28**

NOTES:
Detected values are Bolded
Bolded and Shaded detected values exceed 3XPEC screening value
Bolded and Shaded detected values exceed 2XPEC screening value
Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-24	HT18-25	HT18-25	HT18-25	HT18-25	HT18-25	HT18-25	HT18-26	HT18-26	HT18-26	HT18-26	HT18-26
			Sample Name:	HT18-24-6575	HT18-25-SURF	HT18-25-0010	HT18-25-1030	HT18-25-3040	HT18-25-4070	HT18-25-7010	HT18-26-SURF	HT18-26-0010	HT18-26-1030	HT18-26-3050	HT18-26-3050-FD
			Sample Date:	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	6.6-7.8	0-0.5	0-1	1-3	3-4.2	4.2-7	7-9.5	0-0.5	0-1	1-3	3-5	3-5
Analyte	**TEC**	**PEC**	**Unit**												
1-Methylnaphthalene	NSL	NSL	ug/kg	**4.3**	**5.2 J**	**55 J**	**230 J**	2600 U	**0.7 J**	**0.99 J**	**7 J**	200 U	**0.83 J**	**1.2 J**	**1.1 J**
2-Methylnaphthalene[a]	20.2	NSL	ug/kg	**4.5**	**5.9 J**	**75 J**	**140 J**	2600 U	**0.45 J**	**0.62 J**	**8.2 J**	200 U	**0.79 J**	**0.92 J**	**0.9 J**
Acenaphthene[a][b]	6.71	NSL	ug/kg	**0.35 J**	**25 J**	**130 J**	**460 J**	**1200 J**	**17**	**0.39 J**	**23 J**	**85 J**	**1.2 J**	**0.56 J**	**0.46 J**
Acenaphthylene[a][b]	5.87	NSL	ug/kg	3.9 U	50 U	380 U	**94 J**	2600 U	4.5 U	4.3 U	65 U	200 U	4 U	4.3 U	4.2 U
Anthracene[a][b]	57.2	845	ug/kg	**0.52 J**	**57**	**270 J**	**790**	**3000**	**4.1 J**	4.3 U	**45 J**	**320**	**2.8 J**	4.3 U	4.2 U
Benzo(a)anthracene[a][b]	108	1,050	ug/kg	**0.85 J**	**260**	**1600**	**2800**	**8800**	**2 J**	**0.85 J**	**300**	**890**	**11**	**1.1 J**	**0.94 J**
Benzo(a)pyrene[a][b]	150	1,450	ug/kg	**1.4 J**	**240**	**1000**	**2100**	**6900**	**1.2 J**	**0.91 J**	**240**	**690**	**9.8**	**0.81 J**	**0.58 J**
Benzo(b)fluoranthene[a][b]	10,400	NSL	ug/kg	**2.7 J**	**320**	**1600**	**2500**	**7200**	**2.9 J**	**2.2 J**	**410**	**810**	**11**	**2.5 J**	**2.6 J**
Benzo(e)pyrene[b]	150	1,450	ug/kg	**3.6 J**	**210**	**790**	**1800**	**5300**	**2.4 J**	**1.8 J**	**250**	**560**	**8.2**	**2.2 J**	**1.7 J**
Benzo(g,h,i)perylene[a][b]	170	NSL	ug/kg	**4.4**	**150**	**91 J**	**1100**	**4200**	**15**	4.3 U	**73**	**490**	**8.5**	**2.1 J**	**2.6 J**
Benzo(k)fluoranthene[a][b]	240	NSL	ug/kg	**0.77 J**	**250**	**1300**	**2100**	**6800**	**1.9 J**	**0.9 J**	**320**	**680**	**10**	4.3 U	4.2 U
C1 Chrysenes[b]	NSL	NSL	ug/kg	**7.5 J**	**100 J**	**1200 J**	**2700 J**	**3900 J**	4.5 U	4.3 U	**140 J**	**340 J**	**7.3 J**	4.3 U	4.2 U
C1 Fluorenes[b]	NSL	NSL	ug/kg	**5.6 J**	50 U	380 U	**620 J**	2600 U	4.5 U	4.3 U	65 U	200 U	4 U	4.3 U	4.2 U
C1-Fluoranthenes/Pyrenes[b]	NSL	NSL	ug/kg	**12 J**	**230 J**	**2100 J**	**4100 J**	**8800 J**	**4.6 J**	**6 J**	**270 J**	**1000 J**	**15 J**	**6.3 J**	**5.5 J**
C1-Naphthalenes[b]	NSL	NSL	ug/kg	**6 J**	50 U	380 U	610 U	2600 U	4.5 U	4.3 U	65 U	200 U	4 U	4.3 U	4.2 U
C1-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**22 J**	**110 J**	**1800 J**	**4600 J**	**5600 J**	**7.9 J**	**7.7 J**	**140 J**	**550 J**	**9.3 J**	**5.4 J**	**5.2 J**
C2 Chrysenes[b]	NSL	NSL	ug/kg	**7.6 J**	50 U	**600 J**	**1700 J**	2600 U	4.5 U	4.3 U	65 U	200 U	**4.9 J**	4.3 U	4.2 U
C2 Fluorenes[b]	NSL	NSL	ug/kg	**11 J**	50 U	**590 J**	**2000 J**	2600 U	4.5 U	4.3 U	65 U	200 U	4 U	4.3 U	4.2 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**16 J**	**110 J**	**1500 J**	**3000 J**	**3500 J**	4.5 U	**5.7 J**	**150 J**	**360 J**	**8.8 J**	**5.8 J**	**5.1 J**
C2-Naphthalenes[b]	NSL	NSL	ug/kg	**26 J**	50 U	**710 J**	**2700 J**	2600 U	**6.1 J**	**4.7 J**	65 U	200 U	4 U	**4.7 J**	4.2 U
C2-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**31 J**	**58 J**	**3100 J**	**7400 J**	**4600 J**	**9.5 J**	**17 J**	**140 J**	**420 J**	**12 J**	**9.1 J**	**8.1 J**
C3 Chrysenes[b]	NSL	NSL	ug/kg	**6.1 J**	50 U	380 U	**1100 J**	2600 U	4.5 U	4.3 U	65 U	200 U	4 U	4.3 U	4.2 U
C3 Fluorenes[b]	NSL	NSL	ug/kg	**14 J**	50 U	**1200 J**	**3400 J**	2600 U	4.5 U	4.3 U	**85 J**	200 U	**4.2 J**	4.3 U	4.2 U
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**11 J**	50 U	**1000 J**	**2000 J**	2600 U	4.5 U	**4.5 J**	**66 J**	200 U	**6 J**	**4.6 J**	4.2 U
C3-Naphthalenes[b]	NSL	NSL	ug/kg	**59 J**	50 U	**1800 J**	**8300 J**	2600 U	**11 J**	**12 J**	**77 J**	200 U	**9.7 J**	**10 J**	**9.2 J**
C3-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**28 J**	50 U	**3300 J**	**7000 J**	**3800 J**	**6.3 J**	**9.9 J**	**120 J**	**280 J**	**16 J**	**10 J**	**8.7 J**
C4 Chrysenes[b]	NSL	NSL	ug/kg	3.9 U	50 U	380 U	610 U	2600 U	4.5 U	4.3 U	65 U	200 U	4 U	4.3 U	4.2 U
C4-Naphthalenes[b]	NSL	NSL	ug/kg	**95 J**	50 U	**2200 J**	**8600 J**	2600 U	**19 J**	**22 J**	**89 J**	200 U	**15 J**	**17 J**	**18 J**
C4-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**20 J**	50 U	**2400 J**	**4400 J**	**3000 J**	**4.7 J**	**7.1 J**	**84 J**	200 U	**9.3 J**	**6.6 J**	**5.9 J**
Chrysene[a][b]	166	1,290	ug/kg	**5.7**	**350**	**2100**	**3400**	**10000**	**3.9 J**	**3.6 J**	**430**	**970**	**14**	**3.8 J**	**3.4 J**
Dibenzo(a,h)anthracene[a][b]	33	NSL	ug/kg	**0.71 J**	**66**	**330 J**	**540 J**	**1500 J**	**0.74 J**	4.3 U	**84**	**170 J**	**2.1 J**	4.3 U	**0.89 J**
Fluoranthene[a][b]	423	2,230	ug/kg	**2.4 J**	**770**	**4400**	**7900**	**26000**	**11**	**3.2 J**	**840**	**2400**	**27**	**3.3 J**	**2.9 J**
Fluorene[a][b]	77	536	ug/kg	**1.6 J**	**31 J**	**180 J**	**590 J**	**1700 J**	**3.6 J**	**1.3 J**	**28 J**	**47 J**	**0.98 J**	**0.53 J**	**0.51 J**
Indeno(1,2,3-cd)pyrene[a][b]	200	NSL	ug/kg	**0.86 J**	**190**	**820**	**1500**	**4300**	**1.6 J**	**0.68 J**	**240**	**460**	**6.7**	**0.71 J**	**1.3 J**
Naphthalene[a][b]	176	561	ug/kg	**2.2 J**	**9 J**	**52 J**	**80 J**	2600 U	4.5 U	**0.56 J**	**12 J**	200 U	**1.1 J**	**1.3 J**	**1.2 J**
Perylene[b]	NSL	NSL	ug/kg	**3.8 J**	**66**	**160 J**	**530 J**	**2000 J**	**4.2 J**	**8.7**	**62 J**	**210**	**9.9**	**7.9**	**7.1**
Phenanthrene[a][b]	204	1,170	ug/kg	**7.3**	**350**	**1900**	**4500**	**16000**	**43**	**3.6 J**	**320**	**1400**	**13**	**2.9 J**	**2.2 J**
Pyrene[a][b]	195	1,520	ug/kg	**4.3**	**460**	**2800**	**5000**	**16000**	**7**	**3.6 J**	**510**	**2000**	**21**	**3.5 J**	**3 J**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**42.51**	**3558.9**	**18838**	**35594**	**117500**	**119.89**	**31.01**	**3915.7**	**11712**	**142.97**	**32.63**	**29.78**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**398.16**	**4627**	**41473**	**97014**	**166200**	**213.14**	**144.49**	**5592**	**16072**	**274.98**	**128.11**	**117.18**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-26	HT18-26	HT18-27	HT18-27	HT18-29	HT18-29	HT18-30	HT18-30	HT18-30	HT18-30	HT18-30	HT18-30
			Sample Name:	HT18-26-5070	HT18-26-7010	HT18-27-0010	HT18-27-1020	HT18-29-SURF	HT18-29-0010	HT18-30-SURF	HT18-30-0010	HT18-30-1030	HT18-30-3050	HT18-30-5070	HT18-30-7010
			Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/22/2018	10/23/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	5-7	7-9.5	0-0.8	0.8-2.4	0-0.5	0-1.2	0-0.5	0-1	1-3	3-5	5-7	7-10
Analyte	**TEC**	**PEC**	**Unit**												
1-Methylnaphthalene	NSL	NSL	ug/kg	**1.5 J**	**1 J**	**390 J**	**590**	**17 J**	**37 J**	**8.8 J**	**12 J**	**50 J**	**41 J**	**57 J**	**170 J**
2-Methylnaphthalene[a]	20.2	NSL	ug/kg	**0.97 J**	**0.61 J**	**490**	**540**	210 U	**36 J**	**7.2 J**	**10 J**	**49 J**	**43 J**	**63 J**	**170 J**
Acenaphthene[a][b]	6.71	NSL	ug/kg	**0.52 J**	4.3 U	**1000**	**570**	**37 J**	**180 J**	**8.3 J**	**35 J**	**78 J**	**58 J**	**69 J**	**110 J**
Acenaphthylene[a][b]	5.87	NSL	ug/kg	4.5 U	4.3 U	**76 J**	210 U	**88 J-**	**28 J**	**4.8 J-**	49 U	**47 J**	**41 J**	**35 J**	**56 J**
Anthracene[a][b]	57.2	845	ug/kg	4.5 U	4.3 U	**530**	**290**	**180 J-**	**320**	**17 J-**	**78**	**150**	**110**	**110**	**250**
Benzo(a)anthracene[a][b]	108	1,050	ug/kg	4.5 U	4.3 U	**2600**	**200 J**	**1200 J-**	**770**	**120 J-**	**240**	**640**	**560**	**550**	**900**
Benzo(a)pyrene[a][b]	150	1,450	ug/kg	**1.2 J**	4.3 U	**1600**	**140 J**	**320**	**480**	**63**	**170**	**450**	**420**	**410**	**720**
Benzo(b)fluoranthene[a][b]	10,400	NSL	ug/kg	**2 J**	**1.8 J**	**2000**	**170 J**	**680**	**600**	**180**	**290**	**670**	**660**	**560**	**910**
Benzo(e)pyrene[b]	150	1,450	ug/kg	**1.7 J**	**1.6 J**	**1500**	**140 J**	**240**	**460**	**56**	**200**	**490**	**430**	**420**	**660**
Benzo(g,h,i)perylene[a][b]	170	NSL	ug/kg	**2 J**	4.3 U	**1200**	**140 J**	**42 J-**	**390**	**12 J-**	**180**	**370**	**330**	**310**	**490**
Benzo(k)fluoranthene[a][b]	240	NSL	ug/kg	4.5 U	**0.64 J**	**2000**	**210 J**	**750**	**610**	**140**	**260**	**570**	**470**	**450**	**760**
C1 Chrysenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	**990 J**	210 U	**530 J**	**290 J**	**57 J**	**86 J**	**490 J**	**370 J**	**500 J**	**1100 J**
C1 Fluorenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	**440 J**	210 U	210 U	200 U	29 U	49 U	**210 J**	**120 J**	**120 J**	**300 J**
C1-Fluoranthenes/Pyrenes[b]	NSL	NSL	ug/kg	**6.3 J**	**5.5 J**	**3400 J**	**250 J**	**1400 J**	**850 J**	**150 J**	**260 J**	**1100 J**	**910 J**	**1000 J**	**2800 J**
C1-Naphthalenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	**590 J**	**760 J**	210 U	200 U	29 U	49 U	120 U	110 U	110 U	**250 J**
C1-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**7.1 J**	**7.2 J**	**1600 J**	**290 J**	**860 J**	**650 J**	**75 J**	**160 J**	**1300 J**	**860 J**	**990 J**	**2600 J**
C2 Chrysenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	440 U	210 U	**230 J**	200 U	**33 J**	49 U	**410 J**	**300 J**	**400 J**	**910 J**
C2 Fluorenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	440 U	210 U	210 U	200 U	29 U	49 U	**780 J**	**480 J**	**450 J**	**1200 J**
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**6 J**	**5.6 J**	**1000 J**	210 U	**900 J**	**480 J**	**93 J**	**130 J**	**910 J**	**700 J**	**890 J**	**2300 J**
C2-Naphthalenes[b]	NSL	NSL	ug/kg	**4.9 J**	**4.9 J**	**1600 J**	**1300 J**	210 U	200 U	**42 J**	**62 J**	**750 J**	**390 J**	**630 J**	**2200 J**
C2-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**11 J**	**15 J**	**1300 J**	210 U	**520 J**	**370 J**	**71 J**	**93 J**	**2600 J**	**1800 J**	**2100 J**	**5500 J**
C3 Chrysenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	440 U	210 U	210 U	200 U	29 U	49 U	**270 J**	**210 J**	**260 J**	**480 J**
C3 Fluorenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	440 U	210 U	210 U	200 U	29 U	49 U	**1200 J**	**840 J**	**880 J**	**1700 J**
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	4.5 U	**4.3 J**	440 U	210 U	**310 J**	200 U	**35 J**	49 U	**800 J**	**580 J**	**720 J**	**1700 J**
C3-Naphthalenes[b]	NSL	NSL	ug/kg	**11 J**	**14 J**	**1600 J**	**380 J**	**280 J**	200 U	**73 J**	**76 J**	**2600 J**	**1200 J**	**1300 J**	**3900 J**
C3-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**10 J**	**8.7 J**	**620 J**	210 U	210 U	**230 J**	**50 J**	**50 J**	**2800 J**	**2000 J**	**2300 J**	**6500 J**
C4 Chrysenes[b]	NSL	NSL	ug/kg	4.5 U	4.3 U	440 U	210 U	210 U	200 U	29 U	49 U	120 U	110 U	110 U	190 U
C4-Naphthalenes[b]	NSL	NSL	ug/kg	**20 J**	**22 J**	**870 J**	210 U	210 U	200 U	**110 J**	**71 J**	**3300 J**	**1700 J**	**1600 J**	**3800 J**
C4-Phenanthrenes/Anthracenes[b]	NSL	NSL	ug/kg	**7.1 J**	**6.4 J**	440 U	210 U	210 U	200 U	**30 J**	49 U	**2100 J**	**1500 J**	**1800 J**	**4800 J**
Chrysene[a][b]	166	1,290	ug/kg	**3.2 J**	**3.2 J**	**2600**	**220**	**970 J-**	**820**	**160 J-**	**310**	**920**	**780**	**770**	**1400**
Dibenzo(a,h)anthracene[a][b]	33	NSL	ug/kg	4.5 U	4.3 U	**440**	**40 J**	**180 J**	**140 J**	**30**	**54**	**140**	**120**	**110**	**190**
Fluoranthene[a][b]	423	2,230	ug/kg	**1.8 J**	**1.8 J**	**6400**	**660**	**1900**	**1900**	**320**	**710**	**1700**	**1500**	**1300**	**2200**
Fluorene[a][b]	77	536	ug/kg	**0.89 J**	**1.2 J**	**840**	**990**	**92 J**	**180 J**	**17 J**	**58**	**120**	**97 J**	**93 J**	**170 J**
Indeno(1,2,3-cd)pyrene[a][b]	200	NSL	ug/kg	4.5 U	4.3 U	**1100**	**110 J**	**270 J-**	**370**	**60 J-**	**160**	**360**	**320**	**290**	**490**
Naphthalene[a][b]	176	561	ug/kg	**1.4 J**	**0.51 J**	**450**	**570**	210 U	**55 J**	**4.6 J**	**7.1 J**	**31 J**	**36 J**	**44 J**	**84 J**
Perylene[b]	NSL	NSL	ug/kg	**17**	**9.6**	**450**	**45 J**	**51 J**	**160 J**	**12 J**	**68**	**160**	**140**	**120**	**190**
Phenanthrene[a][b]	204	1,170	ug/kg	**2.5 J**	**3.6 J**	**1900**	**2200**	**1000**	**1700**	**130**	**510**	**980**	**780**	**740**	**1300**
Pyrene[a][b]	195	1,520	ug/kg	**2.3 J**	**2.4 J**	**5200**	**530**	**1200 J-**	**1600**	**170 J-**	**540**	**1200**	**1100**	**1000**	**1900**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**32.28**	**32.96**	**30426**	**7685**	**9119**	**10179**	**1443.9**	**3636.6**	**8475**	**7425**	**6904**	**12100**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**145.41**	**144.45**	**46216**	**11465**	**14175**	**14253**	**2282.7**	**4948.6**	**29106**	**20742**	**21821**	**50915**

NOTES:

Detected values are Bolded

Bolded and Shaded detected values exceed 3XPEC screening value

Bolded and Shaded detected values exceed 2XPEC screening value

Bolded and Shaded detected values exceed PEC screening value

Bolded and Shaded detected values exceed TEC screening value

FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
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PEC = Probable effect concentration. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (MacDonald et al. 2000).
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B = Compound was found in the blank and sample
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J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-4 SEDIMENT RESULTS FOR PAHS, HT

			Location ID:	HT18-31	HT18-31	HT18-31	HT18-31	HT18-31	HT18-32	HT18-32	HT18-32	HT18-32	HT18-32	HT18-32	HT18-32
			Sample Name:	HT18-31-SURF	HT18-31-0010	HT18-31-1025	HT18-31-2555	HT18-31-5565	HT18-32-SURF	HT18-32-SURF-FD	HT18-32-0010	HT18-32-0010-FD	HT18-32-1030	HT18-32-3050	HT18-32-5070
			Sample Date:	10/23/2018	10/25/2018	10/25/2018	10/25/2018	10/25/2018	10/23/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	0-0.5	0-1.3	1.3-2.6	2.6-5.7	5.7-6.6	0-0.5	0-0.5	0-1	0-1	1-3	3-5	5-7
Analyte	**TEC**	**PEC**	**Unit**												
1-Methylnaphthalene	NSL	NSL	ug/kg	**2.8 J**	**3.1 J-**	35 U	3.9 U	3.8 U	**1.5 J**	**4.4 J**	**5.8 J**	**5.3 J**	**1.9 J**	**1.6 J**	**1.8 J**
2-Methylnaphthalene(a)	20.2	NSL	ug/kg	**1.9 J**	**3.3 J-**	35 U	3.9 U	3.8 U	**1.2 J**	**2.8 J**	**6.4 J**	**5.9 J**	**1.4 J**	**1.2 J**	**1.3 J**
Acenaphthene(a)(b)	6.71	NSL	ug/kg	9 U	**1.5 J-**	35 U	3.9 U	3.8 U	**1.1 J**	**2.3 J**	**4 J**	**3.4 J**	**0.6 J**	**0.44 J**	4.6 U
Acenaphthylene(a)(b)	5.87	NSL	ug/kg	**1 J-**	**1.3 J-**	35 U	3.9 U	3.8 U	**0.92 J-**	**3 J-**	**4.1 J**	**3.5 J**	4.4 U	4.5 U	4.6 U
Anthracene(a)(b)	57.2	845	ug/kg	9 UJ	**2.4 J-**	35 U	3.9 U	3.8 U	6.8 UJ	**2.4 J-**	**7.1 J**	**5.9 J**	4.4 U	4.5 U	4.6 U
Benzo(a)anthracene(a)(b)	108	1,050	ug/kg	**7.9 J-**	**14 J-**	35 U	3.9 U	3.8 U	**5.7 J-**	**20 J-**	**43**	**38**	**0.99 J**	**0.62 J**	**0.73 J**
Benzo(a)pyrene(a)(b)	150	1,450	ug/kg	**6.7 J**	**13 J-**	35 U	3.9 U	3.8 U	**2.5 J**	**10**	**38**	**35**	**0.85 J**	4.5 U	4.6 U
Benzo(b)fluoranthene(a)(b)	10,400	NSL	ug/kg	**17**	**28 J-**	35 U	3.9 U	**1 J**	**9**	**32**	**54**	**51**	**3.6 J**	**2.3 J**	**2.7 J**
Benzo(e)pyrene(b)	150	1,450	ug/kg	**5.2 J**	**21 J-**	35 U	3.9 U	**0.87 J**	**2.8 J**	**8.5**	**42**	**39**	**3.2 J**	**1.9 J**	**2.2 J**
Benzo(g,h,i)perylene(a)(b)	170	NSL	ug/kg	**1.9 J-**	**19 J-**	35 U	3.9 U	3.8 U	6.8 UJ	**1.7 J-**	**31**	**29**	**4.2 J**	**2.4 J**	**2.9 J**
Benzo(k)fluoranthene(a)(b)	240	NSL	ug/kg	**11**	**22 J-**	35 U	3.9 U	3.8 U	**7**	**21**	**43**	**39**	4.4 U	4.5 U	4.6 U
C1 Chrysenes(b)	NSL	NSL	ug/kg	9 U	**14 J-**	35 U	3.9 U	3.8 U	6.8 U	**15 J**	**37 J**	**39 J**	**6.7 J**	4.5 U	**4.7 J**
C1 Fluorenes(b)	NSL	NSL	ug/kg	9 U	5.7 UJ	35 U	3.9 U	3.8 U	6.8 U	6.7 U	**11 J**	**9.9 J**	4.4 U	4.5 U	4.6 U
C1-Fluoranthenes/Pyrenes(b)	NSL	NSL	ug/kg	**13 J**	**25 J-**	35 U	3.9 U	3.8 U	**9.5 J**	**32 J**	**81 J**	**78 J**	**11 J**	**7.7 J**	**8.9 J**
C1-Naphthalenes(b)	NSL	NSL	ug/kg	9 U	5.7 UJ	35 U	3.9 U	3.8 U	6.8 U	6.7 U	**8.2 J**	9.3 U	4.4 U	4.5 U	4.6 U
C1-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**10 J**	**21 J-**	35 U	3.9 U	3.8 U	**6.9 J**	**24 J**	**53 J**	**51 J**	**9.7 J**	**7.5 J**	**12 J**
C2 Chrysenes(b)	NSL	NSL	ug/kg	9 U	**9.2 J-**	35 U	3.9 U	3.8 U	6.8 U	**12 J**	**25 J**	**27 J**	**6.5 J**	4.5 U	4.6 U
C2 Fluorenes(b)	NSL	NSL	ug/kg	9 U	**8.5 J-**	35 U	3.9 U	3.8 U	6.8 U	**12 J**	**17 J**	**19 J**	4.4 U	4.5 U	4.6 U
C2-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	**10 J**	**19 J-**	35 U	3.9 U	3.8 U	**7.8 J**	**24 J**	**59 J**	**61 J**	**11 J**	**7.7 J**	**8.5 J**
C2-Naphthalenes(b)	NSL	NSL	ug/kg	**11 J**	**18 J-**	35 U	3.9 U	3.8 U	**7.7 J**	**22 J**	**29 J**	**28 J**	**8.1 J**	**6.6 J**	**7.5 J**
C2-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**13 J**	**29 J-**	35 U	3.9 U	3.8 U	**10 J**	**34 J**	**80 J**	**80 J**	**17 J**	**16 J**	**19 J**
C3 Chrysenes(b)	NSL	NSL	ug/kg	9 U	**6.1 J-**	35 U	3.9 U	3.8 U	6.8 U	**8.3 J**	**14 J**	**15 J**	4.4 U	4.5 U	4.6 U
C3 Fluorenes(b)	NSL	NSL	ug/kg	9 U	**15 J-**	35 U	3.9 U	3.8 U	6.8 U	**12 J**	**32 J**	**33 J**	**6.9 J**	**4.5 J**	**5.5 J**
C3-Fluoranthenes/Pyrenes	NSL	NSL	ug/kg	9 U	**12 J-**	35 U	3.9 U	3.8 U	6.8 U	**14 J**	**39 J**	**39 J**	**8 J**	**6 J**	**6.6 J**
C3-Naphthalenes(b)	NSL	NSL	ug/kg	**20 J**	**37 J-**	35 U	3.9 U	3.8 U	**14 J**	**42 J**	**54 J**	**52 J**	**21 J**	**15 J**	**18 J**
C3-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	**11 J**	**23 J-**	35 U	3.9 U	3.8 U	**8.5 J**	**30 J**	**79 J**	**82 J**	**20 J**	**12 J**	**14 J**
C4 Chrysenes(b)	NSL	NSL	ug/kg	9 U	5.7 UJ	35 U	3.9 U	3.8 U	6.8 U	6.7 U	7.5 U	9.3 U	4.4 U	4.5 U	4.6 U
C4-Naphthalenes(b)	NSL	NSL	ug/kg	**33 J**	**47 J-**	35 U	3.9 U	3.8 U	**18 J**	**70 J**	**73 J**	**71 J**	**38 J**	**25 J**	**28 J**
C4-Phenanthrenes/Anthracenes(b)	NSL	NSL	ug/kg	9 U	**17 J-**	35 U	3.9 U	3.8 U	**6.9 J**	**20 J**	**60 J**	**64 J**	**13 J**	**8.7 J**	**9.9 J**
Chrysene(a)(b)	166	1,290	ug/kg	**13 J-**	**29 J-**	35 U	3.9 U	**1 J**	**8 J-**	**27 J-**	**61**	**55**	**5.8**	**3.9 J**	**4.9**
Dibenzo(a,h)anthracene(a)(b)	33	NSL	ug/kg	**2.5 J**	**4.6 J-**	35 U	3.9 U	3.8 U	**1.8 J**	**5.4 J**	**10**	**9.7**	**0.52 J**	4.5 U	4.6 U
Fluoranthene(a)(b)	423	2,230	ug/kg	**23**	**52 J-**	35 U	3.9 U	3.8 U	**15**	**54**	**110**	**95**	**3.3 J**	**2.5 J**	**4 J**
Fluorene(a)(b)	77	536	ug/kg	**1.9 J**	**3.3 J-**	35 U	3.9 U	3.8 U	**1.5 J**	**5.4 J**	**7.5**	**7.1 J**	**1.1 J**	**0.65 J**	**1.2 J**
Indeno(1,2,3-cd)pyrene(a)(b)	200	NSL	ug/kg	**5.2 J-**	**15 J-**	35 U	3.9 U	3.8 U	**3 J-**	**9.7 J-**	**27**	**25**	**1.4 J**	**0.61 J**	**0.78 J**
Naphthalene(a)(b)	176	561	ug/kg	**1.2 J**	**2.3 J-**	35 U	3.9 U	3.8 U	**0.76 J**	**1.7 J**	**6.8 J**	**4.9 J**	**1.7 J**	**1.4 J**	**1.4 J**
Perylene(b)	NSL	NSL	ug/kg	**1.8 J**	**13 J-**	**420**	**12**	**2.4 J**	**1.4 J**	**4.5 J**	**37**	**32**	**10**	**6.4**	**5.7**
Phenanthrene(a)(b)	204	1,170	ug/kg	**11**	**22 J-**	35 U	3.9 U	**0.36 J**	**5.4 J**	**22**	**48**	**41**	**2.7 J**	**2.3 J**	**4.8**
Pyrene(a)(b)	195	1,520	ug/kg	**13 J-**	**35 J-**	35 U	3.9 U	**0.9 J**	**7.9 J-**	**27 J-**	**95**	**85**	**4.2 J**	**3.1 J**	**4 J**
Total PAH17 ND=1/2RL	1,610	22,800	ug/kg	**127.2**	**267.7**	**297.5**	**33.15**	**27.96**	**77.58**	**247.4**	**595.9**	**533.4**	**38.96**	**32.67**	**42.51**
Total PAH34 ND=1/2RL	1,610	22,800	ug/kg	**283.8**	**576.75**	**997.5**	**76.35**	**59.73**	**189.28**	**600.95**	**1325.45**	**1256.7**	**219.66**	**158.52**	**190.41**

NOTES:
Detected values are Bolded
Bolded and Shaded detected values exceed 3XPEC screening value
Bolded and Shaded detected values exceed 2XPEC screening value
Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream Area
ug/kg = Microgram per kilogram
ND = Non-detect
NSL = No Screening Level
PAH = Polycyclic aromatic hydrocarbon
RL = Reporting limit
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).
B = Compound was found in the blank and sample
D = Sample was analyzed at a higher dilution factor
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low
U = Indicates the analyte was analyzed but not detected
*TEC value based on USEPA Region 5 RCRA Ecological Screening Value (EPA 2003)
(a) Analytes inlcuded in Total 17 PAH calculations
(b) Analytes inlcuded in Total 34 PAH calculations

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01	HT18-01
			Sample Name:	HT18-01-SURF	HT18-01-SURF-FD	HT18-01-0010	HT18-01-1030	HT18-01-3050	HT18-01-5070	HT18-01-5070-FD
			Sample Date:	10/29/2018	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018
			Depth Interval (ft):	0-0.5	0-0.5	0-1	1-3	3-5	5-7	5-7
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**10.1**	**8.9**	**6.4**	**6.1**	**6.2**	**4.7**	**5.3**
Barium	NSL	NSL	mg/kg	**74.5**	**66.3**	**43.6**	**47.1**	**46.9**	**35.6**	**45.4**
Cadmium	0.99	4.98	mg/kg	1.4 U	0.96 U	**0.58 J**	**1**	**1.4**	**0.33 J**	**0.44 J**
Chromium	43.4	111	mg/kg	**26.3**	**24.4**	**17.6**	**22.2**	**25.7**	**11.8**	**15.4**
Copper	31.6	149	mg/kg	**29.7**	**31**	**32.4**	**26.5**	**28.9**	**17.3**	**18.3**
Iron	20000	40000	mg/kg	**22100**	**20900**	**15400**	**15200**	**16100**	**12000**	**15400**
Lead	35.8	128	mg/kg	**25.4**	**24.1**	**29.7**	**55**	**49**	**29.7**	**31**
Mercury	0.18	1.06	mg/kg	**0.057 J**	**0.049 J**	**0.056 J**	**0.11 J**	**0.11 J**	**0.12 J**	**0.066 J**
Nickel	22.7	48.6	mg/kg	**29.7**	**28.3**	**22.8**	**27.5**	**26.8**	**16**	**21.1**
Selenium	NSL	NSL	mg/kg	9.5 U	**1.1 J**	4.8 U	4.3 U	**0.39 J**	**0.43 J**	3.8 U
Silver[(a)]	1.6	2.2	mg/kg	2.7 U	1.9 U	1.4 U	**0.09 J**	**0.11 J**	1 U	1.1 U
Zinc	121	459	mg/kg	**119**	**108**	**85.8**	**112**	**101**	**61.6**	**70**
Total organic carbon	NSL	NSL	mg/kg	**29900 J**	**29300 J**	**21400**	**14800 J**	**4030**	**113000 J**	**14800 J**

NOTES:
Detected values are Bolded
Bolded and Shaded detected values exceed 3XPEC screening value
Bolded and Shaded detected values exceed 2XPEC screening value
Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream 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)
D = Sample was analyzed at a higher dilution factor
H = Sample was prepped or analyzed beyond the specified holding time
J = compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased low.
J+ = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte, but may be biased high.
R = The data are unusable. The compound may or may not be present.
U = Indicates the analyte was analyzed but not detected
(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-01	HT18-02	HT18-02	HT18-02	HT18-02	HT18-02	HT18-02
			Sample Name:	HT18-01-7085	HT18-02-SURF	HT18-02-0010	HT18-02-1030	HT18-02-3060	HT18-02-6080	HT18-02-8090
			Sample Date:	10/30/2018	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018
			Depth Interval (ft):	7-8.6	0-0.5	0-1	1-3	3-6.1	6.1-7.8	7.8-9.2
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**3**	**8**	**7.3**	**4.9**	**6.9**	**8.3**	**3**
Barium	NSL	NSL	mg/kg	**23.2**	**66.9**	**58**	**33.4**	**59.6**	**72.9**	**20 J**
Cadmium	0.99	4.98	mg/kg	**0.17 J**	1.1 U	**0.73 J**	**0.31 J**	**0.33 J**	**0.44 J**	**0.21 J**
Chromium	43.4	111	mg/kg	**7.9**	**22.6**	**23.1**	**11.3**	**13.8**	**17.7**	**7**
Copper	31.6	149	mg/kg	**9.2**	**30**	**27.8**	**15**	**35.6**	**69.9**	**5.9**
Iron	20000	40000	mg/kg	**7400**	**19400**	**19700**	**11200**	**13700**	**17000**	**7150**
Lead	35.8	128	mg/kg	**13.7 J**	**24.3**	**28.7**	**33.4**	**68.2**	**85.4**	**11.7**
Mercury	0.18	1.06	mg/kg	0.12 U	**0.064 J**	**0.062 J**	**0.069 J**	**0.23 J**	**0.2 J**	**0.02 J**
Nickel	22.7	48.6	mg/kg	**10**	**26.1**	**28.8**	**14.1**	**17.8**	**21.1**	**8.8**
Selenium	NSL	NSL	mg/kg	3.2 U	7.5 U	**1.1 J**	**0.61 J**	4 U	3.8 U	3.6 U
Silver[(a)]	1.6	2.2	mg/kg	0.92 U	2.2 U	1.7 U	1 U	1.1 U	1.1 U	1 U
Zinc	121	459	mg/kg	**29.8**	**100**	**104**	**57.8**	**81.6**	**121**	**26.6**
Total organic carbon	NSL	NSL	mg/kg	**12600 J**	**23400 J**	**26300**	**8890**	**9210**	**27600**	**6460 J**

NOTES:
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Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream 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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J+ = The analyte was positively identified; the associated numerical value is an approxima concentration of the analyte, but may be biased high.
R = The data are unusable. The compound may or may not be present.
U = Indicates the analyte was analyzed but not detected
(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-03	HT18-03	HT18-03	HT18-03	HT18-03	HT18-03	HT18-04
			Sample Name:	HT18-03-SURF	HT18-03-0010	HT18-03-1030	HT18-03-1030-FD	HT18-03-3045	HT18-03-4560	HT18-04-SURF
			Sample Date:	10/29/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/30/2018	10/29/2018
			Depth Interval (ft):	0-0.5	0-1	1-3	1-3	3-4.6	4.6-6	0-0.5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**7.5**	**7.8**	**10.9**	**11.3**	**11.6**	**9.9**	**5.3**
Barium	NSL	NSL	mg/kg	**132**	**162**	**360**	**355**	**421**	**64.6**	**40.3**
Cadmium	0.99	4.98	mg/kg	**6.1**	**4.9**	**18.1**	**18.1**	**25.1**	**0.21 J**	0.8 U
Chromium	43.4	111	mg/kg	**84.6**	**87.1**	**191**	**189**	**232**	**18.2**	**15.6**
Copper	31.6	149	mg/kg	**113**	**129**	**185**	**174**	**196**	**16.8**	**19.2**
Iron	20000	40000	mg/kg	**20000**	**22600**	**22100**	**23200**	**20500**	**18800**	**13100**
Lead	35.8	128	mg/kg	**113**	**173**	**437**	**502**	**500**	**10.9**	**15.4**
Mercury	0.18	1.06	mg/kg	**0.36**	**0.52 J**	**1.2 J**	**0.95 J**	**1.5 J**	0.1 UJ	**0.036 J**
Nickel	22.7	48.6	mg/kg	**58.8**	**52.6**	**87.6**	**89.8**	**101**	**25.9**	**17.9**
Selenium	NSL	NSL	mg/kg	**1.8 J**	**3.5 J**	**2.1 J**	**1.6 J**	**2.2 J**	3.5 U	**0.93 J**
Silver[(a)]	1.6	2.2	mg/kg	**0.72 J**	**2.3**	**4.8**	**3.7**	**3.9**	0.99 U	1.6 U
Zinc	121	459	mg/kg	**587**	**566**	**868**	**864**	**1010**	**46.3**	**70.9**
Total organic carbon	NSL	NSL	mg/kg	**53100 J**	**70900 J**	**64200 J**	**74500 J**	**67100 J**	**6470 J**	**17700 J**

NOTES:
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FD = Field Duplicate
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mg/kg = milligrams per kilogram
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U = Indicates the analyte was analyzed but not detected
(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-04	HT18-04	HT18-04	HT18-04	HT18-05	HT18-05	HT18-05
			Sample Name:	HT18-04-0005	HT18-04-0530	HT18-04-0530-FD	HT18-04-3040	HT18-05-SURF	HT18-05-0010	HT18-05-1030
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/30/2018	10/30/2018
			Depth Interval (ft):	0-0.6	0.6-3.3	0.6-3.3	3.3-4.3	0-0.5	0-1	1-2.7
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**3**	**4.1**	**3.2**	**4.3**	**10.1**	**8.6**	**10.4**
Barium	NSL	NSL	mg/kg	**18.6 J**	**28.3**	**27.7**	**14.9 J**	**126**	**80.7**	**119**
Cadmium	0.99	4.98	mg/kg	0.6 U	0.67 U	0.52 U	0.47 U	**3.9**	**1.1 J**	**2.4**
Chromium	43.4	111	mg/kg	**7.8**	**10.3**	**10.7**	**6.8**	**53.7**	**32.9**	**49.7**
Copper	31.6	149	mg/kg	**6.6**	**7.7**	**8.4**	**3.5**	**89.1**	**44.9**	**72.6**
Iron	20000	40000	mg/kg	**7190**	**10500**	**10400**	**6110**	**22200**	**23400**	**26300**
Lead	35.8	128	mg/kg	**6.2**	**5.8**	**6**	**3.1**	**97.9**	**54.3**	**88.2**
Mercury	0.18	1.06	mg/kg	0.13 U	0.13 U	0.12 U	0.12 U	**0.19 J**	**0.089 J**	**0.22 J**
Nickel	22.7	48.6	mg/kg	**9.8**	**14.7**	**15.1**	**8**	**54.5**	**39.8**	**46.7**
Selenium	NSL	NSL	mg/kg	4.2 U	4.7 U	3.6 U	3.3 U	**1.4 J**	**1.2 J**	**1.2 J**
Silver[(a)]	1.6	2.2	mg/kg	1.2 U	1.3 U	1 U	0.94 U	**0.55 J**	**0.14 J**	**0.6 J**
Zinc	121	459	mg/kg	**31.5**	**30.9**	**29.9**	**14.6**	**358**	**175**	**298**
Total organic carbon	NSL	NSL	mg/kg	**6310**	**11400**	**7760**	**2860**	**41800 J**	**40800 J**	**58400 J**

NOTES:
Detected values are Bolded
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HT = Harbortown Upstream Area
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U = Indicates the analyte was analyzed but not detected
(a) Source: Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application, Publication No. WT-732 2003, WDNR December 2003

TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-05	HT18-05	HT18-06	HT18-06	HT18-06	HT18-06	HT18-06
			Sample Name:	HT18-05-3050	HT18-05-5060	HT18-06-SURF	HT18-06-0010	HT18-06-1030	HT18-06-1030-FD	HT18-06-3060
			Sample Date:	10/30/2018	10/30/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	2.7-5.1	5.1-5.9	0-0.5	0-1	1-3	1-3	3-6
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**9.6**	**7.9**	**9.3**	**9.6**	**10.3**	**10.5**	**11.1**
Barium	NSL	NSL	mg/kg	**311**	**195**	**92.6**	**89.1**	**109**	**97**	**172**
Cadmium	0.99	4.98	mg/kg	**8.3**	**1.6**	1.3 U	1.2 U	**1.6**	**1.8**	**10.6**
Chromium	43.4	111	mg/kg	**100**	**15.3**	**32.1**	**30.9**	**43.1**	**42**	**101**
Copper	31.6	149	mg/kg	**162**	**109**	**44.9**	**38.7**	**49.1**	**47.6**	**100**
Iron	20000	40000	mg/kg	**18000**	**9670**	**21800**	**25600**	**24700**	**25000**	**26000**
Lead	35.8	128	mg/kg	**461**	**327**	**41.8**	**35.8**	**49.1**	**51**	**108**
Mercury	0.18	1.06	mg/kg	**1.2 J**	**0.59 J**	**0.12 J**	0.25 U	**0.35**	0.19 U	**0.61**
Nickel	22.7	48.6	mg/kg	**61.5**	**16.4**	**35**	**40**	**42.3**	**43.7**	**63.4**
Selenium	NSL	NSL	mg/kg	**1.7 J**	**0.81 J**	**1.3 J**	8.6 U	7.1 U	6.5 U	7.1 U
Silver[(a)]	1.6	2.2	mg/kg	**1.8**	**0.4 J**	**0.18 J**	2.5 U	**0.45 J+**	**0.49 J+**	**2.9**
Zinc	121	459	mg/kg	**715**	**405**	**169**	**145**	**209**	**201**	**504**
Total organic carbon	NSL	NSL	mg/kg	**36200 J**	**24100 J**	**47600 J**	**22700**	**46200**	**32500**	**67100**

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mg/kg = milligrams per kilogram
NSL = No Screening Level
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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-06	HT18-06	HT18-06	HT18-07	HT18-07	HT18-07	HT18-07
			Sample Name:	HT18-06-6070	HT18-06-7080	HT18-06-8010	HT18-07-SURF	HT18-07-0020	HT18-07-2050	HT18-07-5070
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	6-7.1	7.1-8.1	8.1-9.7	0-0.5	0-1.8	1.8-4.8	4.8-7
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**5**	**8.8**	**7.5**	**4.5**	**2.8**	**9.4**	**6.4**
Barium	NSL	NSL	mg/kg	**456**	**216**	**221**	**40.4**	**29.3**	**289**	**168**
Cadmium	0.99	4.98	mg/kg	**5.1**	**7.4**	**12**	**0.72**	**0.86**	**16.2**	**7.2**
Chromium	43.4	111	mg/kg	**39.4**	**108**	**117**	**18.3**	**13.1**	**126**	**76.3**
Copper	31.6	149	mg/kg	**72.9**	**76.8**	**82**	**23.6**	**13.9**	**124**	**62.3**
Iron	20000	40000	mg/kg	**8450**	**13100**	**15500**	**9050**	**5920**	**19400**	**14800**
Lead	35.8	128	mg/kg	**193**	**317**	**243**	**40.8**	**25.1**	**248**	**143**
Mercury	0.18	1.06	mg/kg	**0.96**	**0.44**	**0.55**	**0.071 J**	**0.054 J-**	**0.65**	**0.36**
Nickel	22.7	48.6	mg/kg	**33.8**	**78.9**	**58.6**	**15.3**	**12.4**	**55.2**	**38.3**
Selenium	NSL	NSL	mg/kg	4.4 U	4 U	4.4 U	4.5 U	3.6 U	4.7 U	4.9 U
Silver[(a)]	1.6	2.2	mg/kg	**1.1 J+**	**1.7**	**1.7**	**0.094 J**	**0.11 J+**	**1.8**	**2.1**
Zinc	121	459	mg/kg	**383**	**584**	**433**	**76.7**	**70.8**	**543**	**282**
Total organic carbon	NSL	NSL	mg/kg	**16100**	**18100**	**42200**	**19200 J**	**10600**	**59400**	**34100**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-07	HT18-08	HT18-08	HT18-08	HT18-08	HT18-08	HT18-08
			Sample Name:	HT18-07-7090	HT18-08-SURF	HT18-08-0010	HT18-08-1020	HT18-08-1020-FD	HT18-08-2045	HT18-08-4565
			Sample Date:	10/29/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	7-8.9	0-0.5	0-1	1-2.3	1-2.3	2.3-4.6	4.6-6.5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**8.4**	**7.6**	**10.3**	**10**	**9.4**	**34.1**	**3.7**
Barium	NSL	NSL	mg/kg	**294**	**64.7**	**79.5**	**79.8**	**71**	**205**	**30.4**
Cadmium	0.99	4.98	mg/kg	**13.2**	**1.4**	1.3 U	**1.9**	**1.4**	**1.3**	0.58 U
Chromium	43.4	111	mg/kg	**134**	**29.6**	**31.9**	**31.8**	**29.7**	**19.2**	**10.8**
Copper	31.6	149	mg/kg	**124**	**41.6**	**42.5**	**62.6**	**70.1**	**143**	**27.6**
Iron	20000	40000	mg/kg	**16400**	**21500**	**25600**	**18000**	**22100**	**12300**	**10100**
Lead	35.8	128	mg/kg	**233**	**37.5 J-**	**39.4**	**89.6**	**47.4**	**175**	**20.1**
Mercury	0.18	1.06	mg/kg	**0.46**	**0.093 J**	**0.12 J**	**0.2**	**0.24**	**1.3**	**0.22**
Nickel	22.7	48.6	mg/kg	**46.1**	**37**	**40.2**	**31.4**	**35.1**	**19.5**	**12.6**
Selenium	NSL	NSL	mg/kg	4 U	**1.2 J**	**1.6 J**	**1.1 J**	**4.3 J**	**2.4 J**	4.1 U
Silver[(a)]	1.6	2.2	mg/kg	**3.3**	**0.058 J**	**0.094 J+**	**0.97 J+**	**0.15 J+**	**0.21 J+**	1.2 U
Zinc	121	459	mg/kg	**659**	**158**	**169**	**196**	**180**	**287**	**67.7**
Total organic carbon	NSL	NSL	mg/kg	**46600**	**34500**	**35900**	**36000**	**35100**	**49400**	**33300**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-08	HT18-09	HT18-09	HT18-09	HT18-09	HT18-09	HT18-09
			Sample Name:	HT18-08-6580	HT18-09-SURF	HT18-09-0010	HT18-09-1030	HT18-09-3050	HT18-09-3050-FD	HT18-09-5070
			Sample Date:	10/23/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	6.5-8	0-0.5	0-1	1-3	3-5	3-5	5-7
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**2.6**	**8.3**	**10.7**	**10.1**	**9.1**	**9.7**	**12**
Barium	NSL	NSL	mg/kg	**16.5 J**	**67.1**	**93.5**	**81.9**	**77**	**82.6**	**107**
Cadmium	0.99	4.98	mg/kg	**0.12 J**	1.3 U	**1.5**	**1.3**	**1.4**	**1.6**	**3**
Chromium	43.4	111	mg/kg	**7.5**	**27.5**	**35.9**	**33.3**	**34.4**	**36.4**	**53**
Copper	31.6	149	mg/kg	**4.8**	**34.7**	**46.2**	**39.9**	**42.4**	**44.4**	**54.6**
Iron	20000	40000	mg/kg	**6360**	**22300**	**28200**	**24400**	**22100**	**22900**	**28700**
Lead	35.8	128	mg/kg	**4.2 J**	**28 J-**	**36.4**	**37.4**	**45.3**	**47.4**	**62.9**
Mercury	0.18	1.06	mg/kg	0.11 U	**0.063 J**	**0.079 J**	**0.14 J**	**0.18**	**0.12 J**	**0.33**
Nickel	22.7	48.6	mg/kg	**8.8**	**32.1**	**42.9**	**39**	**37.4**	**38.6**	**53.5**
Selenium	NSL	NSL	mg/kg	3.5 U	**1.2 J**	**2.2 J**	**1.3 J**	**1.3 J**	**2 J**	**1.8 J**
Silver[(a)]	1.6	2.2	mg/kg	1 U	**0.13 J**	2.8 U	**0.18 J+**	**0.37 J+**	**0.36 J+**	**1.2 J+**
Zinc	121	459	mg/kg	**19.3**	**135**	**176**	**156**	**168**	**180**	**274**
Total organic carbon	NSL	NSL	mg/kg	**5120 J**	**41500**	**36200**	**29200**	**30000**	**27600**	**37600**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-09	HT18-10	HT18-10	HT18-11	HT18-11	HT18-11	HT18-11
			Sample Name:	HT18-09-7010	HT18-10-SURF	HT18-10-0010	HT18-11-SURF	HT18-11-0010	HT18-11-1030	HT18-11-3050
			Sample Date:	10/23/2018	10/22/2018	10/24/2018	10/22/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	7-9.7	0-0.5	0-1.1	0-0.5	0-1	1-3	3-5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**8.4**	**2.5**	**2.1**	**8.8**	**8.8**	**9.1**	**5.3**
Barium	NSL	NSL	mg/kg	**99.6**	**11.7 J**	**11.8 J**	**74.7**	**70.6**	**71.4**	**44.3**
Cadmium	0.99	4.98	mg/kg	**5**	0.53 U	**0.2 J**	**0.96**	**0.94 J**	**1.3**	**1.1**
Chromium	43.4	111	mg/kg	**51.8**	**11.7**	**6.1**	**30.4**	**31**	**32.3**	**18**
Copper	31.6	149	mg/kg	**64.5**	**5**	**4.6**	**41.2**	**39.3**	**45.6**	**21**
Iron	20000	40000	mg/kg	**19500**	**6750**	**4260**	**23100**	**25700**	**21800**	**11300**
Lead	35.8	128	mg/kg	**125 J**	**22.9 J-**	**11.3**	**49.4 J-**	**36.5**	**45.4**	**26.1**
Mercury	0.18	1.06	mg/kg	**0.67**	**0.024 J**	0.11 U	**0.16 J**	**0.097 J-**	**0.21**	0.16 U
Nickel	22.7	48.6	mg/kg	**48.7**	**7.5**	**5.6**	**36.3**	**36.2**	**34.3**	**17.6**
Selenium	NSL	NSL	mg/kg	**0.8 J**	3.7 U	3.3 U	**1.3 J**	**1.1 J**	6.7 U	5 U
Silver[(a)]	1.6	2.2	mg/kg	**0.89 J**	1.1 U	0.93 U	**0.095 J**	**0.11 J**	**0.21 J**	**0.088 J**
Zinc	121	459	mg/kg	**273**	**26.6**	**18.8**	**150**	**149**	**167**	**79**
Total organic carbon	NSL	NSL	mg/kg	**42400 J**	**2340**	**4000**	**49500**	**32300 J**	**32900**	**16300**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-11	HT18-11	HT18-12	HT18-12	HT18-12	HT18-12	HT18-12
			Sample Name:	HT18-11-5070	HT18-11-7010	HT18-12-SURF	HT18-12-SURF-FD	HT18-12-0010	HT18-12-1030	HT18-12-3050
			Sample Date:	10/24/2018	10/24/2018	10/22/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018
			Depth Interval (ft):	5-7	7-9.4	0-0.5	0-0.5	0-1	1-3	3-5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**2.7**	**2.4**	**6.5**	**7.8**	**9.6**	**11.1**	**6.5**
Barium	NSL	NSL	mg/kg	**20**	**16.2 J**	**66.7**	**72.1**	**110**	**169**	**106**
Cadmium	0.99	4.98	mg/kg	**0.16 J**	**0.15 J**	**1.5**	**1.5**	**4.4**	**9.1**	**1.2**
Chromium	43.4	111	mg/kg	**9.3**	**8.3**	**30.2**	**32.7**	**50.8**	**82.9**	**15.7**
Copper	31.6	149	mg/kg	**6.3**	**4.7**	**73.4**	**79.2**	**101**	**156**	**89.5**
Iron	20000	40000	mg/kg	**7830**	**6720**	**18100**	**20200**	**21800**	**20100**	**13800**
Lead	35.8	128	mg/kg	**4.7**	**4.5 J**	**73.1 J-**	**76.7 J-**	**200**	**306**	**176**
Mercury	0.18	1.06	mg/kg	0.12 U	0.12 U	**0.18 J**	**0.19 J**	**0.48**	**0.8**	**0.52**
Nickel	22.7	48.6	mg/kg	**10.5**	**9.2**	**29.7**	**34.1**	**54**	**51.4**	**23**
Selenium	NSL	NSL	mg/kg	3.3 U	3.6 U	**0.92 J**	**1.5 J**	**1.5 J**	**2.6 J**	**0.57 J**
Silver[(a)]	1.6	2.2	mg/kg	0.94 U	1 U	**0.23 J**	**0.19 J**	**0.66 J+**	**1.1 J**	**0.12 J+**
Zinc	121	459	mg/kg	**26.5**	**22**	**209**	**227**	**428**	**535**	**391**
Total organic carbon	NSL	NSL	mg/kg	**10200**	**5590 J**	**27500**	**27400**	**31700**	**41700**	**17600**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-12	HT18-12	HT18-13	HT18-13	HT18-13	HT18-13	HT18-13
			Sample Name:	HT18-12-5070	HT18-12-7010	HT18-13-SURF	HT18-13-0010	HT18-13-1030	HT18-13-3050	HT18-13-5060
			Sample Date:	10/23/2018	10/23/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
			Depth Interval (ft):	5-7	7-9.7	0-0.5	0-1	1-3	3-5	5-6.3
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**3.4**	**2.6**	**9.3**	**10.2**	**12**	**9.2**	**9.3**
Barium	NSL	NSL	mg/kg	**35.3**	**23.3**	**82**	**224**	**230**	**127**	**91.6**
Cadmium	0.99	4.98	mg/kg	0.48 U	**0.17 J**	1.2 U	**7**	**16.8**	**10.2**	**1.4**
Chromium	43.4	111	mg/kg	**12.1**	**11**	**32.5**	**50.7**	**108**	**55.1**	**23.7**
Copper	31.6	149	mg/kg	**10.2**	**7**	**39.6**	**67.6**	**100**	**96.8**	**53.8**
Iron	20000	40000	mg/kg	**10500**	**9490**	**24700**	**19900**	**21400**	**20100**	**18300**
Lead	35.8	128	mg/kg	**8.2**	**6.5 J**	**30.8**	**103**	**191**	**139**	**81.4**
Mercury	0.18	1.06	mg/kg	**0.011 J**	0.12 U	**0.1 J**	0.19 U	**0.54**	**0.44**	**0.18**
Nickel	22.7	48.6	mg/kg	**15.1**	**13.3**	**44.1**	**38.2**	**42.2**	**36.5**	**26.9**
Selenium	NSL	NSL	mg/kg	3.4 U	3 U	8.6 U	5.4 U	6 U	4.4 U	5 U
Silver[(a)]	1.6	2.2	mg/kg	0.96 U	0.87 U	2.5 U	**0.47 J+**	**1.3 J+**	**0.49 J+**	1.4 U
Zinc	121	459	mg/kg	**38.4**	**31.3**	**132**	**233**	**465**	**353**	**194**
Total organic carbon	NSL	NSL	mg/kg	**17300**	**7970 J**	**33200 J**	**38900**	**40700 J**	**20900 J**	**16300 J**

NOTES:
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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-13	HT18-13	HT18-13	HT18-14	HT18-14	HT18-14	HT18-15
			Sample Name:	HT18-13-6090	HT18-13-6090-FD	HT18-13-9010	HT18-14-SURF	HT18-14-0010	HT18-14-1020	HT18-15-SURF
			Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/30/2018	10/30/2018	10/24/2018
			Depth Interval (ft):	6.3-8.8	6.3-8.8	8.8-10	0-0.5	0-1.3	1.3-1.9	0-0.5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**8.1**	**8.4**	**2.5**	**3.4**	**6.2**	**5.4**	**3.4**
Barium	NSL	NSL	mg/kg	**66.4**	**65.8**	**25**	**24.2**	**133**	**52.3**	**32.6**
Cadmium	0.99	4.98	mg/kg	**0.79**	**0.68**	0.47 U	0.57 U	**2.6**	**0.82**	0.7 U
Chromium	43.4	111	mg/kg	**19.9**	**20.7**	**7.3**	**8.3**	**28.4**	**15.7**	**10.6**
Copper	31.6	149	mg/kg	**52.6**	**50.8**	**4.8**	**27.2**	**40.7**	**20.4**	**11.1**
Iron	20000	40000	mg/kg	**17400**	**22000**	**6810**	**6910**	**7800**	**15600**	**7980**
Lead	35.8	128	mg/kg	**52.6**	**59.4**	**6.2**	**17.4**	**87.1**	**93.5**	**13.6 J**
Mercury	0.18	1.06	mg/kg	**0.082 J**	**0.17**	0.12 U	**0.017 J**	**0.13 J**	**0.11 J**	**0.055 J**
Nickel	22.7	48.6	mg/kg	**25.2**	**23.6**	**9**	**9.7**	**15.4**	**17.6**	**11.2**
Selenium	NSL	NSL	mg/kg	**0.72 J**	**0.6 J**	3.3 U	4 U	**0.72 J**	3.7 U	4.9 U
Silver[(a)]	1.6	2.2	mg/kg	**0.12 J**	**0.11 J**	0.94 U	1.1 U	**0.14 J**	1.1 U	1.4 U
Zinc	121	459	mg/kg	**157**	**153**	**26.7**	**73.2**	**121**	**78.2**	**68.6**
Total organic carbon	NSL	NSL	mg/kg	**10600 J**	**8110 J**	**5460 J**	**17300 J**	**21300 J**	**12800 J**	**13300**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-15	HT18-15	HT18-15	HT18-15	HT18-16	HT18-17	HT18-17
			Sample Name:	HT18-15-0005	HT18-15-0530	HT18-15-3050	HT18-15-3050-FD	HT18-16-SURF	HT18-17-SURF	HT18-17-0010
			Sample Date:	10/25/2018	10/25/2018	10/25/2018	10/25/2018	10/24/2018	10/24/2018	10/25/2018
			Depth Interval (ft):	0-0.5	0.5-3	3-5	3-5	0-0.5	0-0.5	0-1
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**4.1**	**9.8**	**7.6**	**7.6**	**5.2**	**3.5**	**6.8**
Barium	NSL	NSL	mg/kg	**59.5**	**100**	**59.3**	**53.3**	**89.5**	**20.8**	**83.4**
Cadmium	0.99	4.98	mg/kg	**0.14 J**	**0.16 J**	**0.22 J**	**0.2 J**	**1.2**	0.48 U	**0.14 J**
Chromium	43.4	111	mg/kg	**8**	**18.4**	**21.2**	**20.3**	**39.6**	**11.8**	**16.6**
Copper	31.6	149	mg/kg	**9.3**	**18.1**	**19.5**	**19.2**	**44.3**	**9.8**	**15.9**
Iron	20000	40000	mg/kg	**7630**	**19200**	**20500**	**20600**	**15700**	**10200**	**18200**
Lead	35.8	128	mg/kg	**10.5**	**10.2**	**10.8**	**9.7**	**288 J**	**22.2 J**	**8.8**
Mercury	0.18	1.06	mg/kg	**0.013 J-**	**0.0091 J-**	**0.12 R**	**0.0092 J-**	**0.11 J**	0.13 U	**0.11 R**
Nickel	22.7	48.6	mg/kg	**9.2**	**25.5**	**26**	**26**	**43.8**	**12.4**	**22.8**
Selenium	NSL	NSL	mg/kg	3.1 U	**0.34 J**	**0.71 J**	**0.5 J**	**0.97 J**	3.4 U	**0.56 J**
Silver[(a)]	1.6	2.2	mg/kg	0.89 U	0.84 U	1.2 U	1.2 U	**0.16 J**	0.96 U	0.91 U
Zinc	121	459	mg/kg	**34.5**	**47.3**	**54.9**	**52**	**139**	**37.1**	**47.6**
Total organic carbon	NSL	NSL	mg/kg	**5690**	**9790**	**13400**	**9460**	**33600**	**6220**	**7280 J+**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-17	HT18-17	HT18-18	HT18-18	HT18-18	HT18-18	HT18-18
			Sample Name:	HT18-17-1030	HT18-17-3050	HT18-18-SURF	HT18-18-0020	HT18-18-2030	HT18-18-3035	HT18-18-3555
			Sample Date:	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/25/2018
			Depth Interval (ft):	1-3	3-4.7	0-0.5	0-1.9	1.9-2.8	2.8-3.6	3.6-5.4
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**7.4**	**9.3**	**6**	**9.8**	**7.6**	**2.8**	**9.3**
Barium	NSL	NSL	mg/kg	**32.5**	**79.3**	**85.2**	**268**	**47.7**	**17.5 J**	**47.8**
Cadmium	0.99	4.98	mg/kg	**0.21 J**	**0.14 J**	**1.9**	**14.4**	**0.23 J**	**0.13 J**	**1.5**
Chromium	43.4	111	mg/kg	**18.6**	**16.2**	**30.5**	**36.7**	**16.4**	**8.1**	**19.8**
Copper	31.6	149	mg/kg	**18.1**	**18.2**	**56.6**	**302**	**19.8**	**6.1**	**19.8**
Iron	20000	40000	mg/kg	**19600**	**19300**	**17900**	**13000**	**19100**	**6840**	**21200**
Lead	35.8	128	mg/kg	**10.6**	**9.6**	**89.1 J**	**623 J**	**9.5 J**	**8.5 J**	**9.8**
Mercury	0.18	1.06	mg/kg	**0.12 R**	**0.11 R**	0.22 U	**4.8 J-**	**0.065 J-**	**0.012 J-**	**0.1 R**
Nickel	22.7	48.6	mg/kg	**25.1**	**22.2**	**27.2**	**42.7**	**25.4**	**7.7**	**26**
Selenium	NSL	NSL	mg/kg	**0.5 J**	**0.48 J**	**0.92 J**	**1.7 J**	**0.44 J**	3.8 U	**0.49 J**
Silver[a]	1.6	2.2	mg/kg	1 U	0.98 U	**0.3 J**	**2.6**	1 U	1.1 U	1.2 U
Zinc	121	459	mg/kg	**51.3**	**45**	**180**	**772**	**55.6**	**19.4**	**314**
Total organic carbon	NSL	NSL	mg/kg	**8010 J+**	**7570 J+**	**31100**	**58100**	**14300**	**8730**	**6120**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-19	HT18-19	HT18-19	HT18-19	HT18-20	HT18-20	HT18-20
			Sample Name:	HT18-19-SURF	HT18-19-0010	HT18-19-1020	HT18-19-2030	HT18-20-SURF	HT18-20-0010	HT18-20-1020
			Sample Date:	10/24/2018	10/25/2018	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/25/2018
			Depth Interval (ft):	0-0.5	0-1	1-2.3	2.3-2.8	0-0.5	0-0.8	0.8-1.8
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**2.9**	**11.4**	**2.7**	**3**	**4.1**	**5.5**	**3.8**
Barium	NSL	NSL	mg/kg	**33.6**	**240**	**28.4**	**19.8 J**	**61**	**44.8**	**61.8**
Cadmium	0.99	4.98	mg/kg	**0.71**	**10.8**	**0.38 J**	**0.11 J**	**0.88**	**3.7**	**0.21 J**
Chromium	43.4	111	mg/kg	**18.5**	**35.1**	**7.7**	**6.2**	**22.3**	**27.6**	**21.4**
Copper	31.6	149	mg/kg	**39**	**274**	**45.9**	**3.1**	**36.5**	**125**	**11.2**
Iron	20000	40000	mg/kg	**8550**	**16100**	**5950**	**5870**	**12900**	**7690**	**21100**
Lead	35.8	128	mg/kg	**65.4 J**	**624**	**74**	**4.5**	**50.9 J**	**157**	**12.8**
Mercury	0.18	1.06	mg/kg	**0.19**	**3.5 J-**	**0.84 J-**	**0.11 R**	**0.12 J**	**0.19 J-**	**0.0098 J-**
Nickel	22.7	48.6	mg/kg	**12.3**	**36.7**	**7.6**	**5.9**	**18.7**	**13**	**27.2**
Selenium	NSL	NSL	mg/kg	3.8 U	**1.6 J**	3.2 U	**0.53 J**	5.3 U	**0.43 J**	**0.91 J**
Silver[a]	1.6	2.2	mg/kg	**0.091 J**	**1.9**	**0.13 J**	1.1 U	1.5 U	**0.13 J**	1 U
Zinc	121	459	mg/kg	**77.3**	**769**	**95.3**	**14.2**	**108**	**91.2**	**60.9**
Total organic carbon	NSL	NSL	mg/kg	**8060**	**59800**	**7680**	**4720**	**16700**	**5310 J**	**7000**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-20	HT18-20	HT18-21	HT18-21	HT18-23	HT18-23	HT18-23
			Sample Name:	HT18-20-2030	HT18-20-2030-FD	HT18-21-SURF	HT18-21-0015	HT18-23-SURF	HT18-23-0010	HT18-23-1030
			Sample Date:	10/25/2018	10/25/2018	10/24/2018	10/25/2018	10/23/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	1.8-2.8	1.8-2.8	0-0.5	0-1.7	0-0.5	0-1	1-3
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**3.6**	**3.4**	**2.8**	**5.1**	**8**	**3.1**	**2.5**
Barium	NSL	NSL	mg/kg	**21.4 J**	**21.2**	**30.4**	**102**	**82.5**	**20.4 J**	**11.3 J**
Cadmium	0.99	4.98	mg/kg	**0.14 J**	**0.16 J**	0.56 U	**0.47**	1.3 U	**0.42 J**	**0.12 J**
Chromium	43.4	111	mg/kg	**8.6**	**8.8**	**9.1**	**96.8**	**29.5**	**10.4**	**6.1**
Copper	31.6	149	mg/kg	**5.8**	**8.1**	**25.6**	**26.5**	**41.2**	**11.1**	**3.4**
Iron	20000	40000	mg/kg	**7520**	**8490**	**7080**	**21100**	**23900**	**7090**	**5990**
Lead	35.8	128	mg/kg	**10.4**	**8.2**	**15.7 J**	**143**	**41.4 J**	**18.8**	**3**
Mercury	0.18	1.06	mg/kg	**0.014 J-**	**0.022 J-**	**0.059 J**	**0.03 J-**	0.29 U	0.13 U	0.11 U
Nickel	22.7	48.6	mg/kg	**8.5**	**9.1**	**8.5**	**8.2**	**34.3**	**10.4**	**6.6**
Selenium	NSL	NSL	mg/kg	3.9 U	3.6 U	3.9 U	**4.5**	9.2 U	4.5 U	3.9 U
Silver[(a)]	1.6	2.2	mg/kg	1.1 U	1 U	1.1 U	**0.92**	2.6 U	1.3 U	1.1 U
Zinc	121	459	mg/kg	**24.1**	**22.6**	**37.4**	**46.7**	**146**	**39.8**	**14.9**
Total organic carbon	NSL	NSL	mg/kg	**9870**	**6290**	**22600**	**10800**	**33000**	**9430**	**4160**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-23	HT18-23	HT18-23	HT18-24	HT18-24	HT18-24	HT18-24
			Sample Name:	HT18-23-3050	HT18-23-5070	HT18-23-7010	HT18-24-SURF	HT18-24-0010	HT18-24-1025	HT18-24-2550
			Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	3-5	5-7	7-9.2	0-0.5	0-1	1-2.7	2.7-5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**2.6**	**3.5**	**3.7**	**5.1**	**3**	**2.9**	**3.4**
Barium	NSL	NSL	mg/kg	**14.6 J**	**28.6**	**32.6**	**47.5**	**22.7**	**20 J**	**36.2**
Cadmium	0.99	4.98	mg/kg	**0.22 J**	**0.19 J**	**0.21 J**	0.92 U	**0.16 J**	**0.15 J**	**0.19 J**
Chromium	43.4	111	mg/kg	**7**	**10.8**	**12.2**	**19.8**	**7.8**	**8.4**	**12.8**
Copper	31.6	149	mg/kg	**4.5**	**8.1**	**9.4**	**51**	**6.7**	**5.7**	**10.1**
Iron	20000	40000	mg/kg	**6730**	**11700**	**13300**	**13300**	**7090**	**9370**	**12300**
Lead	35.8	128	mg/kg	**3.7**	**6.5**	**7.7 J**	**45.5 J**	**11**	**4.8**	**7.9**
Mercury	0.18	1.06	mg/kg	0.11 U	0.12 U	0.12 U	**1.4**	**0.045 J-**	**0.12 R**	**0.13 R**
Nickel	22.7	48.6	mg/kg	**8.3**	**14.5**	**16.8**	**19.1**	**9.3**	**10.4**	**16.9**
Selenium	NSL	NSL	mg/kg	4 U	4.4 U	4.3 U	**0.81 J**	3.6 U	3.6 U	3.3 U
Silver[(a)]	1.6	2.2	mg/kg	1.1 U	1.3 U	1.2 U	1.8 U	1 U	1 U	0.95 U
Zinc	121	459	mg/kg	**25.9**	**31.2**	**34.7**	**133**	**34.6**	**22.3**	**34.9**
Total organic carbon	NSL	NSL	mg/kg	**6350**	**11000**	**7600 J**	**26700**	**7370 J**	**6950 J**	**8400 J**

NOTES:
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NSL = No Screening Level
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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-24	HT18-24	HT18-24	HT18-25	HT18-25	HT18-25	HT18-25
			Sample Name:	HT18-24-5065	HT18-24-5065-FD	HT18-24-6575	HT18-25-SURF	HT18-25-0010	HT18-25-1030	HT18-25-3040
			Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	5-6.6	5-6.6	6.6-7.8	0-0.5	0-1	1-3	3-4.2
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**3.1**	**2.8**	**5.9**	**7.9**	**8.5**	**12.8**	**7.8**
Barium	NSL	NSL	mg/kg	**24**	**21.6**	**44.4**	**65.4**	**157**	**259**	**122**
Cadmium	0.99	4.98	mg/kg	**0.15 J**	**0.14 J**	**0.2 J**	1.1 U	**10.2**	**10.3**	**0.89**
Chromium	43.4	111	mg/kg	**9.1**	**8.3**	**16.7**	**26.6**	**76.3**	**42.6**	**18.9**
Copper	31.6	149	mg/kg	**5.5**	**4.8**	**17.3**	**35.7**	**73.9**	**217**	**94.9**
Iron	20000	40000	mg/kg	**8280**	**7600**	**19000**	**20300**	**17000**	**22000**	**15800**
Lead	35.8	128	mg/kg	**5.1**	**4.8**	**9.1 J**	**35.2 J**	**191**	**524**	**283**
Mercury	0.18	1.06	mg/kg	**0.0072 J-**	**0.005 J-**	0.1 U	**0.3**	**0.79 J-**	**3.4 J-**	**2.8 J-**
Nickel	22.7	48.6	mg/kg	**10.4**	**9.6**	**24.8**	**29.2**	**33.4**	**39.4**	**21.1**
Selenium	NSL	NSL	mg/kg	3.5 U	3 U	3.1 U	7.7 U	**1.3 J**	**0.94 J**	**0.72 J**
Silver[(a)]	1.6	2.2	mg/kg	1 U	0.85 U	0.87 U	2.2 U	**0.91 J**	**3**	**2.2**
Zinc	121	459	mg/kg	**23.4**	**22.6**	**48.6**	**137**	**326**	**837**	**425**
Total organic carbon	NSL	NSL	mg/kg	**7550 J**	**6720 J**	**6920 J**	**35600**	**34700 J**	**67200 J**	**49500 J**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-25	HT18-25	HT18-26	HT18-26	HT18-26	HT18-26	HT18-26
			Sample Name:	HT18-25-4070	HT18-25-7010	HT18-26-SURF	HT18-26-0010	HT18-26-1030	HT18-26-3050	HT18-26-3050-FD
			Sample Date:	10/24/2018	10/24/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	4.2-7	7-9.5	0-0.5	0-1	1-3	3-5	3-5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**3.3**	**3.3**	**4.2**	**2.8**	**2.6**	**3**	**3.2**
Barium	NSL	NSL	mg/kg	**20.9 J**	**21.4**	**39.1**	**21.9 J**	**13.8 J**	**20.5 J**	**21**
Cadmium	0.99	4.98	mg/kg	**0.15 J**	**0.14 J**	**1.8**	**0.18 J**	**0.14 J**	**0.15 J**	**0.18 J**
Chromium	43.4	111	mg/kg	**9.1**	**9.2**	**21.7**	**6.5**	**6.6**	**9.1**	**9.6**
Copper	31.6	149	mg/kg	**6.7**	**6.6**	**35.1**	**8.5**	**4.5**	**6.2**	**6.4**
Iron	20000	40000	mg/kg	**10100**	**9660**	**11200**	**6230**	**7080**	**9310**	**9050**
Lead	35.8	128	mg/kg	**5.8**	**5.3 J**	**113 J**	**67.7**	**4**	**5**	**4.7**
Mercury	0.18	1.06	mg/kg	**0.12 R**	0.12 U	0.16 U	0.11 U	0.11 U	0.12 U	0.12 U
Nickel	22.7	48.6	mg/kg	**11.7**	**11.2**	**19.8**	**7.5**	**7.6**	**11.8**	**11.7**
Selenium	NSL	NSL	mg/kg	4 U	3.6 U	**0.6 J**	3.9 U	3.6 U	4.2 U	3.4 U
Silver[(a)]	1.6	2.2	mg/kg	1.1 U	1 U	**0.18 J**	**0.047 J**	1 U	1.2 U	0.98 U
Zinc	121	459	mg/kg	**25.2**	**24.2**	**137**	**40.5**	**16.5**	**26.2**	**25.5**
Total organic carbon	NSL	NSL	mg/kg	**11400 J**	**7360 J**	**13700**	**7290**	**12600**	**9290**	**7730**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-26	HT18-26	HT18-27	HT18-27	HT18-29	HT18-29	HT18-30
			Sample Name:	HT18-26-5070	HT18-26-7010	HT18-27-0010	HT18-27-1020	HT18-29-SURF	HT18-29-0010	HT18-30-SURF
			Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/22/2018	10/23/2018	10/22/2018
			Depth Interval (ft):	5-7	7-9.5	0-0.8	0.8-2.4	0-0.5	0-1.2	0-0.5
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**3.4**	**3.3**	**3.4**	**8.1**	**4.6**	**7.3**	**9.6**
Barium	NSL	NSL	mg/kg	**25.5**	**25.7**	**70.2**	**78.1**	**42.7**	**72.1**	**82.6**
Cadmium	0.99	4.98	mg/kg	**0.17 J**	**0.15 J**	**0.55 J**	**0.39 J**	0.52 U	**0.58**	1.1 U
Chromium	43.4	111	mg/kg	**10.7**	**10.5**	**38.5**	**20.5**	**21.3**	**12.5**	**33.5**
Copper	31.6	149	mg/kg	**6.4**	**7.3**	**21.4**	**25.9**	**12**	**36.6**	**39.6**
Iron	20000	40000	mg/kg	**10400**	**10600**	**12800**	**24400**	**11500**	**10400**	**27000**
Lead	35.8	128	mg/kg	**5.3**	**6.2 J**	**34.2**	**52.1**	**98.7 J-**	**80.6**	**38.4 J-**
Mercury	0.18	1.06	mg/kg	0.13 U	0.12 U	**0.3**	0.12 U	0.11 U	**0.17**	**0.13 J**
Nickel	22.7	48.6	mg/kg	**12.5**	**13.6**	**48.8**	**29.9**	**9.6**	**10.8**	**40.8**
Selenium	NSL	NSL	mg/kg	4 U	3.2 U	3.9 U	3.6 U	3.7 U	**0.45 J**	**1.6 J**
Silver[(a)]	1.6	2.2	mg/kg	1.2 U	0.92 U	1.1 U	1 U	1 U	1 U	2.2 U
Zinc	121	459	mg/kg	**26.2**	**28.5**	**98.5**	**81.9**	**51.1**	**96.3**	**143**
Total organic carbon	NSL	NSL	mg/kg	**8310**	**7960 J**	**15200**	**14700**	**9360**	**8650**	**25700**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-30	HT18-30	HT18-30	HT18-30	HT18-30	HT18-31	HT18-31
			Sample Name:	HT18-30-0010	HT18-30-1030	HT18-30-3050	HT18-30-5070	HT18-30-7010	HT18-31-SURF	HT18-31-0010
			Sample Date:	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/25/2018
			Depth Interval (ft):	0-1	1-3	3-5	5-7	7-10	0-0.5	0-1.3
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**9.5**	**12.2**	**13.6**	**11.4**	**10.9**	**7**	**6**
Barium	NSL	NSL	mg/kg	**82.9**	**228**	**203**	**308**	**186**	**63.5**	**43.2**
Cadmium	0.99	4.98	mg/kg	1.1 U	**10.1**	**17.4**	**20**	**17.4**	1.2 U	**0.51 J**
Chromium	43.4	111	mg/kg	**32**	**96.3**	**160**	**89.9**	**77.9**	**26.6**	**19.7**
Copper	31.6	149	mg/kg	**40**	**106**	**134**	**106**	**105**	**30**	**24.6**
Iron	20000	40000	mg/kg	**25800**	**22400**	**22200**	**22100**	**24400**	**23700**	**17600**
Lead	35.8	128	mg/kg	**36.5**	**203**	**243**	**252**	**227 J**	**21.1 J-**	**20.7**
Mercury	0.18	1.06	mg/kg	**0.11 J**	**0.61**	**0.82**	**1.2**	**1.2**	**0.17 J**	**0.1 J-**
Nickel	22.7	48.6	mg/kg	**40.1**	**48.5**	**50.3**	**53.6**	**47.6**	**33.1**	**24.8**
Selenium	NSL	NSL	mg/kg	**1.6 J**	**2.1 J**	**2.6 J**	**2.3 J**	**1.5 J**	**1.7 J**	**0.67 J**
Silver[(a)]	1.6	2.2	mg/kg	**0.1 J+**	**1.3 J**	**1.6**	**1.3 J**	**1.2 J**	2.3 U	1.2 U
Zinc	121	459	mg/kg	**137**	**414**	**484**	**532**	**464**	**93.6**	**74.8**
Total organic carbon	NSL	NSL	mg/kg	**30800**	**36400**	**41100**	**47000**	**36300 J**	**29000**	**25500 J+**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-31	HT18-31	HT18-31	HT18-32	HT18-32	HT18-32	HT18-32
			Sample Name:	HT18-31-1025	HT18-31-2555	HT18-31-5565	HT18-32-SURF	HT18-32-SURF-FD	HT18-32-0010	HT18-32-0010-FD
			Sample Date:	10/25/2018	10/25/2018	10/25/2018	10/23/2018	10/23/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	1.3-2.6	2.6-5.7	5.7-6.6	0-0.5	0-0.5	0-1	0-1
Analyte	**TEC**	**PEC**	**Unit**							
Arsenic	9.79	33	mg/kg	**10.6**	**2.9**	**4.4**	**7**	**6.4**	**5.3**	**6.2**
Barium	NSL	NSL	mg/kg	**70.2**	**53.2**	**29.7**	**49.7**	**47.1**	**31.1**	**31.1**
Cadmium	0.99	4.98	mg/kg	0.72 U	0.57 U	0.46 U	**0.89**	**0.82**	**0.7**	**0.81**
Chromium	43.4	111	mg/kg	**13.1**	**12.9**	**10.7**	**23.3**	**21.7**	**16.8**	**16.6**
Copper	31.6	149	mg/kg	**8.5**	**7.7**	**17.5**	**27.1**	**25**	**16.7**	**25.3**
Iron	20000	40000	mg/kg	**10200**	**12000**	**19200**	**19700**	**18400**	**12700**	**15800**
Lead	35.8	128	mg/kg	**6.7**	**6.7**	**10**	**26.6 J-**	**25.7 J-**	**22.6**	**26.6**
Mercury	0.18	1.06	mg/kg	**0.037 J**	**0.016 J**	**0.015 J**	**2.8**	**0.28**	**0.22**	**0.21**
Nickel	22.7	48.6	mg/kg	**11.7**	**13.8**	**13.5**	**30.8**	**28.7**	**20.5**	**21.9**
Selenium	NSL	NSL	mg/kg	**1 J**	4 U	3.2 U	**1 J**	**0.97 J**	4.2 U	4.8 U
Silver[(a)]	1.6	2.2	mg/kg	1.4 U	1.1 U	0.92 U	1.5 U	1.5 U	1.2 U	1.4 U
Zinc	121	459	mg/kg	**28.4**	**31.6**	**41.3**	**98.3**	**103**	**64.9**	**72.8**
Total organic carbon	NSL	NSL	mg/kg	**46500 J**	**2180 J**	**2900 J**	**21800**	**23300**	**16700**	**14200**

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TABLE 3-5 SEDIMENT RESULTS FOR METALS AND TOC, HT

			Location ID:	HT18-32	HT18-32	HT18-32
			Sample Name:	HT18-32-1030	HT18-32-3050	HT18-32-5070
			Sample Date:	10/24/2018	10/24/2018	10/24/2018
			Depth Interval (ft):	1-3	3-5	5-7
Analyte	**TEC**	**PEC**	**Unit**			
Arsenic	9.79	33	mg/kg	**3.4**	**3.7**	**6.2**
Barium	NSL	NSL	mg/kg	**23.4**	**33.9**	**39.6**
Cadmium	0.99	4.98	mg/kg	**0.2 J**	**0.24 J**	**0.23 J**
Chromium	43.4	111	mg/kg	**11.7**	**14.5**	**14.3**
Copper	31.6	149	mg/kg	**7.6**	**10.5**	**11.1**
Iron	20000	40000	mg/kg	**11200**	**14400**	**14300**
Lead	35.8	128	mg/kg	**6.2**	**8.1**	**7.9**
Mercury	0.18	1.06	mg/kg	0.13 U	0.13 U	0.13 U
Nickel	22.7	48.6	mg/kg	**13.4**	**17.2**	**17.5**
Selenium	NSL	NSL	mg/kg	3.7 U	4.8 U	4.2 U
Silver[(a)]	1.6	2.2	mg/kg	1 U	1.4 U	1.2 U
Zinc	121	459	mg/kg	**33.2**	**40.3**	**42.8**
Total organic carbon	NSL	NSL	mg/kg	**8050**	**9130**	**14400**

NOTES:
Detected values are Bolded
Bolded and Shaded detected values exceed 3XPEC screening value
Bolded and Shaded detected values exceed 2XPEC screening value
Bolded and Shaded detected values exceed PEC screening value
Bolded and Shaded detected values exceed TEC screening value
FD = Field Duplicate
HT = Harbortown Upstream 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)
D = Sample was analyzed at a higher dilution factor
H = Sample was prepped or analyzed beyond the specified holding time
J = compound was detected, but result is below the reporting limit and greater than or equ to the method detection limit (value is estimated)
J- = The analyte was positively identified; the associated numerical value is an approxima concentration of the analyte, but may be biased low.
J+ = The analyte was positively identified; the associated numerical value is an approxima concentration of the analyte, but may be biased high.
R = The data are unusable. The compound may or may not be present.
U = Indicates the analyte was analyzed but not detected
(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 SEM/AVS, HT

	Location ID:	HT18-01	HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06	HT18-07
	Sample Name:	HT18-01-SURF	HT18-01-SURF-FD	HT18-02-SURF	HT18-03-SURF	HT18-04-SURF	HT18-05-SURF	HT18-06-SURF	HT18-07-SURF
	Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
	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	umole/g	0.0069	0.0073	0.006	0.032	0.0052	0.024	0.013	0.0098
Copper	umole/g	0.3	0.31	0.28	1.1	0.2	0.94	0.59	0.28
Lead	umole/g	0.092	0.099	0.083	0.37	0.07	0.37	0.2	0.12
Mercury	umole/g	0.00007 U	0.00007 U	0.000065 U	0.000065 U	0.000055 U	0.000075 U	0.00007 U	0.000045 U
Nickel	umole/g	0.3	0.31	0.26	0.55	0.22	0.54	0.42	0.22
Zinc	umole/g	1.1	1.2	0.94	6	0.75	3.8	2.1	1.1
Acid Volatile Sulfides (AVS)	umole/g	3.8	5.9	12.8	37.5	10.4	25.8	10.5	5.3
SEM/AVS Ratio	none	0.466	0.318	0.122	0.216	0.119	0.219	0.319	0.318

NOTES:
AVS = Acid volatile sulfides
Bolded values exceed 1 SEM/AVS ratio
FD = Field duplicate
HT = Harbortown
SEM = Simultaneously extracted metals
umole/g = micromole per gram
B = Compound was found in the blank and sample
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
"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS, HT

	Location ID:	HT18-08	HT18-09	HT18-10	HT18-11	HT18-12	HT18-12	HT18-13	HT18-14
	Sample Name:	HT18-08-SURF	HT18-09-SURF	HT18-10-SURF	HT18-11-SURF	HT18-12-SURF	HT18-12-SURF-FD	HT18-13-SURF	HT18-14-SURF
	Sample Date:	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/29/2018	10/29/2018
	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	umole/g	0.012	0.0082	0.00098 J	0.0089	0.0089	0.012	0.0098	0.0039
Copper	umole/g	0.51	0.43	0.057	0.5	0.67	0.88	0.39	0.24
Lead	umole/g	0.14	0.12	0.1	0.19	0.22	0.3	0.12	0.16
Mercury	umole/g	0.000085 U	0.00008 U	0.000034 U	0.000085 U	0.00007 U	0.00007 U	0.00007 U	0.000023 J
Nickel	umole/g	0.34	0.31	0.099	0.34	0.27	0.35	0.37	0.14
Zinc	umole/g	1.7	1.4	0.25	1.6	1.8	2.3	1.3	0.59
Acid Volatile Sulfides (AVS)	umole/g	14	9.3	0.47 J	8.0	16.3	23.4	7.6	0.71 U
SEM/AVS Ratio	none	0.195	0.239	**1.1**	0.328	0.182	0.163	0.295	--

NOTES:
AVS = Acid volatile sulfides
Bolded values exceed 1 SEM/AVS ratio
FD = Field duplicate
HT = Harbortown
SEM = Simultaneously extracted metals
umole/g = micromole per gram
B = Compound was found in the blank and sample
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
"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS, HT

	Location ID:	HT18-15	HT18-16	HT18-17	HT18-18	HT18-19	HT18-20	HT18-21	HT18-23
	Sample Name:	HT18-15-SURF	HT18-16-SURF	HT18-17-SURF	HT18-18-SURF	HT18-19-SURF	HT18-20-SURF	HT18-21-SURF	HT18-23-SURF
	Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/23/2018
	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	umole/g	0.0019 J	0.0031	0.0012 J	0.004	0.0044	0.0072	0.0015 J	0.0052
Copper	umole/g	0.14	0.31	0.065	0.3	0.27	0.24	0.15	0.43
Lead	umole/g	0.057	0.11	0.068	0.11	0.26	0.21	0.11	0.16
Mercury	umole/g	0.000045 U	0.00006 U	0.000035 U	0.00006 U	0.000039 U	0.00005 U	0.000036 U	0.00008 U
Nickel	umole/g	0.1	0.18	0.063	0.17	0.11	0.18	0.09 J	0.29
Zinc	umole/g	0.46	1	0.26	0.89	0.78	1.1	0.91	1.4
Acid Volatile Sulfides (AVS)	umole/g	3.3	6.5	0.41 J	5.1	1.1	7.2	2.5	13.5
SEM/AVS Ratio	none	0.231	0.254	**1.09**	0.292	**1.29**	0.238	0.506	0.167

NOTES:
AVS = Acid volatile sulfides
Bolded values exceed 1 SEM/AVS ratio
FD = Field duplicate
HT = Harbortown
SEM = Simultaneously extracted metals
umole/g = micromole per gram
B = Compound was found in the blank and sample
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
"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-7 SEDIMENT RESULTS FOR TOTAL PETROLEUM HYDROCARBONS, HT

Analyte	Unit	HT18-01	HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06	HT18-07
Sample Name:		HT18-01-SURF	HT18-01-SURF-FD	HT18-02-SURF	HT18-03-SURF	HT18-04-SURF	HT18-05-SURF	HT18-06-SURF	HT18-07-SURF
Sample Date:		10/29/18	10/29/18	10/29/18	10/29/18	10/29/18	10/29/18	10/29/18	10/29/18
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
foc	**fraction**	0.0299	0.0293	0.0234	0.0531	0.0177	0.0418	0.0476	0.0192
Diesel Range Organics (C10-C20)	mg/kg	45 J	42 J	29 J	**930**	20 J	**320**	180	100
DRO Sample-Specific Risk Screening Level	mg/kg	166	162	130	294	98	232	264	106
Oil Range Organics (C20-C36)	mg/kg	53	54	38 J	**1300**	26 J	**460**	220	130
ORO Sample-Specific Risk Screening Level	mg/kg	296	290	231	525	175	413	470	190
Σ TPH	mg/kg	98	96	67	2230	46	780	400	230

NOTES:

Detected values are Bolded

- 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**

FD = Field duplicate

HT = Harbortown Upstream Area

mg/kg = milligram per kilogram

TPH = Total petroleum hydrocarbon

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

TABLE 3-7 SEDIMENT RESULTS FOR TOTAL PETROLEUM HYDROCARBONS, HT

	Location ID:	HT18-08	HT18-09	HT18-10	HT18-11	HT18-12	HT18-12	HT18-13	HT18-14
	Sample Name:	HT18-08-SURF	HT18-09-SURF	HT18-10-SURF	HT18-11-SURF	HT18-12-SURF	HT18-12-SURF-FD	HT18-13-SURF	HT18-14-SURF
	Sample Date:	10/22/18	10/22/18	10/22/18	10/22/18	10/22/18	10/22/18	10/29/18	10/29/18
	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**								
foc	**fraction**	0.0345	0.0415	0.00234	0.0495	0.0275	0.0274	0.0332	0.0173
Diesel Range Organics (C10-C20)	mg/kg	51 J	64	**34**	49 J	**170**	110	42 J	49
DRO Sample-Specific Risk Screening Level	mg/kg	191	230	13	274	152	152	184	96
Oil Range Organics (C20-C36)	mg/kg	56 J	73	**34**	51 J	180	120	48	60
ORO Sample-Specific Risk Screening Level	mg/kg	341	410	23	489	272	271	328	171
Σ TPH	mg/kg	107	137	68	100	350	230	90	109

NOTES:

Detected values are Bolded

- 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**

FD = Field duplicate

HT = Harbortown Upstream Area

mg/kg = milligram per kilogram

TPH = Total petroleum hydrocarbon

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

TABLE 3-7 SEDIMENT RESULTS FOR TOTAL PETROLEUM HYDROCARBONS, HT

	Location ID:	HT18-15	HT18-16	HT18-17	HT18-18	HT18-19	HT18-20	HT18-21	HT18-23
	Sample Name:	HT18-15-SURF	HT18-16-SURF	HT18-17-SURF	HT18-18-SURF	HT18-19-SURF	HT18-20-SURF	HT18-21-SURF	HT18-23-SURF
	Sample Date:	10/24/18	10/24/18	10/24/18	10/24/18	10/24/18	10/24/18	10/24/18	10/23/18
	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**								
foc	**fraction**	0.0133	0.0336	0.00622	0.0311	0.00806	0.0167	0.0226	0.033
Diesel Range Organics (C10-C20)	mg/kg	**200**	**220**	33	170	**160**	**130**	**360**	42 J
DRO Sample-Specific Risk Screening Level	mg/kg	74	186	34	172	45	93	125	183
Oil Range Organics (C20-C36)	mg/kg	**170**	230	38	190	**200**	140	**470**	39 J
ORO Sample-Specific Risk Screening Level	mg/kg	131	332	61	307	80	165	223	326
Σ TPH	mg/kg	370	450	71	360	360	270	830	81

NOTES:

Detected values are Bolded

- 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**

FD = Field duplicate

HT = Harbortown Upstream Area

mg/kg = milligram per kilogram

TPH = Total petroleum hydrocarbon

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

TABLE 3-7 SEDIMENT RESULTS FOR TOTAL PETROLEUM HYDROCARBONS, HT

	Location ID:	HT18-24	HT18-25	HT18-26	HT18-29	HT18-30	HT18-31	HT18-32	HT18-32
	Sample Name:	HT18-24-SURF	HT18-25-SURF	HT18-26-SURF	HT18-29-SURF	HT18-30-SURF	HT18-31-SURF	HT18-32-SURF	HT18-32-SURF-FD
	Sample Date:	10/23/18	10/23/18	10/23/18	10/22/18	10/22/18	10/23/18	10/23/18	10/23/18
	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**								
foc	**fraction**	0.0267	0.0356	0.0137	0.00936	0.0257	0.029	0.0218	0.0233
Diesel Range Organics (C10-C20)	mg/kg	**280**	63	**180**	**200**	56	67	65	30 J
DRO Sample-Specific Risk Screening Level	mg/kg	148	197	76	52	142	161	121	129
Oil Range Organics (C20-C36)	mg/kg	**300**	84	**180**	**270**	65	61	66	33 J
ORO Sample-Specific Risk Screening Level	mg/kg	264	352	135	93	254	287	215	230
Σ TPH	mg/kg	580	147	360	470	121	128	131	63

NOTES:

Detected values are Bolded

- 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**

FD = Field duplicate
HT = Harbortown Upstream Area
mg/kg = milligram per kilogram
TPH = Total petroleum hydrocarbon
J = Compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)

TABLE 3-6 SEDIMENT RESULTS FOR SEM/AVS, HT

	Location ID:	HT18-24	HT18-25	HT18-26	HT18-29	HT18-30	HT18-31	HT18-32	HT18-32
	Sample Name:	HT18-24-SURF	HT18-25-SURF	HT18-26-SURF	HT18-29-SURF	HT18-30-SURF	HT18-31-SURF	HT18-32-SURF	HT18-32-SURF-FD
	Sample Date:	10/23/2018	10/23/2018	10/23/2018	10/22/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018
	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	umole/g	0.0036	0.0058	0.0087	0.003	0.0098	0.006	0.0077	0.0064
Copper	umole/g	0.26	0.46	0.32	0.11	0.46	0.28	0.26	0.21
Lead	umole/g	0.2	0.23	0.49	0.3	0.15	0.076	0.1	0.08
Mercury	umole/g	0.000055 U	0.000075 U	0.000047 U	0.000031 U	0.000065 U	0.00007 U	0.000055 U	0.00005 U
Nickel	umole/g	0.16	0.28	0.18	0.11 J	0.41	0.29	0.3	0.25
Zinc	umole/g	1	1.5	1.4	0.46	1.4	0.78	0.84	0.72
Acid Volatile Sulfides (AVS)	umole/g	6.8	9.4	3	1	8.4	4.8	16.4	14.5
SEM/AVS Ratio	none	0.241	0.261	0.807	0.959	0.282	0.302	0.0926	0.0874

NOTES:

AVS = Acid volatile sulfides
Bolded values exceed 1 SEM/AVS ratio
FD = Field duplicate
HT = Harbortown
SEM = Simultaneously extracted metals
umole/g = micromole per gram
B = Compound was found in the blank and sample
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
"--" SEM/AVS not calculated because AVS was not detected.

TABLE 3-8 SEDIMENT RESULTS FOR CYANIDE, HT

		Location ID:	HT18-01	HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06
		Sample Name:	HT18-01-SURF	HT18-01-SURF-FD	HT18-02-SURF	HT18-03-SURF	HT18-04-SURF	HT18-05-SURF	HT18-06-SURF
		Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
		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	**EPA Region V RCRA ***	**Unit**							
Cyanide, Weak Acid Dissociable	0.1	mg/kg	2.6 U	2.5 U	**0.84 J**	**1.3 J**	**0.81 J**	**1.1 J**	2.6 UJ
Cyanide, Total	0.1	mg/kg	2.7 U	**1.8 J**	2.4 U	2.5 U	2 U	2.9 U	**2.7**

NOTES:

Source: * EPA Region V Resource Conservation and Recovery Act (EPA 2003).

Bolded and Shaded detected values exceed the RCRA screening value

HT = Harbortown Upstream Area

FD = Field Duplicate

mg/kg = milligrams per kilogram

U = Indicates the analyte was analyzed but not detected.

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

TABLE 3-8 SEDIMENT RESULTS FOR CYANIDE, HT

		Location ID:	HT18-07	HT18-08	HT18-09	HT18-10	HT18-11	HT18-12	HT18-12
		Sample Name:	HT18-07-SURF	HT18-08-SURF	HT18-09-SURF	HT18-10-SURF	HT18-11-SURF	HT18-12-SURF	HT18-12-SURF-FD
		Sample Date:	10/29/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018
		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	**EPA Region V RCRA ***	**Unit**							
Cyanide, Weak Acid Dissociable	0.1	mg/kg	1.6 UJ	3.2 U	3 U	1.3 U	3.4 U	2.5 U	2.7 U
Cyanide, Total	0.1	mg/kg	1.7 U	3.1 U	3 U	1.3 U	3.2 U	2.7 U	2.5 U

NOTES:

Source: * EPA Region V Resource Conservation and Recovery Act (EPA 2003).

Bolded and Shaded detected values exceed the RCRA screening value

HT = Harbortown Upstream Area

FD = Field Duplicate

mg/kg = milligrams per kilogram

U = Indicates the analyte was analyzed but not detected.

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

TABLE 3-8 SEDIMENT RESULTS FOR CYANIDE, HT

		Location ID:	HT18-13	HT18-14	HT18-15	HT18-16	HT18-17	HT18-18	HT18-19	HT18-20	HT18-21
		Sample Name:	HT18-13-SURF	HT18-14-SURF	HT18-15-SURF	HT18-16-SURF	HT18-17-SURF	HT18-18-SURF	HT18-19-SURF	HT18-20-SURF	HT18-21-SURF
		Sample Date:	10/29/2018	10/29/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018
		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	**EPA Region V RCRA ***	**Unit**									
Cyanide, Weak Acid Dissociable	0.1	mg/kg	2.6 UJ	1.3 U	1.8 U	2.4 U	1.2 U	2.3 U	1.5 U	1.7 U	1.3 U
Cyanide, Total	0.1	mg/kg	2.7 U	1.5 U	1.6 U	**1.1 J**	1.2 U	2.4 U	**0.83 J**	1.9 U	1.3 U

NOTES:

Source: * EPA Region V Resource Conservation and Recovery Act (EPA 2003).

Bolded and Shaded detected values exceed the RCRA screening value

HT = Harbortown Upstream Area

FD = Field Duplicate

mg/kg = milligrams per kilogram

U = Indicates the analyte was analyzed but not detected.

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

TABLE 3-8 SEDIMENT RESULTS FOR CYANIDE, HT

		Location ID:	HT18-23	HT18-24	HT18-25	HT18-26	HT18-29	HT18-30	HT18-31	HT18-32	HT18-32
		Sample Name:	HT18-23-SURF	HT18-24-SURF	HT18-25-SURF	HT18-26-SURF	HT18-29-SURF	HT18-30-SURF	HT18-31-SURF	HT18-32-SURF	HT18-32-SURF-FD
		Sample Date:	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/22/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018
		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	**EPA Region V RCRA ***	**Unit**									
Cyanide, Weak Acid Dissociable	0.1	mg/kg	3.1 U	2.1 U	3.1 U	1.6 U	1.2 U	2.5 U	2.6 U	**0.89 J**	2 U
Cyanide, Total	0.1	mg/kg	2.9 U	2.1 U	2.8 U	1.9 U	1.2 U	2.5 U	2.6 U	2 U	2 U

NOTES:
Source: * EPA Region V Resource Conservation and Recovery Act (EPA 2003).
Bolded and Shaded detected values exceed the RCRA screening value
HT = Harbortown Upstream Area
FD = Field Duplicate
mg/kg = milligrams per kilogram
U = Indicates the analyte was analyzed but not detected.
J = compound was detected, but result is below the reporting limit and greater than or equal to the method detection limit (value is estimated)

TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-01				HT18-01				HT18-01			
		Sample Name:	HT18-01-SURF				HT18-01-SURF-FD				HT18-01-0010			
		Sample Date:	10/29/2018				10/29/2018				10/30/2018			
		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 (%)	--	--	2.99	0.0299	--	--	2.93	0.0293	--	--	2.14	0.0214	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.27	0.27	0.001	0.005	0.16	0.16	0.00	0.01	0.31	0.31	0.00
2-Methylnaphthalene	447	154,800	0.01	0.25	0.25	0.001	0.004	0.14	0.14	0.0003	0.04	0.00	0.00	0.00
Acenaphthene	491	33,400	0.01	0.24	0.24	0.0005	0.01	0.21	0.21	0.00	0.03	1.40	1.40	0.00
Acenaphthylene	452	24,000	0.02	0.00	0.00	0	0.01	0.00	0.00	0.0000	0.04	0.00	0.00	0.00
Anthracene	594	1,300	0.01	0.43	0.43	0.001	0.01	0.38	0.38	0.001	0.03	1.36	1.36	0.00
Benzo[a]anthracene	841	4,153	0.12	4.01	4.01	0.005	0.07	2.46	2.46	0.00	0.22	10.28	10.28	0.01
Benzo[a]pyrene	965	3,840	0.16	5.35	5.35	0.01	0.09	3.14	3.14	0.00	0.08	3.74	3.74	0.00
Benzo[b]fluoranthene	979	2,169	0.29	9.70	9.70	0.01	0.17	5.80	5.80	0.01	0.30	14.02	14.02	0.01
Benzo[e]pyrene	967	4,300	0.20	6.69	6.69	0.01	0.12	4.10	4.10	0.00	0.22	10.28	10.28	0.01
Benzo[g,h,i]perylene	1,095	648	0.17	5.69	5.69	0.01	0.10	3.28	3.28	0.00	0.21	9.81	9.81	0.01
Benzo[k]fluoranthene	981	1,220	0.22	7.36	7.36	0.01	0.12	4.10	4.10	0.00	0.30	14.02	14.02	0.01
C1-Chrysenes	929	--	0.07	2.27	2.27	0.002	0.04	1.37	1.37	0.00	0.04	0.00	0.00	0.00
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.16	5.35	5.35	0.01	0.09	3.14	3.14	0.00	0.26	12.15	12.15	0.02
C1-Naphthalenes	444	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.08	2.51	2.51	0.004	0.05	1.54	1.54	0.00	0.11	5.14	5.14	0.01
C2-Chrysenes	1,008	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.10	3.28	3.28	--	0.06	1.91	1.91	--	0.13	6.07	6.07	--
C2-Naphthalenes	510	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.06	1.97	1.97	0.003	0.04	1.23	1.23	0.00	0.04	0.00	0.00	0.00
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C3-Fluorenes	769	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.05	1.81	1.81	0.003	0.03	1.13	1.13	0.00	0.04	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	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	0.04	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.07	2.37	2.37	0.004	0.04	1.47	1.47	0.00	0.04	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Chrysene	844	826	0.27	9.03	9.03	0.01	0.15	5.12	5.12	0.01	0.34	15.89	15.89	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.05	1.57	1.57	0.001	0.03	0.89	0.89	0.00	0.07	3.41	3.41	0.00
Fluoranthene	707	23,870	0.53	17.73	17.73	0.03	0.31	11	11	0.01	0.71	33.18	33.18	0.05
Fluorene	538	26,000	0.02	0.54	0.54	0.001	0.01	0.34	0.34	0.001	0.04	1.87	1.87	0.00
Naphthalene	385	61,700	0.01	0.28	0.28	0.001	0.01	0.17	0.17	0.000	0.08	3.74	3.74	0.01
Perylene	967	431	0.05	1.71	1.71	0.002	0.03	1.06	1.06	0.00	0.02	0.89	0.89	0.00
Phenanthrene	596	34,300	0.18	6.02	6.02	0.01	0.12	4.10	4.10	0.01	0.40	18.69	18.69	0.03
Pyrene	697	9,090	0.33	11.04	11.04	0.02	0.20	7	7	0.01	0.55	25.70	25.70	0.04
	--	**ESBTU FCVi**	--	--	--	0.14	--	--	--	0.08	--	--	--	0.25

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-01				HT18-01				HT18-01			
		Sample Name:	HT18-01-1030				HT18-01-3050				HT18-01-5070			
		Sample Date:	10/30/2018				10/30/2018				10/30/2018			
		Depth Interval (ft):	1-3				3-5				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 (%)	--	--	1.48	0.0148	--	--	0.403	0.00403	--	--	11.3	0.113	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.52	0.52	0.001	0.01	2.06	2.06	0.005	0.00	0.03	0.03	0.0001
2-Methylnaphthalene	447	154,800	0.01	0.53	0.53	0.001	0.05	11.91	11.91	0.03	0.02	0.19	0.19	0.0004
Acenaphthene	491	33,400	0.04	2.50	2.50	0.01	0.04	8.68	8.68	0.02	0.02	0.19	0.19	0.0004
Acenaphthylene	452	24,000	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.02	0.0001
Anthracene	594	1,300	0.09	6.08	6.08	0.01	0.06	15.63	15.63	0.03	0.04	0.32	0.32	0.001
Benzo[a]anthracene	841	4,153	0.25	16.89	16.89	0.02	0.21	52	52	0.06	0.09	1	1	0.001
Benzo[a]pyrene	965	3,840	0.16	10.81	10.81	0.01	0.11	27	27	0.03	0.06	1	1	0.001
Benzo[b]fluoranthene	979	2,169	0.29	19.59	19.59	0.02	0.19	47	47	0.05	0.07	1	1	0.001
Benzo[e]pyrene	967	4,300	0.20	13.51	13.51	0.01	0.14	35	35	0.04	0.06	0	0	0.001
Benzo[g,h,i]perylene	1,095	648	0.14	9.46	9.46	0.01	0.13	32	32	0.03	0.05	0	0	0.0004
Benzo[k]fluoranthene	981	1,220	0.24	16.22	16.22	0.02	0.20	50	50	0.05	0.08	1	1	0.001
C1-Chrysenes	929	--	0.10	6.55	6.55	0.01	0.09	22	22	0.02	0.04	0	0	0.0004
C1-Fluorenes	611	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.29	19.59	19.59	0.03	0.25	62.03	62.03	0.08	0.12	1.06	1.06	0.001
C1-Naphthalenes	444	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.16	10.81	10.81	0.02	0.13	32	32	0.05	0.07	1	1	0.001
C2-Chrysenes	1,008	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C2-Fluorenes	686	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.14	9.46	9.46	--	0.12	29.78	29.78	--	0.05	0.44	0.44	--
C2-Naphthalenes	510	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.12	8.11	8.11	0.01	0.09	22.58	22.58	0.03	0.04	0.37	0.37	0.0005
C3-Chrysenes	1,112	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Fluorenes	769	--	0.03	0.00	0.00	0.00	0.05	12.16	12.16	0.02	0.01	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.03	0.00	0.00	0.00	0.05	12.66	12.66	0.01	0.01	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.08	5	5	0.01	0.05	12.16	12.16	0.02	0.03	0.22	0.22	0.0004
C3-Phenanthrenes/Anthracenes	829	--	0.09	5.95	5.95	0.01	0.07	17.37	17.37	0.02	0.01	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.03	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	--	0.09	5.74	5.74	0.01	0.05	12.66	12.66	0.02	0.01	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.07	4.66	4.66	0.01	0.05	12.66	12.66	0.01	0.01	0.00	0.00	0.00
Chrysene	844	826	0.32	21.62	21.62	0.03	0.24	60	60	0.07	0.10	1	1	0.001
Dibenzo(a,h)anthracene	1,123	2,389	0.05	3.58	3.58	0.003	0.05	12.41	12.41	0.01	0.02	0.19	0.19	0.0002
Fluoranthene	707	23,870	0.81	55	55	0.08	0.54	134	134	0.19	0.23	2	2	0.003
Fluorene	538	26,000	0.05	3.65	3.65	0.01	0.04	9.18	9.18	0.02	0.02	0.14	0.14	0.0003
Naphthalene	385	61,700	0.01	0.56	0.56	0.001	0.05	11.91	11.91	0.03	0.02	0.19	0.19	0.001
Perylene	967	431	0.07	4.39	4.39	0.005	0.05	11.66	11.66	0.01	0.02	0.21	0.21	0.0002
Phenanthrene	596	34,300	0.53	35.81	35.81	0.06	0.35	87	87	0.15	0.17	2	2	0.003
Pyrene	697	9,090	0.56	38	38	0.05	0.44	109	109	0.16	0.20	2	2	0.003
	--	**ESBTU FCVi**	--	--	--	0.44	--	--	--	1.23	--	--	--	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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-01				HT18-01				HT18-02			
		Sample Name:	HT18-01-5070-FD				HT18-01-7085				HT18-02-SURF			
		Sample Date:	10/30/2018				10/30/2018				10/29/2018			
		Depth Interval (ft):	5-7				7-8.6				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 (%)	--	--	1.48	0.0148	--	--	1.26	0.0126	--	--	2.34	0.0234	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.02	1.42	1.42	0.003	0.01	0.79	0.79	0.002	0.01	0.38	0.38	0.001
2-Methylnaphthalene	447	154,800	0.09	6.08	6.08	0.01	0.01	0.76	0.76	0.002	0.01	0.36	0.36	0.001
Acenaphthene	491	33,400	0.09	6	6	0.01	0.06	5	5	0.01	0.02	0.94	0.94	0.002
Acenaphthylene	452	24,000	0.01	0.81	0.81	0.002	0.02	0.00	0.00	0.00	0.01	0.37	0.37	0.001
Anthracene	594	1,300	0.17	11	11	0.02	0.07	5	5	0.01	0.07	2.86	2.86	0.005
Benzo[a]anthracene	841	4,153	0.40	27	27	0.03	0.18	14	14	0.02	0.21	8.97	8.97	0.01
Benzo[a]pyrene	965	3,840	0.28	19	19	0.02	0.13	10	10	0.01	0.17	7.26	7.26	0.01
Benzo[b]fluoranthene	979	2,169	0.31	21	21	0.02	0.13	10	10	0.01	0.28	11.97	11.97	0.01
Benzo[e]pyrene	967	4,300	0.24	16	16	0.02	0.10	8	8	0.01	0.18	7.69	7.69	0.01
Benzo[g,h,i]perylene	1,095	648	0.23	16	16	0.01	0.04	3.49	3.49	0.003	0.14	5.98	5.98	0.01
Benzo[k]fluoranthene	981	1,220	0.35	24	24	0.02	0.13	10	10	0.01	0.22	9.40	9.40	0.01
C1-Chrysenes	929	--	0.18	12	12	0.01	0.06	5	5	0.01	0.10	4.10	4.10	0.004
C1-Fluorenes	611	--	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.53	35.81	35.81	0.05	0.20	16	16	0.02	0.23	9.83	9.83	0.01
C1-Naphthalenes	444	--	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.34	23	23	0.03	0.14	11	11	0.02	0.14	5.98	5.98	0.01
C2-Chrysenes	1,008	--	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Fluorenes	686	--	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.24	16.22	16.22	--	0.08	6.51	6.51	--	0.11	4.70	4.70	--
C2-Naphthalenes	510	--	0.13	9	9	0.02	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.25	17	17	0.02	0.08	6	6	0.01	0.08	3.55	3.55	0.005
C3-Chrysenes	1,112	--	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Fluorenes	769	--	0.10	6.69	6.69	0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.09	6.15	6.15	0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.21	14	14	0.02	0.05	4	4	0.01	0.06	2.48	2.48	0.004
C3-Phenanthrenes/Anthracenes	829	--	0.16	11	11	0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.19	12.84	12.84	0.02	0.02	0.00	0.00	0.00	0.06	2.52	2.52	0.004
C4-Phenanthrenes/Anthracenes	913	--	0.10	6.76	6.76	0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Chrysene	844	826	0.43	29	29	0.03	0.17	13	13	0.02	0.28	11.97	11.97	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.09	6	6	0.01	0.03	2.54	2.54	0.002	0.05	2.01	2.01	0.002
Fluoranthene	707	23,870	1.10	74	74	0.11	0.44	35	35	0.05	0.66	28.21	28.21	0.04
Fluorene	538	26,000	0.08	5	5	0.01	0.05	4	4	0.01	0.04	1.58	1.58	0.003
Naphthalene	385	61,700	0.09	6.08	6.08	0.02	0.01	1.11	1.11	0.003	0.01	0.36	0.36	0.001
Perylene	967	431	0.12	8	8	0.01	0.05	4.21	4.21	0.004	0.06	2.48	2.48	0.003
Phenanthrene	596	34,300	0.75	51	51	0.09	0	31	31	0.05	0.36	15	15	0.03
Pyrene	697	9,090	1	59	59	0.08	0	29	29	0.04	0.44	18.80	18.80	0.03
	--	**ESBTU FCVi**	--	--	--	0.73	--	--	--	0.32	--	--	--	0.22

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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-02				HT18-02				HT18-02			
		Sample Name:	HT18-02-0010				HT18-02-1030				HT18-02-3060			
		Sample Date:	10/30/2018				10/30/2018				10/30/2018			
		Depth Interval (ft):	0-1				1-3				3-6.1			
	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 (%)	--	--	2.63	0.0263	--	--	0.889	0.00889	--	--	0.921	0.00921	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.22	0.22	0.001	0.02	1.80	1.80	0.004	0.06	6.73	6.73	0.02
2-Methylnaphthalene	447	154,800	0.03	1.25	1.25	0.003	0.05	5.06	5.06	0.011	0.22	23.89	23.89	0.05
Acenaphthene	491	33,400	0.01	0.49	0.49	0.001	0.08	8.89	8.89	0.02	0.44	47.77	47.77	0.10
Acenaphthylene	452	24,000	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	3.58	3.58	0.01
Anthracene	594	1,300	0.03	0.99	0.99	0.002	0.11	12.37	12.37	0.02	0.69	74.92	74.92	0.13
Benzo[a]anthracene	841	4,153	0.12	4.56	4.56	0.01	0.19	21.37	21.37	0.03	0.94	102.06	102.06	0.12
Benzo[a]pyrene	965	3,840	0.10	3.76	3.76	0.004	0.16	18.00	18.00	0.02	0.80	86.86	86.86	0.09
Benzo[b]fluoranthene	979	2,169	0.19	7.22	7.22	0.01	0.14	15.75	15.75	0.02	0.65	70.58	70.58	0.07
Benzo[e]pyrene	967	4,300	0.14	5.32	5.32	0.01	0.11	12.37	12.37	0.01	0.52	56.46	56.46	0.06
Benzo[g,h,i]perylene	1,095	648	0.15	5.70	5.70	0.01	0.10	11.02	11.02	0.01	0.47	51.03	51.03	0.05
Benzo[k]fluoranthene	981	1,220	0.17	6.46	6.46	0.01	0.16	18.00	18.00	0.02	0.75	81.43	81.43	0.08
C1-Chrysenes	929	--	0.06	2.24	2.24	0.002	0.08	9.11	9.11	0.01	0.40	43.43	43.43	0.05
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.15	5.70	5.70	0.01	0.24	27.00	27.00	0.04	1.30	141.15	141.15	0.18
C1-Naphthalenes	444	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.07	2.66	2.66	0.004	0.16	18.00	18.00	0.03	1.00	109	109	0.16
C2-Chrysenes	1,008	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.08	3.19	3.19	--	0.10	11.25	11.25	--	0.49	53.20	53.20	--
C2-Naphthalenes	510	--	0.02	0.00	0.00	0.00	0.06	6.97	6.97	0.01	0.47	51	51	0.10
C2-Phenanthrenes/Anthracenes	746	--	0.05	1.94	1.94	0.003	0.08	9	9	0.01	0.49	53	53	0.07
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluorenes	769	--	0.04	1.44	1.44	0.002	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.05	1.75	1.75	0.003	0.05	5.40	5.40	0.01	0.37	40	40	0.07
C3-Phenanthrenes/Anthracenes	829	--	0.03	1.25	1.25	0.002	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.05	1.83	1.83	0.003	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Chrysene	844	826	0.20	7.60	7.60	0.01	0.20	22.50	22.50	0.03	0.97	105.32	105.32	0.12
Dibenzo(a,h)anthracene	1,123	2,389	0.05	1.79	1.79	0.002	0.04	4.39	4.39	0.004	0.18	19.54	19.54	0.02
Fluoranthene	707	23,870	0.36	13.69	13.69	0.02	0.49	55.12	55.12	0.08	2.30	249.73	249.73	0.35
Fluorene	538	26,000	0.02	0.72	0.72	0.001	0.06	6.52	6.52	0.01	0.37	40.17	40.17	0.07
Naphthalene	385	61,700	0.03	1.25	1.25	0.003	0.05	5.06	5.06	0.013	0.22	23.89	23.89	0.06
Perylene	967	431	0.05	1.86	1.86	0.002	0.05	5.51	5.51	0.01	0.22	23.89	23.89	0.02
Phenanthrene	596	34,300	0.17	6.46	6.46	0.01	0.47	52.87	52.87	0.09	2.20	239	239	0.40
Pyrene	697	9,090	0.27	10.27	10.27	0.01	0.42	47.24	47.24	0.07	2.00	217.16	217.16	0.31
	--	**ESBTU FCVi**	--	--	--	0.13	--	--	--	0.55	--	--	--	2.75

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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		Location ID:	HT18-02				HT18-02				HT18-03			
		Sample Name:	HT18-02-6080				HT18-02-8090				HT18-03-SURF			
		Sample Date:	10/30/2018				10/30/2018				10/29/2018			
		Depth Interval (ft):	6.1-7.8				7.8-9.2				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 (%)	--	--	2.76	0.0276	--	--	0.646	0.00646	--	--	5.31	0.0531	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.04	1.45	1.45	0.003	0.02	2.48	2.48	0.01	0.02	0.43	0.43	0.001
2-Methylnaphthalene	447	154,800	0.21	8	8	0.02	0.10	15.48	15.48	0.03	0.03	0.56	0.56	0.001
Acenaphthene	491	33,400	0.17	6	6	0.01	0.08	12.85	12.85	0.03	0.03	0.58	0.58	0.001
Acenaphthylene	452	24,000	0.04	1.27	1.27	0.003	0.01	1.86	1.86	0.004	0.09	0.00	0.00	0.00
Anthracene	594	1,300	0.24	9	9	0.01	0.15	23.22	23.22	0.04	0.06	1.13	1.13	0.002
Benzo[a]anthracene	841	4,153	0.99	36	36	0.04	0.35	54.18	54.18	0.06	0.56	11	11	0.01
Benzo[a]pyrene	965	3,840	0.38	14	14	0.01	0.21	32.51	32.51	0.03	0.45	8	8	0.01
Benzo[b]fluoranthene	979	2,169	0.72	26	26	0.03	0.26	40.25	40.25	0.04	1.00	19	19	0.02
Benzo[e]pyrene	967	4,300	0.53	19	19	0.02	0.20	30.96	30.96	0.03	0.73	14	14	0.01
Benzo[g,h,i]perylene	1,095	648	0.47	17.03	17.03	0.02	0.19	29.41	29.41	0.03	0.58	11	11	0.01
Benzo[k]fluoranthene	981	1,220	0.87	32	32	0.03	0.28	43.34	43.34	0.04	0.86	16	16	0.02
C1-Chrysenes	929	--	0.42	15	15	0.02	0.16	24.77	24.77	0.03	0.24	4.52	4.52	0.005
C1-Fluorenes	611	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.09	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	1.30	47.10	47.10	0.06	0.45	69.66	69.66	0.09	0.67	12.62	12.62	0.02
C1-Naphthalenes	444	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.09	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.68	25	25	0.04	0.30	46.44	46.44	0.07	0.33	6	6	0.01
C2-Chrysenes	1,008	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.09	0.00	0.00	0.00
C2-Fluorenes	686	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.09	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.54	19.57	19.57	--	0.19	29.41	29.41	--	0.40	7.53	7.53	--
C2-Naphthalenes	510	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.17	3.20	3.20	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.38	14	14	0.02	0.16	24.77	24.77	0.03	0.38	7	7	0.01
C3-Chrysenes	1,112	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.09	0.00	0.00	0.00
C3-Fluorenes	769	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.23	4.33	4.33	0.01
C3-Fluoranthenes/Pyrene	949	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.21	3.95	3.95	0.004
C3-Naphthalenes	581	--	0.21	8	8	0.01	0.05	0.00	0.00	0.00	0.27	5.08	5.08	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.33	6.21	6.21	0.01
C4-Chrysenes	1,214	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.09	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.35	6.59	6.59	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.11	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.26	4.90	4.90	0.01
Chrysene	844	826	1.10	40	40	0.05	0.37	57.28	57.28	0.07	1.00	19	19	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.21	7.61	7.61	0.01	0.07	11.30	11.30	0.010	0.17	3.20	3.20	0.003
Fluoranthene	707	23,870	2.40	87	87	0.12	0.89	137.77	137.77	0.19	2.20	41	41	0.06
Fluorene	538	26,000	0.18	7	7	0.01	0.09	13.31	13.31	0.02	0.05	1.00	1.00	0.002
Naphthalene	385	61,700	0.21	7.61	7.61	0.02	0.10	15.48	15.48	0.04	0.03	0.47	0.47	0.001
Perylene	967	431	0.15	5.43	5.43	0.01	0.10	15.17	15.17	0.02	0.16	3.01	3.01	0.003
Phenanthrene	596	34,300	1.60	58	58	0.10	0.73	113.00	113.00	0.19	0.74	14	14	0.02
Pyrene	697	9,090	1.90	69	69	0.10	0.76	117.65	117.65	0.17	1.40	26	26	0.04
	--	ESBTU FCVi	--	--	--	0.75	--	--	--	1.27	--	--	--	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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-03				HT18-03				HT18-03			
		Sample Name:	HT18-03-0010				HT18-03-1030				HT18-03-1030-FD			
		Sample Date:	10/30/2018				10/30/2018				10/30/2018			
		Depth Interval (ft):	0-1				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	Conc µg/g dry wt.	Coc µg/g oc	Final Coc[b]	ESBTU FCVi
Total Organic Carbon (%)	--	--	7.09	0.0709	--	--	6.42	0.0642	--	--	7.45	0.0745	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.05	0.72	0.72	0.002	0.36	5.61	5.61	0.01	0.35	4.70	4.70	0.01
2-Methylnaphthalene	447	154,800	0.34	4.80	4.80	0.01	0.30	4.67	4.67	0.01	0.30	4.03	4.03	0.01
Acenaphthene	491	33,400	0.08	1.09	1.09	0.002	0.23	3.58	3.58	0.01	0.24	3.22	3.22	0.01
Acenaphthylene	452	24,000	0.17	0.00	0.00	0.00	0.05	0.83	0.83	0.00	0.05	0.64	0.64	0.001
Anthracene	594	1,300	0.15	2.12	2.12	0.004	0.22	3	3	0.01	0.35	5	5	0.01
Benzo[a]anthracene	841	4,153	0.96	14	14	0.02	0.95	15	15	0.02	0.99	13	13	0.02
Benzo[a]pyrene	965	3,840	1.10	16	16	0.02	0.84	13	13	0.01	0.87	12	12	0.01
Benzo[b]fluoranthene	979	2,169	1.40	20	20	0.02	1.00	16	16	0.02	0.93	12	12	0.01
Benzo[e]pyrene	967	4,300	1.10	16	16	0.02	0.75	12	12	0.01	0.78	10	10	0.01
Benzo[g,h,i]perylene	1,095	648	1.20	17	17	0.02	0.69	11	11	0.01	0.69	9	9	0.01
Benzo[k]fluoranthene	981	1,220	1.30	18	18	0.02	0.91	14	14	0.01	1.00	13	13	0.01
C1-Chrysenes	929	--	0.54	8	8	0.01	0.92	14	14	0.02	0.94	12.62	12.62	0.01
C1-Fluorenes	611	--	0.17	0.00	0.00	0.00	0.58	9	9	0.01	0.55	7	7	0.01
C1-Fluoranthenes/pyrene	770	--	1.20	16.93	16.93	0.02	1.90	29.60	29.60	0.04	1.90	25.50	25.50	0.03
C1-Naphthalenes	444	--	0.17	0.00	0.00	0.00	0.35	5.45	5.45	0.01	0.33	4.43	4.43	0.01
C1-Phenanthrenes/Anthracenes	670	--	0.57	8	8	0.01	3.00	47	47	0.07	2.80	38	38	0.06
C2-Chrysenes	1,008	--	0.17	0.00	0.00	0.00	0.64	9.97	9.97	0.01	0.63	8.46	8.46	0.01
C2-Fluorenes	686	--	0.17	0.00	0.00	0.00	1.60	25	25	0.04	1.50	20	20	0.03
C2-Fluoranthenes/Pyrene	--	--	0.79	11.14	11.14	--	1.60	24.92	24.92	--	1.60	21.48	21.48	--
C2-Naphthalenes	510	--	0.36	5	5	0.01	3.80	59.19	59.19	0.12	3.60	48.32	48.32	0.09
C2-Phenanthrenes/Anthracenes	746	--	0.73	10	10	0.01	4.40	69	69	0.09	4.20	56.38	56.38	0.08
C3-Chrysenes	1,112	--	0.17	0.00	0.00	0.00	0.48	7.48	7.48	0.01	0.46	6.17	6.17	0.01
C3-Fluorenes	769	--	0.54	8	8	0.01	2.10	32.71	32.71	0.04	2.00	26.85	26.85	0.03
C3-Fluoranthenes/Pyrene	949	--	0.38	5.36	5.36	0.01	1.10	17.13	17.13	0.02	1.10	14.77	14.77	0.02
C3-Naphthalenes	581	--	0.51	7	7	0.01	5.90	91.90	91.90	0.16	5.60	75.17	75.17	0.13
C3-Phenanthrenes/Anthracenes	829	--	0.74	10	10	0.01	4.00	62.31	62.31	0.08	3.80	51.01	51.01	0.06
C4-Chrysenes	1,214	--	0.17	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.15	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.67	9	9	0.01	5.10	79.44	79.44	0.12	5.30	71.14	71.14	0.11
C4-Phenanthrenes/Anthracenes	913	--	0.57	8	8	0.01	2.90	45.17	45.17	0.05	2.70	36.24	36.24	0.04
Chrysene	844	826	1.60	23	23	0.03	1.40	22	22	0.03	1.40	19	19	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.38	5.36	5.36	0.005	0.25	3.89	3.89	0.00	0.26	3.49	3.49	0.003
Fluoranthene	707	23,870	2.90	41	41	0.06	2.80	44	44	0.06	2.70	36	36	0.05
Fluorene	538	26,000	0.09	1.20	1.20	0.002	0.23	3.58	3.58	0.01	0.22	2.95	2.95	0.01
Naphthalene	385	61,700	0.34	4.80	4.80	0.01	0.30	4.67	4.67	0.01	0.30	4.03	4.03	0.01
Perylene	967	431	0.31	4.37	4.37	0.005	0.27	4.21	4.21	0.00	0.27	3.62	3.62	0.004
Phenanthrene	596	34,300	1.10	16	16	0.03	1.80	28	28	0.05	1.80	24	24	0.04
Pyrene	697	9,090	2.00	28	28	0.04	2.00	31	31	0.04	2.10	28	28	0.04
	--	**ESBTU FCVi**	--	--	--	0.42	--	--	--	1.17	--	--	--	0.99

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-03				HT18-03				HT18-04			
		Sample Name:	HT18-03-3045				HT18-03-4560				HT18-04-SURF			
		Sample Date:	10/30/2018				10/30/2018				10/29/2018			
		Depth Interval (ft):	3-4.6				4.6-6				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 (%)	--	--	6.71	0.0671	--	--	0.647	0.00647	--	--	1.77	0.0177	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.52	7.75	7.75	0.017	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.0002
2-Methylnaphthalene	447	154,800	0.26	3.87	3.87	0.009	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.0003
Acenaphthene	491	33,400	0.240	3.58	3.58	0.007	0.00	0.00	0.00	0.00	0.00	0.15	0.15	0.0003
Acenaphthylene	452	24,000	0.047	0.70	0.70	0.0015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.27	4.02	4.02	0.007	0.00	0.00	0.00	0.00	0.01	0.38	0.38	0.0006
Benzo[a]anthracene	841	4,153	0.72	10.73	10.73	0.013	0.00	0.13	0.13	0.0002	0.03	1.81	1.81	0.0021
Benzo[a]pyrene	965	3,840	0.55	8.20	8.20	0.008	0.00	0.00	0.00	0.00	0.03	1.75	1.75	0.0018
Benzo[b]fluoranthene	979	2,169	0.68	10.13	10.13	0.010	0.00	0.00	0.00	0.00	0.05	2.66	2.66	0.0027
Benzo[e]pyrene	967	4,300	0.58	8.64	8.64	0.009	0.00	0.28	0.28	0.0003	0.03	1.86	1.86	0.0019
Benzo[g,h,i]perylene	1,095	648	0.48	7.15	7.15	0.007	0.00	0.49	0.49	0.0005	0.03	1.47	1.47	0.0013
Benzo[k]fluoranthene	981	1,220	0.77	11.48	11.48	0.012	0.00	0.07	0.07	0.0001	0.04	2.15	2.15	0.0022
C1-Chrysenes	929	--	0.82	12.22	12.22	0.013	0.01	0.79	0.79	0.0008	0.02	0.85	0.85	0.0009
C1-Fluorenes	611	--	0.60	8.94	8.94	0.015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	1.70	25.34	25.34	0.033	0.01	1.10	1.10	0.0014	0.03	1.64	1.64	0.0021
C1-Naphthalenes	444	--	0.44	6.56	6.56	0.015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	2.90	43.22	43.22	0.065	0.02	2.32	2.32	0.0035	0.02	1.02	1.02	0.0015
C2-Chrysenes	1,008	--	0.59	8.79	8.79	0.009	0.00	0.74	0.74	0.0007	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	1.60	23.85	23.85	0.03	0.01	1.00	1.00	0.0015	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	1.50	22.35	22.35	--	0.01	1.70	1.70	--	0.02	1.19	1.19	--
C2-Naphthalenes	510	--	4.70	70.04	70.04	0.137	0.02	2.63	2.63	0.01	0.00	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	4.30	64.08	64.08	0.086	0.02	3.09	3.09	0.0041	0.01	0.68	0.68	0.0009
C3-Chrysenes	1,112	--	0.44	6.56	6.56	0.006	0.00	0.63	0.63	0.0006	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	2.10	31.30	31.30	0.041	0.01	1.51	1.51	0.0020	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	1.10	16.39	16.39	0.017	0.01	1.19	1.19	0.0013	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	6.90	102.83	102.83	0.18	0.04	5.87	5.87	0.01	0.01	0.51	0.51	0.0009
C3-Phenanthrenes/Anthracenes	829	--	3.80	56.63	56.63	0.068	0.02	2.63	2.63	0.0032	0.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	5.70	84.95	84.95	0.13	0.06	8.66	8.66	0.01	0.01	0.68	0.68	0.0010
C4-Phenanthrenes/Anthracenes	913	--	2.60	38.75	38.75	0.042	0.01	1.85	1.85	0.0020	0.00	0.00	0.00	0.00
Chrysene	844	826	1.10	16.39	16.39	0.019	0.00	0.62	0.62	0.0007	0.05	2.66	2.66	0.0031
Dibenzo(a,h)anthracene	1,123	2,389	0.170	2.53	2.53	0.0023	0.00	0.00	0.00	0.00	0.01	0.44	0.44	0.0004
Fluoranthene	707	23,870	2.20	32.79	32.79	0.046	0.00	0.20	0.20	0.0003	0.10	6	6	0.01
Fluorene	538	26,000	0.23	3.43	3.43	0.006	0.00	0.15	0.15	0.0003	0.00	0.24	0.24	0.0004
Naphthalene	385	61,700	0.260	3.87	3.87	0.010	0.00	0.00	0.00	0.00	0.00	0.15	0.15	0.0004
Perylene	967	431	0.19	2.83	2.83	0.003	0.00	0.40	0.40	0.0004	0.01	0.62	0.62	0.0006
Phenanthrene	596	34,300	1.70	25.34	25.34	0.043	0.01	0.83	0.83	0.0014	0.05	2.54	2.54	0.0043
Pyrene	697	9,090	1.70	25.34	25.34	0.036	0.00	0.39	0.39	0.0006	0.07	4	4	0.01
	--	**ESBTU FCVi**	--	--	--	1.12	--	--	--	0.05	--	--	--	0.04

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-04				HT18-04				HT18-04			
		Sample Name:	HT18-04-0005				HT18-04-0530				HT18-04-0530-FD			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		Depth Interval (ft):	0-0.6				0.6-3.3				0.6-3.3			
	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 (%)	--	--	0.631	0.00631	--	--	1.14	0.0114	--	--	0.776	0.00776	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.17	0.17	0.00	0.00	0.04	0.04	0.00	0.00	0.06	0.06	0.00
2-Methylnaphthalene	447	154,800	0.00	0.14	0.14	0.00	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
Acenaphthene	491	33,400	0.002	0.29	0.29	0.001	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00
Acenaphthylene	452	24,000	0.001	0.09	0.09	0.0002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.46	0.46	0.00	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
Benzo[a]anthracene	841	4,153	0.02	2.38	2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	965	3,840	0.02	2.69	2.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b]fluoranthene	979	2,169	0.03	3.96	3.96	0.00	0.00	0.13	0.13	0.00	0.00	0.11	0.11	0.00
Benzo[e]pyrene	967	4,300	0.01	2.22	2.22	0.00	0.00	0.08	0.08	0.00	0.00	0.08	0.08	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.43	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.02	3.49	3.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Chrysenes	929	--	0.01	1.24	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.02	2.85	2.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.01	1.54	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Chrysenes	1,008	--	0.00	0.68	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.01	1.74	1.74	--	0.00	0.00	0.00	--	0.00	0.00	0.00	--
C2-Naphthalenes	510	--	0.00	0.78	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.01	1.46	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.0000	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
C3-Fluorenes	769	--	0.00	0.71	0.71	0.00	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.01	0.82	0.82	0.001	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.01	1.38	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.01	1.03	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.0000	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.01	2.06	2.06	0.00	0.01	0.68	0.68	0.00	0.01	0.88	0.88	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.00	0.74	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	844	826	0.02	3.65	3.65	0.004	0.002	0.18	0.18	0.00	0.002	0.19	0.19	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.005	0.82	0.82	0.0007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoranthene	707	23,870	0.05	7.45	7.45	0.01	0.002	0.16	0.16	0.00	0.001	0.15	0.15	0.00
Fluorene	538	26,000	0.003	0.40	0.40	0.001	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
Naphthalene	385	61,700	0.001	0.10	0.10	0.0003	0.002	0.00	0.00	0.00	0.002	0.00	0.00	0.00
Perylene	967	431	0.01	1.17	1.17	0.001	0.00	0.28	0.28	0.0003	0.00	0.39	0.39	0.0004
Phenanthrene	596	34,300	0.02	2.54	2.54	0.004	0.001	0.09	0.09	0.00	0.001	0.12	0.12	0.00
Pyrene	697	9,090	0.03	5.07	5.07	0.01	0.002	0.15	0.15	0.00	0.001	0.17	0.17	0.00
	--	**ESBTU FCVi**	--	--	--	0.07	--	--	--	0.00	--	--	--	0.00

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).
[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-04				HT18-05				HT18-05			
		Sample Name:	HT18-04-3040				HT18-05-SURF				HT18-05-0010			
		Sample Date:	10/29/2018				10/29/2018				10/30/2018			
		Depth Interval (ft):	3.3-4.3				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 (%)	--	--	0.286	0.00286	--	--	4.18	0.0418	--	--	4.08	0.0408	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.11	0.11	0.00	0.02	0.45	0.45	0.00	0.01	0.25	0.25	0.00
2-Methylnaphthalene	447	154,800	0.002	0.00	0.00	0.00	0.02	0.55	0.55	0.00	0.05	1.10	1.10	0.00
Acenaphthene	491	33,400	0.002	0.00	0.00	0.00	0.04	1.03	1.03	0.00	0.01	0.32	0.32	0.00
Acenaphthylene	452	24,000	0.002	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Anthracene	594	1,300	0.002	0.00	0.00	0.00	0.10	2.27	2.27	0.00	0.02	0.47	0.47	0.00
Benzo[a]anthracene	841	4,153	0.00	0.00	0.00	0.00	0.66	16	16	0.02	0.17	4.17	4.17	0.00
Benzo[a]pyrene	965	3,840	0.002	0.00	0.00	0.00	0.69	17	17	0.02	0.16	3.92	3.92	0.00
Benzo[b]fluoranthene	979	2,169	0.00	0.23	0.23	0.00	1.00	24	24	0.02	0.29	7.11	7.11	0.01
Benzo[e]pyrene	967	4,300	0.00	0.17	0.17	0.00	0.70	17	17	0.02	0.21	5.15	5.15	0.01
Benzo[g,h,i]perylene	1,095	648	0.00	0.00	0.00	0.00	0.56	13	13	0.01	0.21	5.15	5.15	0.00
Benzo[k]fluoranthene	981	1,220	0.002	0.00	0.00	0.00	0.81	19	19	0.02	0.25	6.13	6.13	0.01
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.35	8.37	8.37	0.01	0.14	3.43	3.43	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.08	0	0	0.00	0.02	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.00	0.00	0.00	0.00	0.68	16.27	16.27	0.02	0.21	5.15	5.15	0.01
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.00	0.00	0.00	0.00	0.31	7	7	0.01	0.09	2.18	2.18	0.00
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.08	0	0	0.00	0.02	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.00	0.00	0.00	--	0.39	9.33	9.33	--	0.13	3.19	3.19	--
C2-Naphthalenes	510	--	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.06	1.35	1.35	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.00	0.00	0.00	0.00	0.27	6.46	6.46	0.01	0.09	2.08	2.08	0.00
C3-Chrysenes	1,112	--	0.002	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluorenes	769	--	0.002	0.00	0.00	0.00	0.19	4.55	4.55	0.01	0.08	1.86	1.86	0.00
C3-Fluoranthenes/Pyrene	949	--	0.002	0.00	0.00	0.00	0.16	3.83	3.83	0.00	0.05	1.30	1.30	0.00
C3-Naphthalenes	581	--	0.00	0.00	0.00	0.00	0.17	4.07	4.07	0.01	0.08	2.01	2.01	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.00	0.00	0.00	0.00	0.21	5.02	5.02	0.01	0.07	1.76	1.76	0.00
C4-Chrysenes	1,214	--	0.002	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.01	1.75	1.75	0.00	0.21	5.02	5.02	0.01	0.10	2.43	2.43	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.00	0.00	0.00	0.00	0.16	3.83	3.83	0.00	0.05	1.27	1.27	0.00
Chrysene	844	826	0.001	0.38	0.38	0.00	1.00	24	24	0.03	0.30	7.35	7.35	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.002	0.00	0.00	0.00	0.17	4.07	4.07	0.00	0.06	1.54	1.54	0.001
Fluoranthene	707	23,870	0.001	0.24	0.24	0.00	2.30	55	55	0.08	0.53	12.99	12.99	0.02
Fluorene	538	26,000	0.002	0.00	0.00	0.00	0.06	1.48	1.48	0.00	0.02	0.47	0.47	0.001
Naphthalene	385	61,700	0.002	0.00	0.00	0.00	0.02	0.55	0.55	0.00	0.05	1.10	1.10	0.003
Perylene	967	431	0.00	0.77	0.77	0.001	0.20	4.78	4.78	0.00	0.06	1.42	1.42	0.001
Phenanthrene	596	34,300	0.002	0.00	0.00	0.00	0.84	20	20	0.03	0.21	5.15	5.15	0.01
Pyrene	697	9,090	0.001	0.26	0.26	0.00	1.40	33	33	0.05	0.42	10.29	10.29	0.01
	--	**ESBTU FCVi**	--	--	--	0.01	--	--	--	0.41	--	--	--	0.13

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-05				HT18-05				HT18-05			
		Sample Name:	HT18-05-1030				HT18-05-3050				HT18-05-5060			
		Sample Date:	10/30/2018				10/30/2018				10/30/2018			
		Depth Interval (ft):	1-2.7				2.7-5.1				5.1-5.9			
	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	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	5.84	0.0584	--	--	3.62	0.0362	--	--	2.41	0.0241	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.03	0.43	0.43	0.00	0.13	3.59	3.59	0.01	0.10	4.02	4.02	0.01
2-Methylnaphthalene	447	154,800	0.09	1.49	1.49	0.003	0.50	13.81	13.81	0.031	0.22	9.13	9.13	0.020
Acenaphthene	491	33,400	0.03	0.46	0.46	0.001	0.56	15.47	15.47	0.032	0.22	9.13	9.13	0.019
Acenaphthylene	452	24,000	0.04	0.00	0.00	0.000	0.25	0.00	0.00	0.00	0.03	1.16	1.16	0.00
Anthracene	594	1,300	0.03	0.57	0.57	0.00	0.60	16.57	16.57	0.028	0.30	12.45	12.45	0.021
Benzo[a]anthracene	841	4,153	0.26	4.45	4.45	0.01	1.60	44.20	44.20	0.05	1.20	49.79	49.79	0.06
Benzo[a]pyrene	965	3,840	0.28	4.79	4.79	0.00	1.20	33.15	33.15	0.03	0.83	34.44	34.44	0.04
Benzo[b]fluoranthene	979	2,169	0.42	7.19	7.19	0.007	1.20	33.15	33.15	0.034	1.10	45.64	45.64	0.047
Benzo[e]pyrene	967	4,300	0.31	5.31	5.31	0.01	0.87	24.03	24.03	0.02	0.82	34.02	34.02	0.04
Benzo[g,h,i]perylene	1,095	648	0.31	5.31	5.31	0.005	0.68	18.78	18.78	0.02	0.83	34.44	34.44	0.03
Benzo[k]fluoranthene	981	1,220	0.38	6.51	6.51	0.01	1.30	35.91	35.91	0.037	1.10	45.64	45.64	0.047
C1-Chrysenes	929	--	0.17	2.91	2.91	0.003	0.83	22.93	22.93	0.02	0.69	28.63	28.63	0.03
C1-Fluorenes	611	--	0.04	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.39	6.68	6.68	0.01	2.30	63.54	63.54	0.08	1.40	58.09	58.09	0.08
C1-Naphthalenes	444	--	0.04	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.20	3.42	3.42	0.01	1.70	46.96	46.96	0.07	0.79	32.78	32.78	0.05
C2-Chrysenes	1,008	--	0.04	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.34	14.11	14.11	0.01
C2-Fluorenes	686	--	0.09	1.61	1.61	0.00	0.68	18.78	18.78	0.03	0.11	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.23	3.94	3.94	--	1.10	30.39	30.39	--	0.83	34.44	34.44	--
C2-Naphthalenes	510	--	0.18	3.08	3.08	0.006	1.60	44.20	44.20	0.09	0.50	20.75	20.75	0.04
C2-Phenanthrenes/Anthracenes	746	--	0.25	4.28	4.28	0.006	1.90	52.49	52.49	0.07	0.80	33.20	33.20	0.04
C3-Chrysenes	1,112	--	0.04	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluorenes	769	--	0.17	2.91	2.91	0.00	0.81	22.38	22.38	0.03	0.40	16.60	16.60	0.02
C3-Fluoranthenes/Pyrene	949	--	0.11	1.88	1.88	0.00	0.58	16.02	16.02	0.02	0.44	18.26	18.26	0.02
C3-Naphthalenes	581	--	0.26	4.45	4.45	0.008	2.60	71.82	71.82	0.12	0.59	24.48	24.48	0.04
C3-Phenanthrenes/Anthracenes	829	--	0.23	3.94	3.94	0.005	1.60	44.20	44.20	0.05	0.77	31.95	31.95	0.04
C4-Chrysenes	1,214	--	0.04	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.28	4.79	4.79	0.01	2.50	69.06	69.06	0.11	0.55	22.82	22.82	0.03
C4-Phenanthrenes/Anthracenes	913	--	0.21	3.60	3.60	0.00	1.10	30.39	30.39	0.03	0.71	29.46	29.46	0.03
Chrysene	844	826	0.48	8.22	8.22	0.01	1.80	49.72	49.72	0.06	1.40	58.09	58.09	0.07
Dibenzo(a,h)anthracene	1,123	2,389	0.09	1.61	1.61	0.001	0.31	8.56	8.56	0.008	0.35	14.52	14.52	0.013
Fluoranthene	707	23,870	0.83	14.21	14.21	0.02	4.10	113.26	113.26	0.16	2.60	107.88	107.88	0.15
Fluorene	538	26,000	0.04	0.68	0.68	0.001	0.42	11.60	11.60	0.022	0.24	9.96	9.96	0.019
Naphthalene	385	61,700	0.09	1.49	1.49	0.00	0.50	13.81	13.81	0.04	0.26	10.79	10.79	0.03
Perylene	967	431	0.09	1.58	1.58	0.00	0.32	8.84	8.84	0.01	0.28	11.62	11.62	0.01
Phenanthrene	596	34,300	0.38	6.51	6.51	0.01	3.00	82.87	82.87	0.14	1.80	74.69	74.69	0.13
Pyrene	697	9,090	0.67	11.47	11.47	0.02	3.50	96.69	96.69	0.14	2.10	87.14	87.14	0.13
	--	**ESBTU FCVi**	--	--	--	0.16	--	--	--	1.55	--	--	--	1.29

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-06				HT18-06				HT18-06			
		Sample Name:	HT18-06-SURF				HT18-06-0010				HT18-06-1030			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	4.76	0.0476	--	--	2.27	0.0227	--	--	4.62	0.0462	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.09	0.09	0.00	0.01	0.28	0.28	0.00	0.02	0.37	0.37	0.00
2-Methylnaphthalene	447	154,800	0.00	0.10	0.10	0.000	0.01	0.29	0.29	0.001	0.02	0.50	0.50	0.001
Acenaphthene	491	33,400	0.01	0.12	0.12	0.000	0.01	0.32	0.32	0.001	0.01	0.28	0.28	0.001
Acenaphthylene	452	24,000	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.15	0.15	0.00
Anthracene	594	1,300	0.01	0.29	0.29	0.000	0.01	0.53	0.53	0.001	0.02	0.50	0.50	0.001
Benzo[a]anthracene	841	4,153	0.10	2.10	2.10	0.00	0.09	4.01	4.01	0.00	0.14	3.03	3.03	0.00
Benzo[a]pyrene	965	3,840	0.12	2.52	2.52	0.00	0.11	4.85	4.85	0.01	0.15	3.25	3.25	0.00
Benzo[b]fluoranthene	979	2,169	0.17	3.57	3.57	0.004	0.18	7.93	7.93	0.008	0.25	5.41	5.41	0.006
Benzo[e]pyrene	967	4,300	0.12	2.52	2.52	0.00	0.10	4.41	4.41	0.00	0.15	3.25	3.25	0.00
Benzo[g,h,i]perylene	1,095	648	0.10	2.02	2.02	0.00	0.02	1.06	1.06	0.00	0.05	1.08	1.08	0.00
Benzo[k]fluoranthene	981	1,220	0.14	2.94	2.94	0.003	0.13	5.73	5.73	0.006	0.19	4.11	4.11	0.004
C1-Chrysenes	929	--	0.06	1.34	1.34	0.00	0.04	1.89	1.89	0.00	0.08	1.80	1.80	0.00
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.11	2.31	2.31	0.00	0.11	4.85	4.85	0.01	0.20	4.33	4.33	0.01
C1-Naphthalenes	444	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.05	1.09	1.09	0.00	0.05	2.29	2.29	0.00	0.16	3.46	3.46	0.01
C2-Chrysenes	1,008	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.09	1.97	1.97	0.00
C2-Fluoranthenes/Pyrene	--	--	0.07	1.39	1.39	--	0.07	2.86	2.86	--	0.12	2.60	2.60	--
C2-Naphthalenes	510	--	0.02	0.00	0.00	0.00	0.03	1.28	1.28	0.00	0.13	2.81	2.81	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.05	1.09	1.09	0.00	0.05	2.38	2.38	0.00	0.19	4.11	4.11	0.01
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluorenes	769	--	0.04	0.78	0.78	0.00	0.01	0.00	0.00	0.00	0.10	2.14	2.14	0.00
C3-Fluoranthenes/Pyrene	949	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06	1.36	1.36	0.00
C3-Naphthalenes	581	--	0.04	0.80	0.80	0.00	0.05	2.20	2.20	0.00	0.23	4.98	4.98	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.04	0.80	0.80	0.00	0.04	1.72	1.72	0.00	0.16	3.46	3.46	0.00
C4-Chrysenes	1,214	--	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.05	1.09	1.09	0.00	0.08	3.52	3.52	0.01	0.33	7.14	7.14	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.02	0.00	0.00	0.00	0.03	1.28	1.28	0.00	0.12	2.60	2.60	0.00
Chrysene	844	826	0.17	3.57	3.57	0.00	0.16	7.05	7.05	0.01	0.24	5.19	5.19	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.03	0.59	0.59	0.001	0.03	1.28	1.28	0.001	0.04	0.89	0.89	0.001
Fluoranthene	707	23,870	0.36	7.56	7.56	0.01	0.31	13.66	13.66	0.02	0.51	11.04	11.04	0.02
Fluorene	538	26,000	0.01	0.19	0.19	0.000	0.01	0.48	0.48	0.001	0.02	0.50	0.50	0.001
Naphthalene	385	61,700	0.00	0.10	0.10	0.00	0.01	0.25	0.25	0.00	0.01	0.26	0.26	0.00
Perylene	967	431	0.04	0.76	0.76	0.00	0.02	1.06	1.06	0.00	0.04	0.87	0.87	0.00
Phenanthrene	596	34,300	0.12	2.52	2.52	0.00	0.11	4.85	4.85	0.01	0.23	4.98	4.98	0.01
Pyrene	697	9,090	0.22	4.62	4.62	0.01	0.22	9.69	9.69	0.01	0.35	7.58	7.58	0.01
	--	**ESBTU FCVi**	--	--	--	0.06	--	--	--	0.12	--	--	--	0.13

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-06				HT18-06				HT18-06			
		Sample Name:	HT18-06-1030-FD				HT18-06-3060				HT18-06-6070			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		Depth Interval (ft):	1-3				3-6				6-7.1			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.25	0.0325	--	--	6.71	0.0671	--	--	1.61	0.0161	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.02	0.46	0.46	0.00	0.09	1.31	1.31	0.00	0.17	10.56	10.56	0.02
2-Methylnaphthalene	447	154,800	0.02	0.62	0.62	0.001	0.13	1.94	1.94	0.004	0.15	9.32	9.32	0.021
Acenaphthene	491	33,400	0.01	0.34	0.34	0.001	0.05	0.73	0.73	0.001	0.11	6.83	6.83	0.014
Acenaphthylene	452	24,000	0.01	0.16	0.16	0.00	0.03	0.48	0.48	0.00	0.03	2.11	2.11	0.00
Anthracene	594	1,300	0.02	0.52	0.52	0.001	0.09	1.28	1.28	0.002	0.16	9.94	9.94	0.017
Benzo[a]anthracene	841	4,153	0.11	3.38	3.38	0.00	0.44	6.56	6.56	0.01	0.43	26.71	26.71	0.03
Benzo[a]pyrene	965	3,840	0.13	4.00	4.00	0.00	0.43	6.41	6.41	0.01	0.40	24.84	24.84	0.03
Benzo[b]fluoranthene	979	2,169	0.22	6.77	6.77	0.007	0.65	9.69	9.69	0.010	0.52	32.30	32.30	0.033
Benzo[e]pyrene	967	4,300	0.13	4.00	4.00	0.00	0.39	5.81	5.81	0.01	0.34	21.12	21.12	0.02
Benzo[g,h,i]perylene	1,095	648	0.04	1.20	1.20	0.00	0.12	1.79	1.79	0.00	0.11	6.83	6.83	0.01
Benzo[k]fluoranthene	981	1,220	0.15	4.62	4.62	0.005	0.48	7.15	7.15	0.007	0.42	26.09	26.09	0.027
C1-Chrysenes	929	--	0.06	1.88	1.88	0.00	0.23	3.43	3.43	0.00	0.30	18.63	18.63	0.02
C1-Fluorenes	611	--	0.03	0.89	0.89	0.00	0.24	3.58	3.58	0.01	0.52	32.30	32.30	0.05
C1-Fluoranthenes/pyrene	770	--	0.16	4.92	4.92	0.01	0.66	9.84	9.84	0.01	0.81	50.31	50.31	0.07
C1-Naphthalenes	444	--	0.01	0.00	0.00	0.00	0.14	2.09	2.09	0.00	0.20	12.42	12.42	0.03
C1-Phenanthrenes/Anthracenes	670	--	0.12	3.69	3.69	0.01	0.57	8.49	8.49	0.01	1.60	99.38	99.38	0.15
C2-Chrysenes	1,008	--	0.04	1.14	1.14	0.00	0.07	0.00	0.00	0.00	0.25	15.53	15.53	0.02
C2-Fluorenes	686	--	0.07	2.25	2.25	0.00	0.63	9.39	9.39	0.01	1.30	80.75	80.75	0.12
C2-Fluoranthenes/Pyrene	--	--	0.10	2.98	2.98	--	0.41	6.11	6.11	--	0.62	38.51	38.51	--
C2-Naphthalenes	510	--	0.11	3.38	3.38	0.01	0.80	11.92	11.92	0.02	2.50	155.28	155.28	0.30
C2-Phenanthrenes/Anthracenes	746	--	0.15	4.62	4.62	0.01	0.80	11.92	11.92	0.02	2.20	136.65	136.65	0.18
C3-Chrysenes	1,112	--	0.01	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.14	8.70	8.70	0.01
C3-Fluorenes	769	--	0.08	2.58	2.58	0.00	0.60	8.94	8.94	0.01	1.50	93.17	93.17	0.12
C3-Fluoranthenes/Pyrene	949	--	0.06	1.91	1.91	0.00	0.22	3.28	3.28	0.00	0.50	31.06	31.06	0.03
C3-Naphthalenes	581	--	0.19	5.85	5.85	0.01	1.40	20.86	20.86	0.04	4.60	285.71	285.71	0.49
C3-Phenanthrenes/Anthracenes	829	--	0.13	4.00	4.00	0.00	0.54	8.05	8.05	0.01	1.70	105.59	105.59	0.13
C4-Chrysenes	1,214	--	0.01	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.04	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.28	8.62	8.62	0.01	1.90	28.32	28.32	0.04	4.50	279.50	279.50	0.43
C4-Phenanthrenes/Anthracenes	913	--	0.10	3.08	3.08	0.00	0.32	4.77	4.77	0.01	1.20	74.53	74.53	0.08
Chrysene	844	826	0.20	6.15	6.15	0.01	0.68	10.13	10.13	0.01	0.60	37.27	37.27	0.04
Dibenzo(a,h)anthracene	1,123	2,389	0.03	0.98	0.98	0.001	0.10	1.48	1.48	0.001	0.09	5.34	5.34	0.005
Fluoranthene	707	23,870	0.40	12.31	12.31	0.02	1.50	22.35	22.35	0.03	1.40	86.96	86.96	0.12
Fluorene	538	26,000	0.02	0.62	0.62	0.001	0.11	1.64	1.64	0.003	0.20	12.42	12.42	0.023
Naphthalene	385	61,700	0.01	0.34	0.34	0.00	0.03	0.37	0.37	0.00	0.11	6.83	6.83	0.02
Perylene	967	431	0.04	1.17	1.17	0.00	0.09	1.37	1.37	0.00	0.10	6.15	6.15	0.01
Phenanthrene	596	34,300	0.17	5.23	5.23	0.01	0.79	11.77	11.77	0.02	1.20	74.53	74.53	0.13
Pyrene	697	9,090	0.27	8.31	8.31	0.01	1.00	14.90	14.90	0.02	0.98	60.87	60.87	0.09
	--	**ESBTU FCVi**	--	--	--	0.15	--	--	--	0.34	--	--	--	2.82

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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-06				HT18-06				HT18-07			
		Sample Name:	HT18-06-7080				HT18-06-8010				HT18-07-SURF			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		Depth Interval (ft):	7.1-8.1				8.1-9.7				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.81	0.0181	--	--	4.22	0.0422	--	--	1.92	0.0192	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.49	27.07	27.07	0.06	0.45	10.66	10.66	0.02	0.00	0.14	0.14	0.00
2-Methylnaphthalene	447	154,800	0.55	30.39	30.39	0.068	0.55	13.03	13.03	0.029	0.00	0.17	0.17	0.000
Acenaphthene	491	33,400	0.13	7.18	7.18	0.015	0.15	3.55	3.55	0.007	0.01	0.30	0.30	0.001
Acenaphthylene	452	24,000	0.05	2.65	2.65	0.01	0.05	1.16	1.16	0.00	0.01	0.00	0.00	0.00
Anthracene	594	1,300	0.16	8.84	8.84	0.015	0.15	3.55	3.55	0.006	0.02	1.04	1.04	0.002
Benzo[a]anthracene	841	4,153	0.46	25.41	25.41	0.03	0.47	11.14	11.14	0.01	0.08	4.32	4.32	0.01
Benzo[a]pyrene	965	3,840	0.37	20.44	20.44	0.02	0.39	9.24	9.24	0.01	0.08	4.01	4.01	0.00
Benzo[b]fluoranthene	979	2,169	0.55	30.39	30.39	0.031	0.54	12.80	12.80	0.013	0.11	5.73	5.73	0.006
Benzo[e]pyrene	967	4,300	0.35	19.34	19.34	0.02	0.34	8.06	8.06	0.01	0.08	3.91	3.91	0.00
Benzo[g,h,i]perylene	1,095	648	0.10	5.52	5.52	0.01	0.10	2.37	2.37	0.00	0.05	2.81	2.81	0.00
Benzo[k]fluoranthene	981	1,220	0.40	22.10	22.10	0.023	0.42	9.95	9.95	0.010	0.09	4.74	4.74	0.005
C1-Chrysenes	929	--	0.51	28.18	28.18	0.03	0.46	10.90	10.90	0.01	0.03	1.61	1.61	0.00
C1-Fluorenes	611	--	0.72	39.78	39.78	0.07	0.56	13.27	13.27	0.02	0.01	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	1.10	60.77	60.77	0.08	1.00	23.70	23.70	0.03	0.09	4.43	4.43	0.01
C1-Naphthalenes	444	--	0.69	38.12	38.12	0.09	0.63	14.93	14.93	0.03	0.01	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	2.40	132.60	132.60	0.20	2.20	52.13	52.13	0.08	0.05	2.34	2.34	0.00
C2-Chrysenes	1,008	--	0.44	24.31	24.31	0.02	0.38	9.00	9.00	0.01	0.01	0.00	0.00	0.00
C2-Fluorenes	686	--	1.70	93.92	93.92	0.14	1.30	30.81	30.81	0.04	0.01	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.96	53.04	53.04	--	0.78	18.48	18.48	--	0.05	2.55	2.55	--
C2-Naphthalenes	510	--	4.10	226.52	226.52	0.44	4.30	101.90	101.90	0.20	0.01	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	3.40	187.85	187.85	0.25	3.20	75.83	75.83	0.10	0.04	2.08	2.08	0.00
C3-Chrysenes	1,112	--	0.21	11.60	11.60	0.01	0.12	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Fluorenes	769	--	1.90	104.97	104.97	0.14	1.40	33.18	33.18	0.04	0.03	1.41	1.41	0.00
C3-Fluoranthenes/Pyrene	949	--	0.70	38.67	38.67	0.04	0.69	16.35	16.35	0.02	0.03	1.30	1.30	0.00
C3-Naphthalenes	581	--	6.50	359.12	359.12	0.62	6.50	154.03	154.03	0.27	0.03	1.77	1.77	0.00
C3-Phenanthrenes/Anthracenes	829	--	2.70	149.17	149.17	0.18	2.70	63.98	63.98	0.08	0.03	1.56	1.56	0.00
C4-Chrysenes	1,214	--	0.10	5.30	5.30	0.00	0.12	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C4-Naphthalenes	657	--	6.30	348.07	348.07	0.53	6.40	151.66	151.66	0.23	0.04	1.98	1.98	0.00
C4-Phenanthrenes/Anthracenes	913	--	1.90	104.97	104.97	0.11	1.90	45.02	45.02	0.05	0.01	0.00	0.00	0.00
Chrysene	844	826	0.70	38.67	38.67	0.05	0.70	16.59	16.59	0.02	0.12	6.25	6.25	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.10	5.25	5.25	0.005	0.08	1.97	1.97	0.002	0.02	1.04	1.04	0.001
Fluoranthene	707	23,870	1.50	82.87	82.87	0.12	1.70	40.28	40.28	0.06	0.27	14.06	14.06	0.02
Fluorene	538	26,000	0.22	12.15	12.15	0.023	0.22	5.21	5.21	0.010	0.01	0.52	0.52	0.001
Naphthalene	385	61,700	0.14	7.73	7.73	0.02	0.04	1.02	1.02	0.00	0.00	0.16	0.16	0.00
Perylene	967	431	0.09	5.19	5.19	0.01	0.09	2.09	2.09	0.00	0.02	1.20	1.20	0.00
Phenanthrene	596	34,300	1.30	71.82	71.82	0.12	1.40	33.18	33.18	0.06	0.12	6.25	6.25	0.01
Pyrene	697	9,090	1.00	55.25	55.25	0.08	1.30	30.81	30.81	0.04	0.18	9.38	9.38	0.01
	--	**ESBTU FCVi**	--	--	--	3.50	--	--	--	1.47	--	--	--	0.11

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-07				HT18-07				HT18-07			
		Sample Name:	HT18-07-0020				HT18-07-2050				HT18-07-5070			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		Depth Interval (ft):	0-1.8				1.8-4.8				4.8-7			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.06	0.0106	--	--	5.94	0.0594	--	--	3.41	0.0341	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	1.04	1.04	0.00	0.11	1.85	1.85	0.00	0.15	4.40	4.40	0.01
2-Methylnaphthalene	447	154,800	0.01	1.32	1.32	0.003	0.06	1.08	1.08	0.002	0.15	4.40	4.40	0.010
Acenaphthene	491	33,400	0.03	2.45	2.45	0.005	0.08	1.30	1.30	0.003	0.07	2.14	2.14	0.004
Acenaphthylene	452	24,000	0.04	0.00	0.00	0.00	0.05	0.79	0.79	0.00	0.03	0.91	0.91	0.00
Anthracene	594	1,300	0.05	4.91	4.91	0.008	0.12	2.02	2.02	0.003	0.11	3.23	3.23	0.005
Benzo[a]anthracene	841	4,153	0.22	20.75	20.75	0.02	0.49	8.25	8.25	0.01	0.40	11.73	11.73	0.01
Benzo[a]pyrene	965	3,840	0.19	17.92	17.92	0.02	0.42	7.07	7.07	0.01	0.35	10.26	10.26	0.01
Benzo[b]fluoranthene	979	2,169	0.24	22.64	22.64	0.023	0.54	9.09	9.09	0.009	0.46	13.49	13.49	0.014
Benzo[e]pyrene	967	4,300	0.15	14.15	14.15	0.01	0.35	5.89	5.89	0.01	0.28	8.21	8.21	0.01
Benzo[g,h,i]perylene	1,095	648	0.04	4.15	4.15	0.00	0.10	1.67	1.67	0.00	0.09	2.55	2.55	0.00
Benzo[k]fluoranthene	981	1,220	0.20	18.87	18.87	0.019	0.49	8.25	8.25	0.008	0.34	9.97	9.97	0.010
C1-Chrysenes	929	--	0.09	8.21	8.21	0.01	0.61	10.27	10.27	0.01	0.33	9.68	9.68	0.01
C1-Fluorenes	611	--	0.04	0.00	0.00	0.00	0.30	5.05	5.05	0.01	0.23	6.74	6.74	0.01
C1-Fluoranthenes/pyrene	770	--	0.25	23.58	23.58	0.03	1.20	20.20	20.20	0.03	0.75	21.99	21.99	0.03
C1-Naphthalenes	444	--	0.04	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.21	6.16	6.16	0.01
C1-Phenanthrenes/Anthracenes	670	--	0.18	16.98	16.98	0.03	1.80	30.30	30.30	0.05	1.20	35.19	35.19	0.05
C2-Chrysenes	1,008	--	0.04	0.00	0.00	0.00	0.47	7.91	7.91	0.01	0.28	8.21	8.21	0.01
C2-Fluorenes	686	--	0.04	0.00	0.00	0.00	1.10	18.52	18.52	0.03	0.71	20.82	20.82	0.03
C2-Fluoranthenes/Pyrene	--	--	0.14	13.21	13.21	--	1.00	16.84	16.84	--	0.56	16.42	16.42	--
C2-Naphthalenes	510	--	0.12	11.32	11.32	0.02	1.90	31.99	31.99	0.06	1.80	52.79	52.79	0.10
C2-Phenanthrenes/Anthracenes	746	--	0.21	19.81	19.81	0.03	3.60	60.61	60.61	0.08	2.00	58.65	58.65	0.08
C3-Chrysenes	1,112	--	0.04	0.00	0.00	0.00	0.30	5.05	5.05	0.00	0.15	4.40	4.40	0.00
C3-Fluorenes	769	--	0.10	9.34	9.34	0.01	1.30	21.89	21.89	0.03	0.81	23.75	23.75	0.03
C3-Fluoranthenes/Pyrene	949	--	0.04	0.00	0.00	0.00	0.96	16.16	16.16	0.02	0.47	13.78	13.78	0.01
C3-Naphthalenes	581	--	0.25	23.58	23.58	0.04	4.00	67.34	67.34	0.12	2.90	85.04	85.04	0.15
C3-Phenanthrenes/Anthracenes	829	--	0.17	16.04	16.04	0.02	3.40	57.24	57.24	0.07	1.80	52.79	52.79	0.06
C4-Chrysenes	1,214	--	0.04	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.28	26.42	26.42	0.04	4.70	79.12	79.12	0.12	3.20	93.84	93.84	0.14
C4-Phenanthrenes/Anthracenes	913	--	0.12	11.32	11.32	0.01	2.50	42.09	42.09	0.05	1.20	35.19	35.19	0.04
Chrysene	844	826	0.28	26.42	26.42	0.03	0.74	12.46	12.46	0.01	0.57	16.72	16.72	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.05	4.25	4.25	0.004	0.09	1.57	1.57	0.001	0.08	2.20	2.20	0.002
Fluoranthene	707	23,870	0.69	65.09	65.09	0.09	1.50	25.25	25.25	0.04	1.30	38.12	38.12	0.05
Fluorene	538	26,000	0.03	2.92	2.92	0.005	0.12	2.02	2.02	0.004	0.11	3.23	3.23	0.006
Naphthalene	385	61,700	0.04	0.00	0.00	0.00	0.02	0.37	0.37	0.00	0.03	0.76	0.76	0.00
Perylene	967	431	0.05	4.53	4.53	0.00	0.11	1.85	1.85	0.00	0.08	2.40	2.40	0.00
Phenanthrene	596	34,300	0.38	35.85	35.85	0.06	0.93	15.66	15.66	0.03	0.92	26.98	26.98	0.05
Pyrene	697	9,090	0.54	50.94	50.94	0.07	1.10	18.52	18.52	0.03	0.93	27.27	27.27	0.04
	--	**ESBTU FCVi**	--	--	--	0.64	--	--	--	0.82	--	--	--	1.01

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-07				HT18-08				HT18-08			
		Sample Name:	HT18-07-7090				HT18-08-SURF				HT18-08-0010			
		Sample Date:	10/29/2018				10/22/2018				10/23/2018			
		Depth Interval (ft):	7-8.9				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	4.66	0.0466	--	--	3.45	0.0345	--	--	3.59	0.0359	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.36	7.73	7.73	0.02	0.01	0.35	0.35	0.00	0.01	0.20	0.20	0.00
2-Methylnaphthalene	447	154,800	0.52	11.16	11.16	0.025	0.01	0.28	0.28	0.001	0.01	0.21	0.21	0.000
Acenaphthene	491	33,400	0.10	2.15	2.15	0.004	0.01	0.25	0.25	0.001	0.01	0.20	0.20	0.000
Acenaphthylene	452	24,000	0.05	1.16	1.16	0.00	0.01	0.19	0.19	0.00	0.02	0.00	0.00	0.00
Anthracene	594	1,300	0.12	2.58	2.58	0.004	0.02	0.61	0.61	0.001	0.01	0.19	0.19	0.000
Benzo[a]anthracene	841	4,153	0.38	8.15	8.15	0.01	0.14	4.06	4.06	0.00	0.10	2.79	2.79	0.00
Benzo[a]pyrene	965	3,840	0.32	6.87	6.87	0.01	0.06	1.74	1.74	0.00	0.06	1.73	1.73	0.00
Benzo[b]fluoranthene	979	2,169	0.43	9.23	9.23	0.009	0.27	7.83	7.83	0.008	0.26	7.24	7.24	0.007
Benzo[e]pyrene	967	4,300	0.26	5.58	5.58	0.01	0.05	1.30	1.30	0.00	0.18	5.01	5.01	0.01
Benzo[g,h,i]perylene	1,095	648	0.06	1.35	1.35	0.00	0.01	0.00	0.00	0.00	0.18	5.01	5.01	0.00
Benzo[k]fluoranthene	981	1,220	0.33	7.08	7.08	0.007	0.17	4.93	4.93	0.005	0.20	5.57	5.57	0.006
C1-Chrysenes	929	--	0.56	12.02	12.02	0.01	0.07	2.00	2.00	0.00	0.06	1.62	1.62	0.00
C1-Fluorenes	611	--	0.44	9.44	9.44	0.02	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	1.00	21.46	21.46	0.03	0.19	5.51	5.51	0.01	0.15	4.18	4.18	0.01
C1-Naphthalenes	444	--	0.60	12.88	12.88	0.03	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	2.00	42.92	42.92	0.06	0.09	2.55	2.55	0.00	0.07	1.87	1.87	0.00
C2-Chrysenes	1,008	--	0.57	12.23	12.23	0.01	0.05	1.42	1.42	0.00	0.02	0.00	0.00	0.00
C2-Fluorenes	686	--	1.30	27.90	27.90	0.04	0.03	0.81	0.81	0.00	0.02	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	1.10	23.61	23.61	--	0.13	3.77	3.77	--	0.10	2.65	2.65	--
C2-Naphthalenes	510	--	4.50	96.57	96.57	0.19	0.05	1.39	1.39	0.00	0.02	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	3.80	81.55	81.55	0.11	0.09	2.61	2.61	0.00	0.08	2.09	2.09	0.00
C3-Chrysenes	1,112	--	0.33	7.08	7.08	0.01	0.03	0.99	0.99	0.00	0.02	0.00	0.00	0.00
C3-Fluorenes	769	--	1.70	36.48	36.48	0.05	0.01	0.00	0.00	0.00	0.06	1.75	1.75	0.00
C3-Fluoranthenes/Pyrene	949	--	1.00	21.46	21.46	0.02	0.06	1.59	1.59	0.00	0.05	1.28	1.28	0.00
C3-Naphthalenes	581	--	6.00	128.76	128.76	0.22	0.08	2.35	2.35	0.00	0.08	2.09	2.09	0.00
C3-Phenanthrenes/Anthracenes	829	--	3.70	79.40	79.40	0.10	0.07	1.94	1.94	0.00	0.07	1.84	1.84	0.00
C4-Chrysenes	1,214	--	0.12	2.58	2.58	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C4-Naphthalenes	657	--	5.90	126.61	126.61	0.19	0.13	3.77	3.77	0.01	0.10	2.73	2.73	0.00
C4-Phenanthrenes/Anthracenes	913	--	2.80	60.09	60.09	0.07	0.05	1.39	1.39	0.00	0.02	0.00	0.00	0.00
Chrysene	844	826	0.63	13.52	13.52	0.02	0.21	6.09	6.09	0.01	0.22	6.13	6.13	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.06	1.31	1.31	0.001	0.04	1.22	1.22	0.001	0.04	1.14	1.14	0.001
Fluoranthene	707	23,870	1.20	25.75	25.75	0.04	0.44	12.75	12.75	0.02	0.41	11.42	11.42	0.02
Fluorene	538	26,000	0.19	4.08	4.08	0.008	0.02	0.49	0.49	0.001	0.01	0.36	0.36	0.001
Naphthalene	385	61,700	0.02	0.49	0.49	0.00	0.01	0.17	0.17	0.00	0.00	0.12	0.12	0.00
Perylene	967	431	0.07	1.52	1.52	0.00	0.01	0.19	0.19	0.00	0.04	1.17	1.17	0.00
Phenanthrene	596	34,300	1.00	21.46	21.46	0.04	0.15	4.35	4.35	0.01	0.13	3.62	3.62	0.01
Pyrene	697	9,090	0.90	19.31	19.31	0.03	0.18	5.22	5.22	0.01	0.27	7.52	7.52	0.01
	--	**ESBTU FCVi**	--	--	--	1.32	--	--	--	0.10	--	--	--	0.10

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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-08				HT18-08				HT18-08			
		Sample Name:	HT18-08-1020				HT18-08-1020-FD				HT18-08-2045			
		Sample Date:	10/23/2018				10/23/2018				10/23/2018			
		Depth Interval (ft):	1-2.3				1-2.3				2.3-4.6			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.6	0.036	--	--	3.51	0.0351	--	--	4.94	0.0494	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.04	1.06	1.06	0.00	0.03	0.83	0.83	0.00	0.44	8.91	8.91	0.02
2-Methylnaphthalene	447	154,800	0.05	1.25	1.25	0.003	0.04	1.00	1.00	0.002	0.50	10.12	10.12	0.023
Acenaphthene	491	33,400	0.12	3.33	3.33	0.007	0.09	2.45	2.45	0.005	1.60	32.39	32.39	0.066
Acenaphthylene	452	24,000	0.11	0.00	0.00	0.00	0.02	0.46	0.46	0.00	0.50	0.00	0.00	0.00
Anthracene	594	1,300	0.18	5.00	5.00	0.008	0.14	3.99	3.99	0.007	3.90	78.95	78.95	0.133
Benzo[a]anthracene	841	4,153	0.85	23.61	23.61	0.03	0.69	19.66	19.66	0.02	6.50	131.58	131.58	0.16
Benzo[a]pyrene	965	3,840	0.55	15.28	15.28	0.02	0.46	13.11	13.11	0.01	4.00	80.97	80.97	0.08
Benzo[b]fluoranthene	979	2,169	0.92	25.56	25.56	0.026	0.78	22.22	22.22	0.023	4.20	85.02	85.02	0.087
Benzo[e]pyrene	967	4,300	0.65	18.06	18.06	0.02	0.51	14.53	14.53	0.02	3.10	62.75	62.75	0.06
Benzo[g,h,i]perylene	1,095	648	0.57	15.83	15.83	0.01	0.50	14.25	14.25	0.01	2.20	44.53	44.53	0.04
Benzo[k]fluoranthene	981	1,220	0.84	23.33	23.33	0.024	0.62	17.66	17.66	0.018	4.30	87.04	87.04	0.089
C1-Chrysenes	929	--	0.31	8.61	8.61	0.01	0.25	7.12	7.12	0.01	3.20	64.78	64.78	0.07
C1-Fluorenes	611	--	0.11	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.50	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.87	24.17	24.17	0.03	0.68	19.37	19.37	0.03	9.50	192.31	192.31	0.25
C1-Naphthalenes	444	--	0.11	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.50	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.44	12.22	12.22	0.02	0.33	9.40	9.40	0.01	5.80	117.41	117.41	0.18
C2-Chrysenes	1,008	--	0.11	0.00	0.00	0.00	0.07	0.00	0.00	0.00	2.10	42.51	42.51	0.04
C2-Fluorenes	686	--	0.11	0.00	0.00	0.00	0.07	0.00	0.00	0.00	1.50	30.36	30.36	0.04
C2-Fluoranthenes/Pyrene	--	--	0.46	12.78	12.78	--	0.37	10.54	10.54	--	5.10	103.24	103.24	--
C2-Naphthalenes	510	--	0.11	0.00	0.00	0.00	0.14	3.99	3.99	0.01	2.10	42.51	42.51	0.08
C2-Phenanthrenes/Anthracenes	746	--	0.32	8.89	8.89	0.01	0.26	7.41	7.41	0.01	5.80	117.41	117.41	0.16
C3-Chrysenes	1,112	--	0.11	0.00	0.00	0.00	0.07	0.00	0.00	0.00	1.10	22.27	22.27	0.02
C3-Fluorenes	769	--	0.11	0.00	0.00	0.00	0.14	3.99	3.99	0.01	1.20	24.29	24.29	0.03
C3-Fluoranthenes/Pyrene	949	--	0.11	0.00	0.00	0.00	0.14	3.99	3.99	0.00	3.10	62.75	62.75	0.07
C3-Naphthalenes	581	--	0.22	6.11	6.11	0.01	0.17	4.84	4.84	0.01	2.70	54.66	54.66	0.09
C3-Phenanthrenes/Anthracenes	829	--	0.23	6.39	6.39	0.01	0.18	5.13	5.13	0.01	6.00	121.46	121.46	0.15
C4-Chrysenes	1,214	--	0.11	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.50	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.22	6.11	6.11	0.01	0.17	4.84	4.84	0.01	4.40	89.07	89.07	0.14
C4-Phenanthrenes/Anthracenes	913	--	0.11	0.00	0.00	0.00	0.14	3.99	3.99	0.00	4.70	95.14	95.14	0.10
Chrysene	844	826	1.10	30.56	30.56	0.04	0.85	24.22	24.22	0.03	6.60	133.60	133.60	0.16
Dibenzo(a,h)anthracene	1,123	2,389	0.19	5.28	5.28	0.005	0.17	4.84	4.84	0.004	0.84	17.00	17.00	0.015
Fluoranthene	707	23,870	2.30	63.89	63.89	0.09	1.80	51.28	51.28	0.07	16.00	323.89	323.89	0.46
Fluorene	538	26,000	0.13	3.61	3.61	0.007	0.10	2.71	2.71	0.005	2.20	44.53	44.53	0.083
Naphthalene	385	61,700	0.05	1.31	1.31	0.00	0.03	0.97	0.97	0.00	0.64	12.96	12.96	0.03
Perylene	967	431	0.21	5.83	5.83	0.01	0.17	4.84	4.84	0.01	1.10	22.27	22.27	0.02
Phenanthrene	596	34,300	1.40	38.89	38.89	0.07	0.93	26.50	26.50	0.04	16.00	323.89	323.89	0.54
Pyrene	697	9,090	1.70	47.22	47.22	0.07	1.30	37.04	37.04	0.05	14.00	283.40	283.40	0.41
	--	**ESBTU FCVi**	--	--	--	0.53	--	--	--	0.44	--	--	--	3.83

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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

Location ID:			HT18-08				HT18-08				HT18-09			
Sample Name:			HT18-08-4565				HT18-08-6580				HT18-09-SURF			
Sample Date:			10/23/2018				10/23/2018				10/22/2018			
Depth Interval (ft):			4.6-6.5				6.5-8				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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.33	0.0333	--	--	0.512	0.00512	--	--	4.15	0.0415	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.10	0.10	0.00	0.00	0.21	0.21	0.00	0.01	0.13	0.13	0.00
2-Methylnaphthalene	447	154,800	0.01	0.15	0.15	0.000	0.00	0.17	0.17	0.000	0.01	0.13	0.13	0.000
Acenaphthene	491	33,400	0.01	0.19	0.19	0.000	0.00	0.12	0.12	0.000	0.03	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.05	1.23	1.23	0.00
Anthracene	594	1,300	0.01	0.36	0.36	0.001	0.00	0.00	0.00	0.000	0.01	0.24	0.24	0.000
Benzo[a]anthracene	841	4,153	0.06	1.80	1.80	0.00	0.00	0.39	0.39	0.00	0.11	2.65	2.65	0.00
Benzo[a]pyrene	965	3,840	0.03	1.02	1.02	0.00	0.00	0.29	0.29	0.00	0.14	3.37	3.37	0.00
Benzo[b]fluoranthene	979	2,169	0.05	1.53	1.53	0.002	0.00	0.63	0.63	0.001	0.23	5.54	5.54	0.006
Benzo[e]pyrene	967	4,300	0.04	1.11	1.11	0.00	0.00	0.51	0.51	0.00	0.16	3.86	3.86	0.00
Benzo[g,h,i]perylene	1,095	648	0.03	0.99	0.99	0.00	0.00	0.00	0.00	0.00	0.11	2.65	2.65	0.00
Benzo[k]fluoranthene	981	1,220	0.04	1.17	1.17	0.001	0.00	0.33	0.33	0.000	0.18	4.34	4.34	0.004
C1-Chrysenes	929	--	0.11	3.30	3.30	0.00	0.01	0.98	0.98	0.00	0.03	0.00	0.00	0.00
C1-Fluorenes	611	--	0.01	0.42	0.42	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.13	3.90	3.90	0.01	0.01	1.56	1.56	0.00	0.15	3.61	3.61	0.00
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.11	3.30	3.30	0.00	0.01	1.50	1.50	0.00	0.06	1.47	1.47	0.00
C2-Chrysenes	1,008	--	0.11	3.30	3.30	0.00	0.00	0.82	0.82	0.00	0.03	0.00	0.00	0.00
C2-Fluorenes	686	--	0.05	1.50	1.50	0.00	0.00	0.82	0.82	0.00	0.03	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.14	4.20	4.20	--	0.01	1.62	1.62	--	0.09	2.07	2.07	--
C2-Naphthalenes	510	--	0.04	1.05	1.05	0.00	0.01	0.98	0.98	0.00	0.03	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.27	8.11	8.11	0.01	0.02	2.93	2.93	0.00	0.06	1.33	1.33	0.00
C3-Chrysenes	1,112	--	0.08	2.31	2.31	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Fluorenes	769	--	0.11	3.30	3.30	0.00	0.01	1.00	1.00	0.00	0.03	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.11	3.30	3.30	0.00	0.01	1.27	1.27	0.00	0.03	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.09	2.61	2.61	0.00	0.01	1.95	1.95	0.00	0.03	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.34	10.21	10.21	0.01	0.01	2.73	2.73	0.00	0.03	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.02	0.72	0.72	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.15	4.50	4.50	0.01	0.02	3.91	3.91	0.01	0.08	2.00	2.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.30	9.01	9.01	0.01	0.01	2.34	2.34	0.00	0.03	0.00	0.00	0.00
Chrysene	844	826	0.08	2.49	2.49	0.00	0.01	0.98	0.98	0.00	0.21	5.06	5.06	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.01	0.33	0.33	0.000	0.00	0.09	0.09	0.000	0.04	0.87	0.87	0.001
Fluoranthene	707	23,870	0.11	3.30	3.30	0.00	0.01	1.00	1.00	0.00	0.38	9.16	9.16	0.01
Fluorene	538	26,000	0.01	0.20	0.20	0.000	0.00	0.23	0.23	0.000	0.01	0.29	0.29	0.001
Naphthalene	385	61,700	0.00	0.10	0.10	0.00	0.00	0.17	0.17	0.00	0.03	0.00	0.00	0.00
Perylene	967	431	0.02	0.48	0.48	0.00	0.01	1.35	1.35	0.00	0.04	1.06	1.06	0.00
Phenanthrene	596	34,300	0.05	1.56	1.56	0.00	0.00	0.63	0.63	0.00	0.15	3.61	3.61	0.01
Pyrene	697	9,090	0.09	2.64	2.64	0.00	0.00	0.96	0.96	0.00	0.31	7.47	7.47	0.01
	--	**ESBTU FCVi**	--	--	--	0.10	--	--	--	0.04	--	--	--	0.08

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-09				HT18-09				HT18-09			
		Sample Name:	HT18-09-0010				HT18-09-1030				HT18-09-3050			
		Sample Date:	10/23/2018				10/23/2018				10/23/2018			
		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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.62	0.0362	--	--	2.92	0.0292	--	--	3	0.03	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.27	0.27	0.00	0.01	0.41	0.41	0.00	0.01	0.19	0.19	0.00
2-Methylnaphthalene	447	154,800	0.01	0.30	0.30	0.001	0.01	0.45	0.45	0.001	0.01	0.22	0.22	0.000
Acenaphthene	491	33,400	0.01	0.22	0.22	0.000	0.01	0.48	0.48	0.001	0.01	0.27	0.27	0.001
Acenaphthylene	452	24,000	0.02	0.00	0.00	0.00	0.01	0.23	0.23	0.00	0.02	0.00	0.00	0.00
Anthracene	594	1,300	0.02	0.50	0.50	0.001	0.02	0.68	0.68	0.001	0.03	0.83	0.83	0.001
Benzo[a]anthracene	841	4,153	0.14	3.87	3.87	0.00	0.17	5.82	5.82	0.01	0.10	3.33	3.33	0.00
Benzo[a]pyrene	965	3,840	0.19	5.25	5.25	0.01	0.18	6.16	6.16	0.01	0.11	3.67	3.67	0.00
Benzo[b]fluoranthene	979	2,169	0.33	9.12	9.12	0.009	0.32	10.96	10.96	0.011	0.15	5.00	5.00	0.005
Benzo[e]pyrene	967	4,300	0.23	6.35	6.35	0.01	0.22	7.53	7.53	0.01	0.10	3.33	3.33	0.00
Benzo[g,h,i]perylene	1,095	648	0.24	6.63	6.63	0.01	0.19	6.51	6.51	0.01	0.09	3.10	3.10	0.00
Benzo[k]fluoranthene	981	1,220	0.25	6.91	6.91	0.007	0.25	8.56	8.56	0.009	0.12	4.00	4.00	0.004
C1-Chrysenes	929	--	0.07	1.88	1.88	0.00	0.09	3.08	3.08	0.00	0.05	1.73	1.73	0.00
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.18	4.97	4.97	0.01	0.23	7.88	7.88	0.01	0.12	4.00	4.00	0.01
C1-Naphthalenes	444	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.08	2.21	2.21	0.00	0.12	4.11	4.11	0.01	0.07	2.40	2.40	0.00
C2-Chrysenes	1,008	--	0.05	1.41	1.41	0.00	0.05	1.71	1.71	0.00	0.02	0.00	0.00	0.00
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.07	2.43	2.43	0.00	0.03	1.10	1.10	0.00
C2-Fluoranthenes/Pyrene	--	--	0.12	3.31	3.31	--	0.13	4.45	4.45	--	0.07	2.27	2.27	--
C2-Naphthalenes	510	--	0.05	1.30	1.30	0.00	0.11	3.77	3.77	0.01	0.05	1.53	1.53	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.08	2.18	2.18	0.00	0.15	5.14	5.14	0.01	0.08	2.60	2.60	0.00
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluorenes	769	--	0.06	1.71	1.71	0.00	0.02	0.00	0.00	0.00	0.05	1.67	1.67	0.00
C3-Fluoranthenes/Pyrene	949	--	0.05	1.41	1.41	0.00	0.07	2.33	2.33	0.00	0.03	1.10	1.10	0.00
C3-Naphthalenes	581	--	0.08	2.21	2.21	0.00	0.18	6.16	6.16	0.01	0.08	2.60	2.60	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.06	1.74	1.74	0.00	0.12	4.11	4.11	0.00	0.06	2.03	2.03	0.00
C4-Chrysenes	1,214	--	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.10	2.76	2.76	0.00	0.20	6.85	6.85	0.01	0.09	2.87	2.87	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.05	1.27	1.27	0.00	0.09	3.05	3.05	0.00	0.05	1.73	1.73	0.00
Chrysene	844	826	0.28	7.73	7.73	0.01	0.30	10.27	10.27	0.01	0.15	5.00	5.00	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.06	1.69	1.69	0.002	0.05	1.68	1.68	0.001	0.03	0.97	0.97	0.001
Fluoranthene	707	23,870	0.50	13.81	13.81	0.02	0.57	19.52	19.52	0.03	0.30	10.00	10.00	0.01
Fluorene	538	26,000	0.02	0.47	0.47	0.001	0.03	0.89	0.89	0.002	0.01	0.47	0.47	0.001
Naphthalene	385	61,700	0.01	0.22	0.22	0.00	0.01	0.34	0.34	0.00	0.00	0.12	0.12	0.00
Perylene	967	431	0.06	1.69	1.69	0.00	0.07	2.29	2.29	0.00	0.04	1.17	1.17	0.00
Phenanthrene	596	34,300	0.18	4.97	4.97	0.01	0.23	7.88	7.88	0.01	0.13	4.33	4.33	0.01
Pyrene	697	9,090	0.35	9.67	9.67	0.01	0.43	14.73	14.73	0.02	0.20	6.67	6.67	0.01
	--	**ESBTU FCVi**	--	--	--	0.13	--	--	--	0.20	--	--	--	0.10

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-09				HT18-09				HT18-09			
		Sample Name:	HT18-09-3050-FD				HT18-09-5070				HT18-09-7010			
		Sample Date:	10/23/2018				10/23/2018				10/23/2018			
		Depth Interval (ft):	3-5				5-7				7-9.7			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	2.76	0.0276	--	--	3.76	0.0376	--	--	4.24	0.0424	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.02	0.65	0.65	0.00	0.03	0.72	0.72	0.00	0.13	3.07	3.07	0.01
2-Methylnaphthalene	447	154,800	0.02	0.80	0.80	0.002	0.04	0.98	0.98	0.002	0.16	3.77	3.77	0.008
Acenaphthene	491	33,400	0.04	1.34	1.34	0.003	0.02	0.53	0.53	0.001	0.06	1.51	1.51	0.003
Acenaphthylene	452	24,000	0.01	0.36	0.36	0.00	0.02	0.43	0.43	0.00	0.04	0.94	0.94	0.00
Anthracene	594	1,300	0.07	2.57	2.57	0.004	0.05	1.28	1.28	0.002	0.16	3.77	3.77	0.006
Benzo[a]anthracene	841	4,153	0.32	11.59	11.59	0.01	0.21	5.59	5.59	0.01	0.52	12.26	12.26	0.01
Benzo[a]pyrene	965	3,840	0.32	11.59	11.59	0.01	0.24	6.38	6.38	0.01	0.49	11.56	11.56	0.01
Benzo[b]fluoranthene	979	2,169	0.45	16.30	16.30	0.017	0.35	9.31	9.31	0.010	0.70	16.51	16.51	0.017
Benzo[e]pyrene	967	4,300	0.29	10.51	10.51	0.01	0.24	6.38	6.38	0.01	0.47	11.08	11.08	0.01
Benzo[g,h,i]perylene	1,095	648	0.27	9.78	9.78	0.01	0.23	6.12	6.12	0.01	0.29	6.84	6.84	0.01
Benzo[k]fluoranthene	981	1,220	0.32	11.59	11.59	0.012	0.28	7.45	7.45	0.008	0.51	12.03	12.03	0.012
C1-Chrysenes	929	--	0.13	4.71	4.71	0.01	0.13	3.46	3.46	0.00	0.39	9.20	9.20	0.01
C1-Fluorenes	611	--	0.03	0.00	0.00	0.00	0.08	2.10	2.10	0.00	0.40	9.43	9.43	0.02
C1-Fluoranthenes/pyrene	770	--	0.35	12.68	12.68	0.02	0.28	7.45	7.45	0.01	0.88	20.75	20.75	0.03
C1-Naphthalenes	444	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.20	4.72	4.72	0.01
C1-Phenanthrenes/Anthracenes	670	--	0.22	7.97	7.97	0.01	0.22	5.85	5.85	0.01	1.40	33.02	33.02	0.05
C2-Chrysenes	1,008	--	0.07	2.64	2.64	0.00	0.06	1.70	1.70	0.00	0.38	8.96	8.96	0.01
C2-Fluorenes	686	--	0.11	3.99	3.99	0.01	0.25	6.65	6.65	0.01	1.10	25.94	25.94	0.04
C2-Fluoranthenes/Pyrene	--	--	0.22	7.97	7.97	--	0.19	5.05	5.05	--	0.74	17.45	17.45	--
C2-Naphthalenes	510	--	0.13	4.71	4.71	0.01	0.27	7.18	7.18	0.01	1.70	40.09	40.09	0.08
C2-Phenanthrenes/Anthracenes	746	--	0.22	7.97	7.97	0.01	0.29	7.71	7.71	0.01	2.10	49.53	49.53	0.07
C3-Chrysenes	1,112	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.20	4.72	4.72	0.00
C3-Fluorenes	769	--	0.17	6.16	6.16	0.01	0.30	7.98	7.98	0.01	1.50	35.38	35.38	0.05
C3-Fluoranthenes/Pyrene	949	--	0.10	3.48	3.48	0.00	0.09	2.42	2.42	0.00	0.58	13.68	13.68	0.01
C3-Naphthalenes	581	--	0.21	7.61	7.61	0.01	0.45	11.97	11.97	0.02	3.50	82.55	82.55	0.14
C3-Phenanthrenes/Anthracenes	829	--	0.17	6.16	6.16	0.01	0.22	5.85	5.85	0.01	1.80	42.45	42.45	0.05
C4-Chrysenes	1,214	--	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.24	8.70	8.70	0.01	0.46	12.23	12.23	0.02	3.90	91.98	91.98	0.14
C4-Phenanthrenes/Anthracenes	913	--	0.14	5.07	5.07	0.01	0.20	5.32	5.32	0.01	1.50	35.38	35.38	0.04
Chrysene	844	826	0.44	15.94	15.94	0.02	0.34	9.04	9.04	0.01	0.77	18.16	18.16	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.09	3.15	3.15	0.003	0.07	1.76	1.76	0.002	0.12	2.83	2.83	0.003
Fluoranthene	707	23,870	0.92	33.33	33.33	0.05	0.69	18.35	18.35	0.03	1.50	35.38	35.38	0.05
Fluorene	538	26,000	0.05	1.88	1.88	0.004	0.05	1.22	1.22	0.002	0.14	3.30	3.30	0.006
Naphthalene	385	61,700	0.02	0.83	0.83	0.00	0.01	0.27	0.27	0.00	0.05	1.27	1.27	0.00
Perylene	967	431	0.10	3.62	3.62	0.00	0.07	1.81	1.81	0.00	0.15	3.54	3.54	0.00
Phenanthrene	596	34,300	0.50	18.12	18.12	0.03	0.32	8.51	8.51	0.01	0.95	22.41	22.41	0.04
Pyrene	697	9,090	0.64	23.19	23.19	0.03	0.46	12.23	12.23	0.02	1.10	25.94	25.94	0.04
	--	**ESBTU FCVi**	--	--	--	0.34	--	--	--	0.25	--	--	--	0.98

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-10				HT18-10				HT18-11			
		Sample Name:	HT18-10-SURF				HT18-10-0010				HT18-11-SURF			
		Sample Date:	10/22/2018				10/24/2018				10/22/2018			
		Depth Interval (ft):	0-0.5				0-1.1				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.234	0.00234	--	--	0.4	0.004	--	--	4.95	0.0495	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	2.86	2.86	0.01	0.00	0.28	0.28	0.00	0.01	0.20	0.20	0.00
2-Methylnaphthalene	447	154,800	0.01	2.78	2.78	0.006	0.00	0.28	0.28	0.001	0.01	0.15	0.15	0.000
Acenaphthene	491	33,400	0.05	20.51	20.51	0.042	0.00	1.13	1.13	0.002	0.01	0.22	0.22	0.000
Acenaphthylene	452	24,000	0.04	18.80	18.80	0.04	0.00	0.50	0.50	0.00	0.01	0.11	0.11	0.00
Anthracene	594	1,300	0.10	42.31	42.31	0.071	0.00	0.83	0.83	0.001	0.02	0.38	0.38	0.001
Benzo[a]anthracene	841	4,153	0.20	85.47	85.47	0.10	0.01	3.50	3.50	0.00	0.12	2.42	2.42	0.00
Benzo[a]pyrene	965	3,840	0.07	28.63	28.63	0.03	0.01	3.00	3.00	0.00	0.08	1.68	1.68	0.00
Benzo[b]fluoranthene	979	2,169	0.14	59.83	59.83	0.061	0.02	4.75	4.75	0.005	0.23	4.65	4.65	0.005
Benzo[e]pyrene	967	4,300	0.04	15.81	15.81	0.02	0.01	3.50	3.50	0.00	0.07	1.49	1.49	0.00
Benzo[g,h,i]perylene	1,095	648	0.02	0.00	0.00	0.00	0.01	2.75	2.75	0.00	0.02	0.40	0.40	0.00
Benzo[k]fluoranthene	981	1,220	0.11	47.01	47.01	0.048	0.02	3.75	3.75	0.004	0.15	3.03	3.03	0.003
C1-Chrysenes	929	--	0.08	35.90	35.90	0.04	0.02	5.00	5.00	0.01	0.06	1.21	1.21	0.00
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.25	106.84	106.84	0.14	0.03	7.50	7.50	0.01	0.15	3.03	3.03	0.00
C1-Naphthalenes	444	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.19	81.20	81.20	0.12	0.02	5.25	5.25	0.01	0.09	1.78	1.78	0.00
C2-Chrysenes	1,008	--	0.05	20.51	20.51	0.02	0.02	4.75	4.75	0.00	0.04	0.71	0.71	0.00
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.01	1.83	1.83	0.00	0.01	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.11	47.01	47.01	--	0.03	7.00	7.00	--	0.11	2.22	2.22	--
C2-Naphthalenes	510	--	0.06	27.35	27.35	0.05	0.01	2.10	2.10	0.00	0.04	0.85	0.85	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.13	55.56	55.56	0.07	0.04	9.50	9.50	0.01	0.08	1.70	1.70	0.00
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.01	2.30	2.30	0.00	0.01	0.00	0.00	0.00
C3-Fluorenes	769	--	0.02	0.00	0.00	0.00	0.02	4.00	4.00	0.01	0.01	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.05	20.51	20.51	0.02	0.03	6.25	6.25	0.01	0.04	0.89	0.89	0.00
C3-Naphthalenes	581	--	0.08	33.76	33.76	0.06	0.02	5.00	5.00	0.01	0.07	1.39	1.39	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.06	26.50	26.50	0.03	0.04	10.75	10.75	0.01	0.06	1.21	1.21	0.00
C4-Chrysenes	1,214	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.07	31.62	31.62	0.05	0.03	6.50	6.50	0.01	0.11	2.22	2.22	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.02	0.00	0.00	0.00	0.03	8.50	8.50	0.01	0.04	0.79	0.79	0.00
Chrysene	844	826	0.17	72.65	72.65	0.09	0.02	5.50	5.50	0.01	0.19	3.84	3.84	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.03	11.54	11.54	0.010	0.00	0.95	0.95	0.001	0.04	0.79	0.79	0.001
Fluoranthene	707	23,870	0.43	183.76	183.76	0.26	0.04	9.50	9.50	0.01	0.37	7.47	7.47	0.01
Fluorene	538	26,000	0.06	26.07	26.07	0.048	0.00	0.70	0.70	0.001	0.02	0.36	0.36	0.001
Naphthalene	385	61,700	0.00	1.97	1.97	0.01	0.00	0.35	0.35	0.00	0.00	0.09	0.09	0.00
Perylene	967	431	0.01	4.27	4.27	0.00	0.01	3.50	3.50	0.00	0.02	0.34	0.34	0.00
Phenanthrene	596	34,300	0.36	153.85	153.85	0.26	0.02	5.50	5.50	0.01	0.16	3.23	3.23	0.01
Pyrene	697	9,090	0.24	102.56	102.56	0.15	0.03	7.25	7.25	0.01	0.20	4.04	4.04	0.01
	--	**ESBTU FCVi**	--	--	--	1.83	--	--	--	0.17	--	--	--	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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	**HT18-11**				**HT18-11**				**HT18-11**			
		Sample Name:	**HT18-11-0010**				**HT18-11-1030**				**HT18-11-3050**			
		Sample Date:	**10/24/2018**				**10/24/2018**				**10/24/2018**			
		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**	**Cocb**	**ESBTU FCVi**	**µg/g dry wt.**	**µg/g oc**	**Cocb**	**ESBTU FCVi**	**µg/g dry wt.**	**µg/g oc**	**Cocb**	**ESBTU FCVi**
Total Organic Carbon (%)	--	--	3.23	0.0323	--	--	3.29	0.0329	--	--	1.63	0.0163	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.16	0.16	0.00	0.01	0.36	0.36	0.00	0.01	0.40	0.40	0.00
2-Methylnaphthalene	447	154,800	0.01	0.18	0.18	0.000	0.01	0.36	0.36	0.001	0.01	0.38	0.38	0.001
Acenaphthene	491	33,400	0.02	0.56	0.56	0.001	0.02	0.52	0.52	0.001	0.01	0.74	0.74	0.001
Acenaphthylene	452	24,000	0.01	0.00	0.00	0.00	0.01	0.27	0.27	0.00	0.00	0.29	0.29	0.00
Anthracene	594	1,300	0.01	0.25	0.25	0.000	0.03	1.00	1.00	0.002	0.02	1.29	1.29	0.002
Benzo[a]anthracene	841	4,153	0.06	1.98	1.98	0.00	0.19	5.78	5.78	0.01	0.11	6.75	6.75	0.01
Benzo[a]pyrene	965	3,840	0.09	2.69	2.69	0.00	0.20	6.08	6.08	0.01	0.11	6.75	6.75	0.01
Benzo[b]fluoranthene	979	2,169	0.15	4.64	4.64	0.005	0.28	8.51	8.51	0.009	0.13	7.98	7.98	0.008
Benzo[e]pyrene	967	4,300	0.10	3.10	3.10	0.00	0.19	5.78	5.78	0.01	0.10	5.83	5.83	0.01
Benzo[g,h,i]perylene	1,095	648	0.09	2.91	2.91	0.00	0.18	5.47	5.47	0.00	0.08	5.03	5.03	0.00
Benzo[k]fluoranthene	981	1,220	0.12	3.72	3.72	0.004	0.24	7.29	7.29	0.007	0.12	7.36	7.36	0.008
C1-Chrysenes	929	--	0.03	0.93	0.93	0.00	0.09	2.67	2.67	0.00	0.07	4.05	4.05	0.00
C1-Fluorenes	611	--	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.09	2.63	2.63	0.00	0.23	6.99	6.99	0.01	0.14	8.59	8.59	0.01
C1-Naphthalenes	444	--	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.04	1.27	1.27	0.00	0.14	4.26	4.26	0.01	0.09	5.21	5.21	0.01
C2-Chrysenes	1,008	--	0.02	0.71	0.71	0.00	0.05	1.58	1.58	0.00	0.03	1.84	1.84	0.00
C2-Fluorenes	686	--	0.02	0.74	0.74	0.00	0.07	2.25	2.25	0.00	0.04	2.15	2.15	0.00
C2-Fluoranthenes/Pyrene	--	--	0.06	1.70	1.70	--	0.14	4.26	4.26	--	0.08	5.03	5.03	--
C2-Naphthalenes	510	--	0.02	0.74	0.74	0.00	0.09	2.80	2.80	0.01	0.05	2.94	2.94	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.04	1.27	1.27	0.00	0.15	4.56	4.56	0.01	0.10	6.07	6.07	0.01
C3-Chrysenes	1,112	--	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Fluorenes	769	--	0.01	0.00	0.00	0.00	0.11	3.34	3.34	0.00	0.06	3.44	3.44	0.00
C3-Fluoranthenes/Pyrene	949	--	0.03	0.80	0.80	0.00	0.07	2.22	2.22	0.00	0.04	2.64	2.64	0.00
C3-Naphthalenes	581	--	0.04	1.21	1.21	0.00	0.16	4.86	4.86	0.01	0.09	5.46	5.46	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.03	0.93	0.93	0.00	0.12	3.65	3.65	0.00	0.09	5.28	5.28	0.01
C4-Chrysenes	1,214	--	0.01	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	--	0.05	1.49	1.49	0.00	0.15	4.56	4.56	0.01	0.10	6.13	6.13	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.02	0.65	0.65	0.00	0.10	3.04	3.04	0.00	0.07	4.05	4.05	0.00
Chrysene	844	826	0.13	4.02	4.02	0.00	0.28	8.51	8.51	0.01	0.15	9.20	9.20	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.03	0.84	0.84	0.001	0.06	1.70	1.70	0.002	0.03	1.72	1.72	0.002
Fluoranthene	707	23,870	0.24	7.43	7.43	0.01	0.57	17.33	17.33	0.02	0.29	17.79	17.79	0.03
Fluorene	538	26,000	0.01	0.24	0.24	0.000	0.03	0.85	0.85	0.002	0.02	1.04	1.04	0.002
Naphthalene	385	61,700	0.01	0.17	0.17	0.00	0.01	0.33	0.33	0.00	0.01	0.35	0.35	0.00
Perylene	967	431	0.03	0.87	0.87	0.00	0.06	1.88	1.88	0.00	0.05	2.76	2.76	0.00
Phenanthrene	596	34,300	0.09	2.69	2.69	0.00	0.27	8.21	8.21	0.01	0.15	9.20	9.20	0.02
Pyrene	697	9,090	0.17	5.26	5.26	0.01	0.38	11.55	11.55	0.02	0.22	13.50	13.50	0.02
	--	**ESBTU FCVi**	--	--	--	0.07	--	--	--	0.18	--	--	--	0.20

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-11				HT18-11				HT18-12			
		Sample Name:	**HT18-11-5070**				**HT18-11-7010**				**HT18-12-SURF**			
		Sample Date:	**10/24/2018**				**10/24/2018**				**10/22/2018**			
		Depth Interval (ft):	**5-7**				**7-9.4**				**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**	**Cocb**	**ESBTU FCVi**	**µg/g dry wt.**	**µg/g oc**	**Cocb**	**ESBTU FCVi**	**µg/g dry wt.**	**µg/g oc**	**Cocb**	**ESBTU FCVi**
Total Organic Carbon (%)	--	--	1.02	0.0102	--	--	0.559	0.00559	--	--	2.75	0.0275	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.08	0.08	0.00	0.00	0.20	0.20	0.00	0.01	0.51	0.51	0.00
2-Methylnaphthalene	447	154,800	0.00	0.07	0.07	0.000	0.00	0.13	0.13	0.000	0.01	0.47	0.47	0.001
Acenaphthene	491	33,400	0.00	0.06	0.06	0.000	0.00	0.00	0.00	0.000	0.02	0.69	0.69	0.001
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.55	0.55	0.00
Anthracene	594	1,300	0.00	0.06	0.06	0.000	0.00	0.00	0.00	0.000	0.04	1.45	1.45	0.002
Benzo[a]anthracene	841	4,153	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.22	8.00	8.00	0.01
Benzo[a]pyrene	965	3,840	0.00	0.22	0.22	0.00	0.00	0.10	0.10	0.00	0.11	4.00	4.00	0.00
Benzo[b]fluoranthene	979	2,169	0.00	0.36	0.36	0.000	0.00	0.32	0.32	0.000	0.25	9.09	9.09	0.009
Benzo[e]pyrene	967	4,300	0.00	0.25	0.25	0.00	0.00	0.29	0.29	0.00	0.08	3.05	3.05	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.02	0.69	0.69	0.00
Benzo[k]fluoranthene	981	1,220	0.00	0.00	0.00	0.000	0.00	0.15	0.15	0.000	0.19	6.91	6.91	0.007
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	4.00	4.00	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.01	0.53	0.53	0.00	0.00	0.77	0.77	0.00	0.26	9.45	9.45	0.01
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.00	0.46	0.46	0.00	0.01	0.97	0.97	0.00	0.16	5.82	5.82	0.01
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	2.22	2.22	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.00	0.42	0.42	--	0.00	0.84	0.84	--	0.17	6.18	6.18	--
C2-Naphthalenes	510	--	0.00	0.00	0.00	0.00	0.00	0.86	0.86	0.00	0.07	2.62	2.62	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.01	0.71	0.71	0.00	0.01	1.66	1.66	0.00	0.16	5.82	5.82	0.01
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	2.80	2.80	0.00
C3-Naphthalenes	581	--	0.01	0.66	0.66	0.00	0.01	1.97	1.97	0.00	0.12	4.36	4.36	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.01	0.59	0.59	0.00	0.01	1.34	1.34	0.00	0.12	4.36	4.36	0.01
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.01	0.93	0.93	0.00	0.02	3.04	3.04	0.00	0.16	5.82	5.82	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.00	0.45	0.45	0.00	0.01	1.11	1.11	0.00	0.08	2.84	2.84	0.00
Chrysene	844	826	0.00	0.42	0.42	0.00	0.00	0.50	0.50	0.00	0.24	8.73	8.73	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.05	0.05	0.000	0.00	0.00	0.00	0.000	0.05	1.64	1.64	0.001
Fluoranthene	707	23,870	0.01	0.69	0.69	0.00	0.00	0.48	0.48	0.00	0.55	20.00	20.00	0.03
Fluorene	538	26,000	0.00	0.07	0.07	0.000	0.00	0.15	0.15	0.000	0.03	1.24	1.24	0.002
Naphthalene	385	61,700	0.00	0.10	0.10	0.00	0.00	0.12	0.12	0.00	0.01	0.40	0.40	0.00
Perylene	967	431	0.01	1.18	1.18	0.00	0.02	4.29	4.29	0.00	0.02	0.73	0.73	0.00
Phenanthrene	596	34,300	0.00	0.37	0.37	0.00	0.00	0.43	0.43	0.00	0.26	9.45	9.45	0.02
Pyrene	697	9,090	0.01	0.55	0.55	0.00	0.00	0.43	0.43	0.00	0.31	11.27	11.27	0.02
	--	**ESBTU FCVi**	--	--	--	0.01	--	--	--	0.03	--	--	--	0.18

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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-12				HT18-12				HT18-12			
		Sample Name:	HT18-12-SURF-FD				HT18-12-0010				HT18-12-1030			
		Sample Date:	10/22/2018				10/23/2018				10/23/2018			
		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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	2.74	0.0274	--	--	3.17	0.0317	--	--	4.17	0.0417	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.51	0.51	0.00	0.03	1.01	1.01	0.00	0.07	1.63	1.63	0.00
2-Methylnaphthalene	447	154,800	0.01	0.51	0.51	0.001	0.03	1.01	1.01	0.002	0.09	2.11	2.11	0.005
Acenaphthene	491	33,400	0.02	0.73	0.73	0.001	0.06	1.96	1.96	0.004	0.19	4.56	4.56	0.009
Acenaphthylene	452	24,000	0.01	0.44	0.44	0.00	0.02	0.69	0.69	0.00	0.07	1.58	1.58	0.00
Anthracene	594	1,300	0.05	1.90	1.90	0.003	0.18	5.68	5.68	0.010	0.28	6.71	6.71	0.011
Benzo[a]anthracene	841	4,153	0.23	8.39	8.39	0.01	0.62	19.56	19.56	0.02	1.20	28.78	28.78	0.03
Benzo[a]pyrene	965	3,840	0.08	2.74	2.74	0.00	0.48	15.14	15.14	0.02	0.79	18.94	18.94	0.02
Benzo[b]fluoranthene	979	2,169	0.26	9.49	9.49	0.010	0.55	17.35	17.35	0.018	1.20	28.78	28.78	0.029
Benzo[e]pyrene	967	4,300	0.05	1.72	1.72	0.00	0.40	12.62	12.62	0.01	0.87	20.86	20.86	0.02
Benzo[g,h,i]perylene	1,095	648	0.01	0.19	0.19	0.00	0.31	9.78	9.78	0.01	0.67	16.07	16.07	0.01
Benzo[k]fluoranthene	981	1,220	0.20	7.30	7.30	0.007	0.46	14.51	14.51	0.015	1.00	23.98	23.98	0.024
C1-Chrysenes	929	--	0.12	4.38	4.38	0.00	0.27	8.52	8.52	0.01	0.77	18.47	18.47	0.02
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.27	9.85	9.85	0.01	0.64	20.19	20.19	0.03	1.70	40.77	40.77	0.05
C1-Naphthalenes	444	--	0.02	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.16	5.84	5.84	0.01	0.52	16.40	16.40	0.02	1.50	35.97	35.97	0.05
C2-Chrysenes	1,008	--	0.06	2.34	2.34	0.00	0.18	5.68	5.68	0.01	0.66	15.83	15.83	0.02
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.16	5.05	5.05	0.01	0.60	14.39	14.39	0.02
C2-Fluoranthenes/Pyrene	--	--	0.17	6.20	6.20	--	0.47	14.83	14.83	--	1.30	31.18	31.18	--
C2-Naphthalenes	510	--	0.08	2.81	2.81	0.01	0.20	6.31	6.31	0.01	0.74	17.75	17.75	0.03
C2-Phenanthrenes/Anthracenes	746	--	0.16	5.84	5.84	0.01	0.51	16.09	16.09	0.02	2.30	55.16	55.16	0.07
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.48	11.51	11.51	0.01
C3-Fluorenes	769	--	0.07	2.70	2.70	0.00	0.29	9.15	9.15	0.01	1.10	26.38	26.38	0.03
C3-Fluoranthenes/Pyrene	949	--	0.07	2.66	2.66	0.00	0.22	6.94	6.94	0.01	1.00	23.98	23.98	0.03
C3-Naphthalenes	581	--	0.13	4.74	4.74	0.01	0.36	11.36	11.36	0.02	1.70	40.77	40.77	0.07
C3-Phenanthrenes/Anthracenes	829	--	0.12	4.38	4.38	0.01	0.45	14.20	14.20	0.02	2.60	62.35	62.35	0.08
C4-Chrysenes	1,214	--	0.02	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.14	5.11	5.11	0.01	0.46	14.51	14.51	0.02	2.10	50.36	50.36	0.08
C4-Phenanthrenes/Anthracenes	913	--	0.09	3.43	3.43	0.00	0.36	11.36	11.36	0.01	2.20	52.76	52.76	0.06
Chrysene	844	826	0.26	9.49	9.49	0.01	0.67	21.14	21.14	0.03	1.50	35.97	35.97	0.04
Dibenzo(a,h)anthracene	1,123	2,389	0.06	2.08	2.08	0.002	0.11	3.47	3.47	0.003	0.25	6.00	6.00	0.005
Fluoranthene	707	23,870	0.53	19.34	19.34	0.03	1.50	47.32	47.32	0.07	3.00	71.94	71.94	0.10
Fluorene	538	26,000	0.04	1.28	1.28	0.002	0.07	2.27	2.27	0.004	0.19	4.56	4.56	0.008
Naphthalene	385	61,700	0.01	0.51	0.51	0.00	0.03	0.88	0.88	0.00	0.08	1.92	1.92	0.00
Perylene	967	431	0.01	0.29	0.29	0.00	0.15	4.73	4.73	0.00	0.29	6.95	6.95	0.01
Phenanthrene	596	34,300	0.26	9.49	9.49	0.02	0.96	30.28	30.28	0.05	1.90	45.56	45.56	0.08
Pyrene	697	9,090	0.25	9.12	9.12	0.01	1.20	37.85	37.85	0.05	2.40	57.55	57.55	0.08
	--	**ESBTU FCVi**	--	--	--	0.18	--	--	--	0.52	--	--	--	1.11

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-12				HT18-12				HT18-12			
		Sample Name:	HT18-12-3050				HT18-12-5070				HT18-12-7010			
		Sample Date:	10/23/2018				10/23/2018				10/23/2018			
		Depth Interval (ft):	3-5				5-7				7-9.7			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.76	0.0176	--	--	1.73	0.0173	--	--	0.797	0.00797	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.22	12.50	12.50	0.03	0.00	0.06	0.06	0.00	0.00	0.15	0.15	0.00
2-Methylnaphthalene	447	154,800	0.08	4.49	4.49	0.010	0.00	0.04	0.04	0.000	0.00	0.10	0.10	0.000
Acenaphthene	491	33,400	0.33	18.75	18.75	0.038	0.01	0.35	0.35	0.001	0.00	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.05	2.90	2.90	0.01	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.35	19.89	19.89	0.033	0.00	0.25	0.25	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	1.20	68.18	68.18	0.08	0.02	0.98	0.98	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	965	3,840	0.49	27.84	27.84	0.03	0.01	0.46	0.46	0.00	0.00	0.00	0.00	0.00
Benzo[b]fluoranthene	979	2,169	1.00	56.82	56.82	0.058	0.02	0.92	0.92	0.001	0.00	0.20	0.20	0.000
Benzo[e]pyrene	967	4,300	0.73	41.48	41.48	0.04	0.01	0.64	0.64	0.00	0.00	0.15	0.15	0.00
Benzo[g,h,i]perylene	1,095	648	0.56	31.82	31.82	0.03	0.01	0.58	0.58	0.00	0.00	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.88	50.00	50.00	0.051	0.01	0.75	0.75	0.001	0.00	0.09	0.09	0.000
C1-Chrysenes	929	--	0.51	28.98	28.98	0.03	0.01	0.52	0.52	0.00	0.00	0.00	0.00	0.00
C1-Fluorenes	611	--	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	1.50	85.23	85.23	0.11	0.02	1.27	1.27	0.00	0.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.20	68.18	68.18	0.10	0.02	0.98	0.98	0.00	0.01	0.65	0.65	0.00
C2-Chrysenes	1,008	--	0.31	17.61	17.61	0.02	0.01	0.29	0.29	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.86	48.86	48.86	--	0.01	0.75	0.75	--	0.00	0.55	0.55	--
C2-Naphthalenes	510	--	0.78	44.32	44.32	0.09	0.01	0.64	0.64	0.00	0.00	0.61	0.61	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.92	52.27	52.27	0.07	0.02	1.04	1.04	0.00	0.01	1.04	1.04	0.00
C3-Chrysenes	1,112	--	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.34	19.32	19.32	0.03	0.01	0.35	0.35	0.00	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.36	20.45	20.45	0.02	0.01	0.35	0.35	0.00	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.65	36.93	36.93	0.06	0.01	0.81	0.81	0.00	0.01	1.38	1.38	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.64	36.36	36.36	0.04	0.02	0.92	0.92	0.00	0.01	0.88	0.88	0.00
C4-Chrysenes	1,214	--	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.45	25.57	25.57	0.04	0.01	0.75	0.75	0.00	0.02	2.01	2.01	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.50	28.41	28.41	0.03	0.01	0.75	0.75	0.00	0.01	0.66	0.66	0.00
Chrysene	844	826	1.30	73.86	73.86	0.09	0.02	1.10	1.10	0.00	0.00	0.31	0.31	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.21	11.93	11.93	0.011	0.00	0.18	0.18	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	3.20	181.82	181.82	0.26	0.05	2.60	2.60	0.00	0.00	0.28	0.28	0.00
Fluorene	538	26,000	0.46	26.14	26.14	0.049	0.00	0.21	0.21	0.000	0.00	0.10	0.10	0.000
Naphthalene	385	61,700	0.12	6.82	6.82	0.02	0.00	0.05	0.05	0.00	0.00	0.10	0.10	0.00
Perylene	967	431	0.21	11.93	11.93	0.01	0.02	1.04	1.04	0.00	0.02	2.89	2.89	0.00
Phenanthrene	596	34,300	3.10	176.14	176.14	0.30	0.03	1.97	1.97	0.00	0.00	0.28	0.28	0.00
Pyrene	697	9,090	2.60	147.73	147.73	0.21	0.03	1.85	1.85	0.00	0.00	0.24	0.24	0.00
	--	**ESBTU FCVi**	--	--	--	1.96	--	--	--	0.03	--	--	--	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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-13				HT18-13				HT18-13			
		Sample Name:	HT18-13-SURF				HT18-13-0010				HT18-13-1030			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.32	0.0332	--	--	3.89	0.0389	--	--	4.07	0.0407	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.09	0.09	0.00	0.02	0.41	0.41	0.00	0.03	0.69	0.69	0.00
2-Methylnaphthalene	447	154,800	0.00	0.09	0.09	0.000	0.02	0.57	0.57	0.001	0.04	0.86	0.86	0.002
Acenaphthene	491	33,400	0.00	0.09	0.09	0.000	0.04	1.05	1.05	0.002	0.06	1.45	1.45	0.003
Acenaphthylene	452	24,000	0.00	0.06	0.06	0.00	0.02	0.59	0.59	0.00	0.04	0.88	0.88	0.00
Anthracene	594	1,300	0.01	0.20	0.20	0.000	0.07	1.80	1.80	0.003	0.10	2.46	2.46	0.004
Benzo[a]anthracene	841	4,153	0.05	1.45	1.45	0.00	0.38	9.77	9.77	0.01	0.51	12.53	12.53	0.01
Benzo[a]pyrene	965	3,840	0.05	1.60	1.60	0.00	0.36	9.25	9.25	0.01	0.45	11.06	11.06	0.01
Benzo[b]fluoranthene	979	2,169	0.09	2.71	2.71	0.003	0.42	10.80	10.80	0.011	0.59	14.50	14.50	0.015
Benzo[e]pyrene	967	4,300	0.06	1.87	1.87	0.00	0.28	7.20	7.20	0.01	0.38	9.34	9.34	0.01
Benzo[g,h,i]perylene	1,095	648	0.05	1.51	1.51	0.00	0.07	1.77	1.77	0.00	0.11	2.70	2.70	0.00
Benzo[k]fluoranthene	981	1,220	0.07	2.11	2.11	0.002	0.40	10.28	10.28	0.010	0.39	9.58	9.58	0.010
C1-Chrysenes	929	--	0.03	0.90	0.90	0.00	0.28	7.20	7.20	0.01	0.51	12.53	12.53	0.01
C1-Fluorenes	611	--	0.01	0.00	0.00	0.00	0.08	2.11	2.11	0.00	0.14	3.44	3.44	0.01
C1-Fluoranthenes/pyrene	770	--	0.06	1.69	1.69	0.00	0.65	16.71	16.71	0.02	1.00	24.57	24.57	0.03
C1-Naphthalenes	444	--	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.03	0.93	0.93	0.00	0.55	14.14	14.14	0.02	1.00	24.57	24.57	0.04
C2-Chrysenes	1,008	--	0.02	0.51	0.51	0.00	0.17	4.37	4.37	0.00	0.37	9.09	9.09	0.01
C2-Fluorenes	686	--	0.01	0.00	0.00	0.00	0.28	7.20	7.20	0.01	0.56	13.76	13.76	0.02
C2-Fluoranthenes/Pyrene	--	--	0.04	1.05	1.05	--	0.44	11.31	11.31	--	0.83	20.39	20.39	--
C2-Naphthalenes	510	--	0.02	0.45	0.45	0.00	0.22	5.66	5.66	0.01	0.38	9.34	9.34	0.02
C2-Phenanthrenes/Anthracenes	746	--	0.03	0.93	0.93	0.00	1.10	28.28	28.28	0.04	2.30	56.51	56.51	0.08
C3-Chrysenes	1,112	--	0.01	0.00	0.00	0.00	0.10	2.57	2.57	0.00	0.22	5.41	5.41	0.00
C3-Fluorenes	769	--	0.02	0.57	0.57	0.00	0.43	11.05	11.05	0.01	1.00	24.57	24.57	0.03
C3-Fluoranthenes/Pyrene	949	--	0.02	0.48	0.48	0.00	0.35	9.00	9.00	0.01	0.79	19.41	19.41	0.02
C3-Naphthalenes	581	--	0.03	0.81	0.81	0.00	0.82	21.08	21.08	0.04	1.20	29.48	29.48	0.05
C3-Phenanthrenes/Anthracenes	829	--	0.02	0.69	0.69	0.00	1.10	28.28	28.28	0.03	2.50	61.43	61.43	0.07
C4-Chrysenes	1,214	--	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.04	1.08	1.08	0.00	1.30	33.42	33.42	0.05	2.10	51.60	51.60	0.08
C4-Phenanthrenes/Anthracenes	913	--	0.02	0.45	0.45	0.00	0.80	20.57	20.57	0.02	1.90	46.68	46.68	0.05
Chrysene	844	826	0.09	2.62	2.62	0.00	0.52	13.37	13.37	0.02	0.71	17.44	17.44	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.01	0.42	0.42	0.000	0.08	2.01	2.01	0.002	0.10	2.46	2.46	0.002
Fluoranthene	707	23,870	0.18	5.42	5.42	0.01	1.10	28.28	28.28	0.04	1.40	34.40	34.40	0.05
Fluorene	538	26,000	0.01	0.16	0.16	0.000	0.07	1.70	1.70	0.003	0.09	2.19	2.19	0.004
Naphthalene	385	61,700	0.00	0.09	0.09	0.00	0.01	0.36	0.36	0.00	0.03	0.64	0.64	0.00
Perylene	967	431	0.02	0.54	0.54	0.00	0.09	2.24	2.24	0.00	0.11	2.70	2.70	0.00
Phenanthrene	596	34,300	0.05	1.63	1.63	0.00	0.55	14.14	14.14	0.02	0.70	17.20	17.20	0.03
Pyrene	697	9,090	0.10	3.01	3.01	0.00	0.85	21.85	21.85	0.03	1.10	27.03	27.03	0.04
	--	**ESBTU FCVi**	--	--	--	0.05	--	--	--	0.46	--	--	--	0.73

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-13				HT18-13				HT18-13			
		Sample Name:	HT18-13-3050				HT18-13-5060				HT18-13-6090			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		Depth Interval (ft):	3-5				5-6.3				6.3-8.8			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	2.09	0.0209	--	--	1.63	0.0163	--	--	1.06	0.0106	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.03	1.29	1.29	0.00	0.01	0.74	0.74	0.00	0.01	0.47	0.47	0.00
2-Methylnaphthalene	447	154,800	0.03	1.58	1.58	0.004	0.02	1.10	1.10	0.002	0.01	0.72	0.72	0.002
Acenaphthene	491	33,400	0.05	2.54	2.54	0.005	0.03	1.66	1.66	0.003	0.02	1.70	1.70	0.003
Acenaphthylene	452	24,000	0.03	1.29	1.29	0.00	0.01	0.67	0.67	0.00	0.00	0.32	0.32	0.00
Anthracene	594	1,300	0.11	5.26	5.26	0.009	0.06	3.37	3.37	0.006	0.02	1.98	1.98	0.003
Benzo[a]anthracene	841	4,153	0.43	20.57	20.57	0.02	0.21	12.88	12.88	0.02	0.06	5.75	5.75	0.01
Benzo[a]pyrene	965	3,840	0.35	16.75	16.75	0.02	0.18	11.04	11.04	0.01	0.04	3.40	3.40	0.00
Benzo[b]fluoranthene	979	2,169	0.44	21.05	21.05	0.022	0.20	12.27	12.27	0.013	0.06	5.57	5.57	0.006
Benzo[e]pyrene	967	4,300	0.28	13.40	13.40	0.01	0.15	9.20	9.20	0.01	0.04	4.15	4.15	0.00
Benzo[g,h,i]perylene	1,095	648	0.06	2.82	2.82	0.00	0.04	2.58	2.58	0.00	0.03	2.45	2.45	0.00
Benzo[k]fluoranthene	981	1,220	0.38	18.18	18.18	0.019	0.19	11.66	11.66	0.012	0.05	4.62	4.62	0.005
C1-Chrysenes	929	--	0.68	32.54	32.54	0.04	0.30	18.40	18.40	0.02	0.11	10.38	10.38	0.01
C1-Fluorenes	611	--	0.12	5.74	5.74	0.01	0.05	3.13	3.13	0.01	0.02	2.08	2.08	0.00
C1-Fluoranthenes/pyrene	770	--	1.00	47.85	47.85	0.06	0.51	31.29	31.29	0.04	0.14	13.21	13.21	0.02
C1-Naphthalenes	444	--	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.98	46.89	46.89	0.07	0.37	22.70	22.70	0.03	0.16	15.09	15.09	0.02
C2-Chrysenes	1,008	--	0.65	31.10	31.10	0.03	0.24	14.72	14.72	0.01	0.09	8.40	8.40	0.01
C2-Fluorenes	686	--	0.39	18.66	18.66	0.03	0.15	9.20	9.20	0.01	0.06	5.66	5.66	0.01
C2-Fluoranthenes/Pyrene	--	--	1.00	47.85	47.85	--	0.45	27.61	27.61	--	0.15	14.15	14.15	--
C2-Naphthalenes	510	--	0.37	17.70	17.70	0.03	0.18	11.04	11.04	0.02	0.08	7.45	7.45	0.01
C2-Phenanthrenes/Anthracenes	746	--	2.20	105.26	105.26	0.14	0.69	42.33	42.33	0.06	0.30	28.30	28.30	0.04
C3-Chrysenes	1,112	--	0.36	17.22	17.22	0.02	0.16	9.82	9.82	0.01	0.06	5.75	5.75	0.01
C3-Fluorenes	769	--	0.63	30.14	30.14	0.04	0.24	14.72	14.72	0.02	0.12	11.32	11.32	0.01
C3-Fluoranthenes/Pyrene	949	--	0.93	44.50	44.50	0.05	0.40	24.54	24.54	0.03	0.13	12.26	12.26	0.01
C3-Naphthalenes	581	--	0.98	46.89	46.89	0.08	0.40	24.54	24.54	0.04	0.17	16.04	16.04	0.03
C3-Phenanthrenes/Anthracenes	829	--	2.60	124.40	124.40	0.15	0.81	49.69	49.69	0.06	0.35	33.02	33.02	0.04
C4-Chrysenes	1,214	--	0.17	8.13	8.13	0.01	0.07	4.17	4.17	0.00	0.02	2.08	2.08	0.00
C4-Naphthalenes	657	--	1.50	71.77	71.77	0.11	0.53	32.52	32.52	0.05	0.20	18.87	18.87	0.03
C4-Phenanthrenes/Anthracenes	913	--	2.20	105.26	105.26	0.12	0.71	43.56	43.56	0.05	0.31	29.25	29.25	0.03
Chrysene	844	826	0.59	28.23	28.23	0.03	0.26	15.95	15.95	0.02	0.08	7.83	7.83	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.08	3.92	3.92	0.003	0.04	2.33	2.33	0.002	0.01	0.90	0.90	0.001
Fluoranthene	707	23,870	1.10	52.63	52.63	0.07	0.48	29.45	29.45	0.04	0.20	18.87	18.87	0.03
Fluorene	538	26,000	0.08	3.97	3.97	0.007	0.04	2.70	2.70	0.005	0.03	2.36	2.36	0.004
Naphthalene	385	61,700	0.02	1.05	1.05	0.00	0.01	0.74	0.74	0.00	0.00	0.45	0.45	0.00
Perylene	967	431	0.08	3.97	3.97	0.00	0.04	2.58	2.58	0.00	0.01	1.04	1.04	0.00
Phenanthrene	596	34,300	0.57	27.27	27.27	0.05	0.28	17.18	17.18	0.03	0.16	15.09	15.09	0.03
Pyrene	697	9,090	0.79	37.80	37.80	0.05	0.41	25.15	25.15	0.04	0.13	12.26	12.26	0.02
	--	**ESBTU FCVi**	--	--	--	1.28	--	--	--	0.65	--	--	--	0.40

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-13				HT18-13				HT18-14			
		Sample Name:	HT18-13-6090-FD				HT18-13-9010				HT18-14-SURF			
		Sample Date:	10/29/2018				10/29/2018				10/29/2018			
		Depth Interval (ft):	6.3-8.8				8.8-10				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.811	0.00811	--	--	0.546	0.00546	--	--	1.73	0.0173	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.73	0.73	0.00	0.00	0.64	0.64	0.00	0.00	0.23	0.23	0.00
2-Methylnaphthalene	447	154,800	0.01	1.17	1.17	0.003	0.00	0.55	0.55	0.001	0.01	0.29	0.29	0.001
Acenaphthene	491	33,400	0.02	2.59	2.59	0.005	0.01	2.56	2.56	0.005	0.01	0.49	0.49	0.001
Acenaphthylene	452	24,000	0.00	0.58	0.58	0.00	0.00	0.57	0.57	0.00	0.01	0.31	0.31	0.00
Anthracene	594	1,300	0.03	3.58	3.58	0.006	0.03	5.68	5.68	0.010	0.03	1.56	1.56	0.003
Benzo[a]anthracene	841	4,153	0.09	10.60	10.60	0.01	0.08	14.10	14.10	0.02	0.17	9.83	9.83	0.01
Benzo[a]pyrene	965	3,840	0.06	7.64	7.64	0.01	0.07	11.90	11.90	0.01	0.10	5.78	5.78	0.01
Benzo[b]fluoranthene	979	2,169	0.09	10.85	10.85	0.011	0.07	12.45	12.45	0.013	0.18	10.40	10.40	0.011
Benzo[e]pyrene	967	4,300	0.06	7.52	7.52	0.01	0.04	7.69	7.69	0.01	0.12	6.94	6.94	0.01
Benzo[g,h,i]perylene	1,095	648	0.04	4.44	4.44	0.00	0.01	1.83	1.83	0.00	0.08	4.80	4.80	0.00
Benzo[k]fluoranthene	981	1,220	0.07	8.26	8.26	0.008	0.06	11.54	11.54	0.012	0.15	8.67	8.67	0.009
C1-Chrysenes	929	--	0.16	19.73	19.73	0.02	0.04	6.41	6.41	0.01	0.07	4.28	4.28	0.00
C1-Fluorenes	611	--	0.03	3.45	3.45	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.19	23.43	23.43	0.03	0.10	17.58	17.58	0.02	0.16	9.25	9.25	0.01
C1-Naphthalenes	444	--	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.21	25.89	25.89	0.04	0.07	12.09	12.09	0.02	0.08	4.34	4.34	0.01
C2-Chrysenes	1,008	--	0.15	18.50	18.50	0.02	0.01	0.00	0.00	0.00	0.03	1.79	1.79	0.00
C2-Fluorenes	686	--	0.08	9.74	9.74	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.20	24.66	24.66	--	0.04	7.69	7.69	--	0.08	4.68	4.68	--
C2-Naphthalenes	510	--	0.10	12.21	12.21	0.02	0.02	3.66	3.66	0.01	0.01	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.41	50.55	50.55	0.07	0.05	8.79	8.79	0.01	0.05	2.89	2.89	0.00
C3-Chrysenes	1,112	--	0.09	11.22	11.22	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Fluorenes	769	--	0.16	19.73	19.73	0.03	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.15	18.50	18.50	0.02	0.01	0.00	0.00	0.00	0.04	2.08	2.08	0.00
C3-Naphthalenes	581	--	0.21	25.89	25.89	0.04	0.03	5.49	5.49	0.01	0.03	1.50	1.50	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.49	60.42	60.42	0.07	0.03	4.95	4.95	0.01	0.03	1.68	1.68	0.00
C4-Chrysenes	1,214	--	0.03	3.70	3.70	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.26	32.06	32.06	0.05	0.04	6.41	6.41	0.01	0.03	1.50	1.50	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.43	53.02	53.02	0.06	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Chrysene	844	826	0.12	14.80	14.80	0.02	0.08	14.47	14.47	0.02	0.19	10.98	10.98	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.01	1.60	1.60	0.001	0.01	2.56	2.56	0.002	0.04	2.02	2.02	0.002
Fluoranthene	707	23,870	0.28	34.53	34.53	0.05	0.20	36.63	36.63	0.05	0.40	23.12	23.12	0.03
Fluorene	538	26,000	0.03	3.70	3.70	0.007	0.02	3.11	3.11	0.006	0.02	0.92	0.92	0.002
Naphthalene	385	61,700	0.01	0.75	0.75	0.00	0.00	0.71	0.71	0.00	0.01	0.46	0.46	0.00
Perylene	967	431	0.02	2.10	2.10	0.00	0.03	5.31	5.31	0.01	0.04	2.14	2.14	0.00
Phenanthrene	596	34,300	0.19	23.43	23.43	0.04	0.13	23.81	23.81	0.04	0.15	8.67	8.67	0.01
Pyrene	697	9,090	0.18	22.19	22.19	0.03	0.15	27.47	27.47	0.04	0.28	16.18	16.18	0.02
	--	**ESBTU FCVi**	--	--	--	0.70	--	--	--	0.34	--	--	--	0.18

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-14				HT18-14				HT18-15			
		Sample Name:	HT18-14-0010				HT18-14-1020				HT18-15-SURF			
		Sample Date:	10/30/2018				10/30/2018				10/24/2018			
		Depth Interval (ft):	0-1.3				1.3-1.9				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	2.13	0.0213	--	--	1.28	0.0128	--	--	1.33	0.0133	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.56	26.29	26.29	0.06	0.02	1.56	1.56	0.00	0.06	4.59	4.59	0.01
2-Methylnaphthalene	447	154,800	0.84	39.44	39.44	0.088	0.09	6.88	6.88	0.015	0.07	4.96	4.96	0.011
Acenaphthene	491	33,400	0.68	31.92	31.92	0.065	0.10	7.81	7.81	0.016	0.18	13.53	13.53	0.028
Acenaphthylene	452	24,000	0.42	0.00	0.00	0.00	0.01	0.94	0.94	0.00	0.06	0.00	0.00	0.00
Anthracene	594	1,300	1.10	51.64	51.64	0.087	0.12	9.38	9.38	0.016	0.31	23.31	23.31	0.039
Benzo[a]anthracene	841	4,153	2.80	131.46	131.46	0.16	0.36	28.13	28.13	0.03	0.48	36.09	36.09	0.04
Benzo[a]pyrene	965	3,840	2.20	103.29	103.29	0.11	0.24	18.75	18.75	0.02	0.25	18.80	18.80	0.02
Benzo[b]fluoranthene	979	2,169	2.00	93.90	93.90	0.096	0.25	19.53	19.53	0.020	0.32	24.06	24.06	0.025
Benzo[e]pyrene	967	4,300	1.60	75.12	75.12	0.08	0.21	16.41	16.41	0.02	0.19	14.29	14.29	0.01
Benzo[g,h,i]perylene	1,095	648	1.20	56.34	56.34	0.05	0.17	13.28	13.28	0.01	0.05	3.61	3.61	0.00
Benzo[k]fluoranthene	981	1,220	2.60	122.07	122.07	0.124	0.30	23.44	23.44	0.024	0.32	24.06	24.06	0.025
C1-Chrysenes	929	--	1.60	75.12	75.12	0.08	0.22	17.19	17.19	0.02	0.18	13.53	13.53	0.01
C1-Fluorenes	611	--	0.42	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	4.50	211.27	211.27	0.27	0.65	50.78	50.78	0.07	0.45	33.83	33.83	0.04
C1-Naphthalenes	444	--	0.89	41.78	41.78	0.09	0.04	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	2.90	136.15	136.15	0.20	0.43	33.59	33.59	0.05	0.49	36.84	36.84	0.05
C2-Chrysenes	1,008	--	0.42	0.00	0.00	0.00	0.10	7.81	7.81	0.01	0.06	0.00	0.00	0.00
C2-Fluorenes	686	--	0.42	0.00	0.00	0.00	0.09	7.03	7.03	0.01	0.06	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	2.30	107.98	107.98	--	0.31	24.22	24.22	--	0.21	15.79	15.79	--
C2-Naphthalenes	510	--	2.10	98.59	98.59	0.19	0.13	10.16	10.16	0.02	0.23	17.29	17.29	0.03
C2-Phenanthrenes/Anthracenes	746	--	2.80	131.46	131.46	0.18	0.39	30.47	30.47	0.04	0.22	16.54	16.54	0.02
C3-Chrysenes	1,112	--	0.42	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C3-Fluorenes	769	--	0.98	46.01	46.01	0.06	0.12	9.38	9.38	0.01	0.06	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	1.10	51.64	51.64	0.05	0.15	11.72	11.72	0.01	0.06	0.00	0.00	0.00
C3-Naphthalenes	581	--	2.40	112.68	112.68	0.19	0.24	18.75	18.75	0.03	0.16	12.03	12.03	0.02
C3-Phenanthrenes/Anthracenes	829	--	2.20	103.29	103.29	0.12	0.31	24.22	24.22	0.03	0.06	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.42	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Naphthalenes	657	--	2.20	103.29	103.29	0.16	0.27	21.09	21.09	0.03	0.06	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	1.50	70.42	70.42	0.08	0.23	17.97	17.97	0.02	0.06	0.00	0.00	0.00
Chrysene	844	826	3.20	150.23	150.23	0.18	0.40	31.25	31.25	0.04	0.46	34.59	34.59	0.04
Dibenzo(a,h)anthracene	1,123	2,389	0.54	25.35	25.35	0.023	0.07	5.31	5.31	0.005	0.06	4.81	4.81	0.004
Fluoranthene	707	23,870	7.00	328.64	328.64	0.46	0.96	75.00	75.00	0.11	1.40	105.26	105.26	0.15
Fluorene	538	26,000	0.79	37.09	37.09	0.069	0.07	5.08	5.08	0.009	0.24	18.05	18.05	0.034
Naphthalene	385	61,700	1.00	46.95	46.95	0.12	0.09	6.88	6.88	0.02	0.09	6.47	6.47	0.02
Perylene	967	431	0.57	26.76	26.76	0.03	0.09	7.27	7.27	0.01	0.06	4.66	4.66	0.00
Phenanthrene	596	34,300	5.30	248.83	248.83	0.42	0.76	59.38	59.38	0.10	1.60	120.30	120.30	0.20
Pyrene	697	9,090	6.10	286.38	286.38	0.41	0.84	65.63	65.63	0.09	0.91	68.42	68.42	0.10
	--	**ESBTU FCVi**	--	--	--	4.16	--	--	--	0.89	--	--	--	0.95

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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		Location ID:	HT18-15				HT18-15				HT18-15			
		Sample Name:	HT18-15-0005				HT18-15-0530				HT18-15-3050			
		Sample Date:	10/25/2018				10/25/2018				10/25/2018			
		Depth Interval (ft):	0-0.5				0.5-3				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.569	0.00569	--	--	0.979	0.00979	--	--	1.34	0.0134	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.19	0.19	0.00	0.00	0.42	0.42	0.00	0.00	0.25	0.25	0.00
2-Methylnaphthalene	447	154,800	0.00	0.21	0.21	0.000	0.01	0.53	0.53	0.001	0.00	0.28	0.28	0.001
Acenaphthene	491	33,400	0.00	0.49	0.49	0.001	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.58	0.58	0.001	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.01	1.27	1.27	0.00	0.00	0.05	0.05	0.00	0.00	0.04	0.04	0.00
Benzo[a]pyrene	965	3,840	0.00	0.76	0.76	0.00	0.00	0.06	0.06	0.00	0.00	0.04	0.04	0.00
Benzo[b]fluoranthene	979	2,169	0.01	1.35	1.35	0.001	0.00	0.16	0.16	0.000	0.00	0.11	0.11	0.000
Benzo[e]pyrene	967	4,300	0.01	1.09	1.09	0.00	0.00	0.20	0.20	0.00	0.00	0.15	0.15	0.00
Benzo[g,h,i]perylene	1,095	648	0.01	1.04	1.04	0.00	0.00	0.34	0.34	0.00	0.00	0.22	0.22	0.00
Benzo[k]fluoranthene	981	1,220	0.01	1.25	1.25	0.001	0.00	0.11	0.11	0.000	0.00	0.08	0.08	0.000
C1-Chrysenes	929	--	0.01	1.62	1.62	0.00	0.00	0.46	0.46	0.00	0.00	0.32	0.32	0.00
C1-Fluorenes	611	--	0.00	0.70	0.70	0.00	0.00	0.39	0.39	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.02	2.81	2.81	0.00	0.01	0.74	0.74	0.00	0.01	0.52	0.52	0.00
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.01	0.65	0.65	0.00	0.00	0.36	0.36	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.02	2.81	2.81	0.00	0.02	1.53	1.53	0.00	0.02	1.19	1.19	0.00
C2-Chrysenes	1,008	--	0.01	1.35	1.35	0.00	0.00	0.48	0.48	0.00	0.00	0.36	0.36	0.00
C2-Fluorenes	686	--	0.01	1.51	1.51	0.00	0.01	0.58	0.58	0.00	0.01	0.45	0.45	0.00
C2-Fluoranthenes/Pyrene	--	--	0.01	2.28	2.28	--	0.01	1.00	1.00	--	0.01	0.74	0.74	--
C2-Naphthalenes	510	--	0.01	1.60	1.60	0.00	0.02	2.15	2.15	0.00	0.02	1.42	1.42	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.03	4.39	4.39	0.01	0.02	2.15	2.15	0.00	0.02	1.64	1.64	0.00
C3-Chrysenes	1,112	--	0.00	0.72	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.01	2.11	2.11	0.00	0.01	0.89	0.89	0.00	0.01	0.67	0.67	0.00
C3-Fluoranthenes/Pyrene	949	--	0.01	1.65	1.65	0.00	0.01	0.93	0.93	0.00	0.01	0.66	0.66	0.00
C3-Naphthalenes	581	--	0.03	4.39	4.39	0.01	0.04	4.19	4.19	0.01	0.04	3.06	3.06	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.03	4.39	4.39	0.01	0.02	1.84	1.84	0.00	0.02	1.42	1.42	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.04	7.56	7.56	0.01	0.06	6.33	6.33	0.01	0.07	4.85	4.85	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.02	3.51	3.51	0.00	0.01	1.33	1.33	0.00	0.01	0.97	0.97	0.00
Chrysene	844	826	0.01	2.11	2.11	0.00	0.00	0.35	0.35	0.00	0.00	0.27	0.27	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.26	0.26	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	0.03	4.75	4.75	0.01	0.00	0.15	0.15	0.00	0.00	0.08	0.08	0.00
Fluorene	538	26,000	0.00	0.42	0.42	0.001	0.00	0.12	0.12	0.000	0.00	0.08	0.08	0.000
Naphthalene	385	61,700	0.00	0.15	0.15	0.00	0.01	0.54	0.54	0.00	0.00	0.24	0.24	0.00
Perylene	967	431	0.01	1.09	1.09	0.00	0.00	0.25	0.25	0.00	0.00	0.18	0.18	0.00
Phenanthrene	596	34,300	0.01	1.93	1.93	0.00	0.01	0.55	0.55	0.00	0.01	0.37	0.37	0.00
Pyrene	697	9,090	0.02	3.34	3.34	0.00	0.00	0.26	0.26	0.00	0.00	0.18	0.18	0.00
	--	**ESBTU FCVi**	--	--	--	0.08	--	--	--	0.04	--	--	--	0.03

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).
[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-15				HT18-16				HT18-17			
		Sample Name:	HT18-15-3050-FD				HT18-16-SURF				HT-18-17-SURF			
		Sample Date:	10/25/2018				10/24/2018				10/24/2018			
		Depth Interval (ft):	3-5				0-0.5				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.946	0.00946	--	--	3.36	0.0336	--	--	0.622	0.00622	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.37	0.37	0.00	0.00	0.14	0.14	0.00	0.00	0.24	0.24	0.00
2-Methylnaphthalene	447	154,800	0.00	0.43	0.43	0.001	0.01	0.17	0.17	0.000	0.00	0.27	0.27	0.001
Acenaphthene	491	33,400	0.00	0.00	0.00	0.000	0.01	0.26	0.26	0.001	0.01	0.82	0.82	0.002
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.00	0.13	0.13	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.00	0.00	0.000	0.02	0.51	0.51	0.001	0.01	0.92	0.92	0.002
Benzo[a]anthracene	841	4,153	0.00	0.07	0.07	0.00	0.10	2.98	2.98	0.00	0.03	4.66	4.66	0.01
Benzo[a]pyrene	965	3,840	0.00	0.07	0.07	0.00	0.10	2.98	2.98	0.00	0.01	1.77	1.77	0.00
Benzo[b]fluoranthene	979	2,169	0.00	0.17	0.17	0.000	0.15	4.46	4.46	0.005	0.04	5.95	5.95	0.006
Benzo[e]pyrene	967	4,300	0.00	0.22	0.22	0.00	0.11	3.27	3.27	0.00	0.03	4.02	4.02	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.34	0.34	0.00	0.05	1.43	1.43	0.00	0.01	1.93	1.93	0.00
Benzo[k]fluoranthene	981	1,220	0.00	0.10	0.10	0.000	0.13	3.87	3.87	0.004	0.04	5.63	5.63	0.006
C1-Chrysenes	929	--	0.00	0.52	0.52	0.00	0.05	1.61	1.61	0.00	0.02	2.41	2.41	0.00
C1-Fluorenes	611	--	0.00	0.42	0.42	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.01	0.85	0.85	0.00	0.11	3.27	3.27	0.00	0.03	4.50	4.50	0.01
C1-Naphthalenes	444	--	0.01	0.55	0.55	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.02	1.69	1.69	0.00	0.06	1.67	1.67	0.00	0.02	2.89	2.89	0.00
C2-Chrysenes	1,008	--	0.00	0.52	0.52	0.00	0.04	1.07	1.07	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.01	0.72	0.72	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.01	1.16	1.16	--	0.08	2.50	2.50	--	0.02	3.05	3.05	--
C2-Naphthalenes	510	--	0.02	2.11	2.11	0.00	0.04	1.10	1.10	0.00	0.00	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.02	2.33	2.33	0.00	0.05	1.55	1.55	0.00	0.01	2.25	2.25	0.00
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.01	1.06	1.06	0.00	0.05	1.46	1.46	0.00	0.01	1.77	1.77	0.00
C3-Fluoranthenes/Pyrene	949	--	0.01	0.99	0.99	0.00	0.04	1.22	1.22	0.00	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.04	4.55	4.55	0.01	0.07	2.08	2.08	0.00	0.01	1.93	1.93	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.02	2.11	2.11	0.00	0.04	1.22	1.22	0.00	0.01	1.59	1.59	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.07	7.19	7.19	0.01	0.08	2.41	2.41	0.00	0.02	2.41	2.41	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.01	1.48	1.48	0.00	0.03	0.83	0.83	0.00	0.00	0.00	0.00	0.00
Chrysene	844	826	0.00	0.41	0.41	0.00	0.17	5.06	5.06	0.01	0.04	6.43	6.43	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.00	0.00	0.000	0.03	0.95	0.95	0.001	0.01	1.32	1.32	0.001
Fluoranthene	707	23,870	0.00	0.14	0.14	0.00	0.37	11.01	11.01	0.02	0.10	16.08	16.08	0.02
Fluorene	538	26,000	0.00	0.12	0.12	0.000	0.01	0.33	0.33	0.001	0.01	0.82	0.82	0.002
Naphthalene	385	61,700	0.00	0.39	0.39	0.00	0.00	0.13	0.13	0.00	0.00	0.23	0.23	0.00
Perylene	967	431	0.00	0.27	0.27	0.00	0.03	0.74	0.74	0.00	0.01	0.98	0.98	0.00
Phenanthrene	596	34,300	0.01	0.56	0.56	0.00	0.16	4.76	4.76	0.01	0.06	9.16	9.16	0.02
Pyrene	697	9,090	0.00	0.29	0.29	0.00	0.23	6.85	6.85	0.01	0.06	10.29	10.29	0.01
	--	**ESBTU FCVi**	--	--	--	0.04	--	--	--	0.09	--	--	--	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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-17				HT18-17				HT18-17			
		Sample Name:	HT-18-17-0010				HT-18-17-1030				HT-18-17-3050			
		Sample Date:	10/25/2018				10/25/2018				10/25/2018			
		Depth Interval (ft):	0-1				1-3				3-4.7			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.728	0.00728	--	--	0.801	0.00801	--	--	0.757	0.00757	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.81	0.81	0.00	0.01	0.62	0.62	0.00	0.01	0.70	0.70	0.00
2-Methylnaphthalene	447	154,800	0.01	0.91	0.91	0.002	0.01	0.69	0.69	0.002	0.01	0.75	0.75	0.002
Acenaphthene	491	33,400	0.00	0.54	0.54	0.001	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.01	1.28	1.28	0.002	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.02	2.61	2.61	0.00	0.00	0.10	0.10	0.00	0.00	0.13	0.13	0.00
Benzo[a]pyrene	965	3,840	0.02	2.20	2.20	0.00	0.00	0.08	0.08	0.00	0.00	0.16	0.16	0.00
Benzo[b]fluoranthene	979	2,169	0.02	2.20	2.20	0.002	0.00	0.27	0.27	0.000	0.00	0.36	0.36	0.000
Benzo[e]pyrene	967	4,300	0.01	1.65	1.65	0.00	0.00	0.31	0.31	0.00	0.00	0.45	0.45	0.00
Benzo[g,h,i]perylene	1,095	648	0.01	1.65	1.65	0.00	0.00	0.50	0.50	0.00	0.00	0.65	0.65	0.00
Benzo[k]fluoranthene	981	1,220	0.01	1.92	1.92	0.002	0.00	0.14	0.14	0.000	0.00	0.16	0.16	0.000
C1-Chrysenes	929	--	0.01	1.92	1.92	0.00	0.01	0.72	0.72	0.00	0.01	0.90	0.90	0.00
C1-Fluorenes	611	--	0.01	1.21	1.21	0.00	0.01	0.62	0.62	0.00	0.01	0.85	0.85	0.00
C1-Fluoranthenes/pyrene	770	--	0.04	4.81	4.81	0.01	0.01	1.20	1.20	0.00	0.01	1.72	1.72	0.00
C1-Naphthalenes	444	--	0.01	1.18	1.18	0.00	0.01	0.90	0.90	0.00	0.01	1.00	1.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.04	5.08	5.08	0.01	0.02	2.50	2.50	0.00	0.02	3.17	3.17	0.00
C2-Chrysenes	1,008	--	0.01	1.17	1.17	0.00	0.01	0.76	0.76	0.00	0.01	0.99	0.99	0.00
C2-Fluorenes	686	--	0.02	2.06	2.06	0.00	0.01	0.97	0.97	0.00	0.01	1.31	1.31	0.00
C2-Fluoranthenes/Pyrene	--	--	0.02	3.30	3.30	--	0.01	1.62	1.62	--	0.02	2.25	2.25	--
C2-Naphthalenes	510	--	0.03	4.40	4.40	0.01	0.03	3.25	3.25	0.01	0.03	3.70	3.70	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.04	5.91	5.91	0.01	0.03	3.37	3.37	0.00	0.03	4.23	4.23	0.01
C3-Chrysenes	1,112	--	0.01	0.74	0.74	0.00	0.00	0.51	0.51	0.00	0.01	0.73	0.73	0.00
C3-Fluorenes	769	--	0.02	2.75	2.75	0.00	0.01	1.50	1.50	0.00	0.02	1.98	1.98	0.00
C3-Fluoranthenes/Pyrene	949	--	0.02	2.34	2.34	0.00	0.01	1.37	1.37	0.00	0.01	1.85	1.85	0.00
C3-Naphthalenes	581	--	0.07	9.20	9.20	0.02	0.05	6.74	6.74	0.01	0.06	8.19	8.19	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.04	4.81	4.81	0.01	0.02	2.87	2.87	0.00	0.03	3.70	3.70	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.10	13.74	13.74	0.02	0.08	10.36	10.36	0.02	0.10	13.21	13.21	0.02
C4-Phenanthrenes/Anthracenes	913	--	0.03	3.43	3.43	0.00	0.02	2.00	2.00	0.00	0.02	2.64	2.64	0.00
Chrysene	844	826	0.02	3.16	3.16	0.00	0.00	0.59	0.59	0.00	0.01	0.74	0.74	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.51	0.51	0.000	0.00	0.06	0.06	0.000	0.00	0.08	0.08	0.000
Fluoranthene	707	23,870	0.06	7.83	7.83	0.01	0.00	0.20	0.20	0.00	0.00	0.26	0.26	0.00
Fluorene	538	26,000	0.00	0.62	0.62	0.001	0.00	0.19	0.19	0.000	0.00	0.26	0.26	0.000
Naphthalene	385	61,700	0.01	0.71	0.71	0.00	0.00	0.55	0.55	0.00	0.01	0.70	0.70	0.00
Perylene	967	431	0.01	1.04	1.04	0.00	0.00	0.36	0.36	0.00	0.00	0.46	0.46	0.00
Phenanthrene	596	34,300	0.03	4.12	4.12	0.01	0.01	0.86	0.86	0.00	0.01	1.18	1.18	0.00
Pyrene	697	9,090	0.05	6.46	6.46	0.01	0.00	0.41	0.41	0.00	0.00	0.57	0.57	0.00
	--	ESBTU FCVi	--	--	--	0.14	--	--	--	0.06	--	--	--	0.08

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-18				HT18-18				HT18-18			
		Sample Name:	HT18-18-SURF				HT18-18-0020				HT18-18-2030			
		Sample Date:	10/24/2018				10/25/2018				10/25/2018			
		Depth Interval (ft):	0-0.5				0-1.9				1.9-2.8			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.11	0.0311	--	--	5.81	0.0581	--	--	1.43	0.0143	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.32	0.32	0.00	0.49	8.43	8.43	0.02	0.01	0.50	0.50	0.00
2-Methylnaphthalene	447	154,800	0.01	0.32	0.32	0.001	0.34	5.85	5.85	0.013	0.01	0.54	0.54	0.001
Acenaphthene	491	33,400	0.03	1.03	1.03	0.002	1.10	18.93	18.93	0.039	0.01	0.91	0.91	0.002
Acenaphthylene	452	24,000	0.04	0.00	0.00	0.00	0.14	2.41	2.41	0.01	0.00	0.27	0.27	0.00
Anthracene	594	1,300	0.07	2.35	2.35	0.004	1.80	30.98	30.98	0.052	0.02	1.19	1.19	0.002
Benzo[a]anthracene	841	4,153	0.32	10.29	10.29	0.01	6.90	118.76	118.76	0.14	0.01	0.77	0.77	0.00
Benzo[a]pyrene	965	3,840	0.27	8.68	8.68	0.01	4.80	82.62	82.62	0.09	0.01	0.59	0.59	0.00
Benzo[b]fluoranthene	979	2,169	0.35	11.25	11.25	0.011	6.40	110.15	110.15	0.113	0.01	0.50	0.50	0.001
Benzo[e]pyrene	967	4,300	0.25	8.04	8.04	0.01	4.30	74.01	74.01	0.08	0.01	0.49	0.49	0.00
Benzo[g,h,i]perylene	1,095	648	0.15	4.82	4.82	0.00	3.10	53.36	53.36	0.05	0.01	0.77	0.77	0.00
Benzo[k]fluoranthene	981	1,220	0.33	10.61	10.61	0.011	5.10	87.78	87.78	0.089	0.01	0.45	0.45	0.000
C1-Chrysenes	929	--	0.15	4.82	4.82	0.01	3.30	56.80	56.80	0.06	0.01	0.91	0.91	0.00
C1-Fluorenes	611	--	0.04	0.00	0.00	0.00	1.10	18.93	18.93	0.03	0.01	0.98	0.98	0.00
C1-Fluoranthenes/pyrene	770	--	0.30	9.65	9.65	0.01	10.00	172.12	172.12	0.22	0.03	1.96	1.96	0.00
C1-Naphthalenes	444	--	0.04	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.01	0.70	0.70	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.17	5.47	5.47	0.01	8.10	139.41	139.41	0.21	0.07	4.55	4.55	0.01
C2-Chrysenes	1,008	--	0.04	0.00	0.00	0.00	2.30	39.59	39.59	0.04	0.01	0.77	0.77	0.00
C2-Fluorenes	686	--	0.04	0.00	0.00	0.00	2.80	48.19	48.19	0.07	0.02	1.33	1.33	0.00
C2-Fluoranthenes/Pyrene	--	--	0.17	5.47	5.47	--	5.40	92.94	92.94	--	0.02	1.47	1.47	--
C2-Naphthalenes	510	--	0.04	0.00	0.00	0.00	4.60	79.17	79.17	0.16	0.06	4.20	4.20	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.12	3.86	3.86	0.01	11.00	189.33	189.33	0.25	0.06	4.34	4.34	0.01
C3-Chrysenes	1,112	--	0.04	0.00	0.00	0.00	1.10	18.93	18.93	0.02	0.01	0.50	0.50	0.00
C3-Fluorenes	769	--	0.04	0.00	0.00	0.00	4.10	70.57	70.57	0.09	0.02	1.61	1.61	0.00
C3-Fluoranthenes/Pyrene	949	--	0.08	2.60	2.60	0.00	3.70	63.68	63.68	0.07	0.02	1.26	1.26	0.00
C3-Naphthalenes	581	--	0.04	0.00	0.00	0.00	11.00	189.33	189.33	0.33	0.12	8.39	8.39	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.04	0.00	0.00	0.00	8.90	153.18	153.18	0.18	0.05	3.15	3.15	0.00
C4-Chrysenes	1,214	--	0.04	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.08	2.70	2.70	0.00	9.00	154.91	154.91	0.24	0.17	11.89	11.89	0.02
C4-Phenanthrenes/Anthracenes	913	--	0.04	0.00	0.00	0.00	6.00	103.27	103.27	0.11	0.03	2.17	2.17	0.00
Chrysene	844	826	0.40	12.86	12.86	0.02	8.10	139.41	139.41	0.17	0.02	1.05	1.05	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.08	2.54	2.54	0.002	1.30	22.38	22.38	0.020	0.00	0.13	0.13	0.000
Fluoranthene	707	23,870	0.95	30.55	30.55	0.04	18.00	309.81	309.81	0.44	0.03	2.24	2.24	0.00
Fluorene	538	26,000	0.04	1.32	1.32	0.002	1.10	18.93	18.93	0.035	0.01	0.84	0.84	0.002
Naphthalene	385	61,700	0.01	0.42	0.42	0.00	0.24	4.13	4.13	0.01	0.01	0.55	0.55	0.00
Perylene	967	431	0.09	2.73	2.73	0.00	1.40	24.10	24.10	0.02	0.00	0.31	0.31	0.00
Phenanthrene	596	34,300	0.50	16.08	16.08	0.03	11.00	189.33	189.33	0.32	0.06	4.06	4.06	0.01
Pyrene	697	9,090	0.56	18.01	18.01	0.03	14.00	240.96	240.96	0.35	0.03	2.17	2.17	0.00
	--	**ESBTU FCVi**	--	--	--	0.22	--	--	--	4.07	--	--	--	0.10

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-18				HT18-18				HT18-19			
		Sample Name:	HT18-18-3035				HT18-18-3555				HT18-19-SURF			
		Sample Date:	10/25/2018				10/25/2018				10/24/2018			
		Depth Interval (ft):	2.8-3.6				3.6-5.4				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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.873	0.00873	--	--	0.612	0.00612	--	--	0.806	0.00806	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.44	0.44	0.00	0.01	0.85	0.85	0.00	0.01	1.74	1.74	0.00
2-Methylnaphthalene	447	154,800	0.00	0.47	0.47	0.001	0.01	0.98	0.98	0.002	0.09	0.00	0.00	0.000
Acenaphthene	491	33,400	0.01	1.49	1.49	0.003	0.00	0.00	0.00	0.000	0.09	10.55	10.55	0.021
Acenaphthylene	452	24,000	0.00	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.13	16.13	16.13	0.04
Anthracene	594	1,300	0.02	2.18	2.18	0.004	0.00	0.00	0.00	0.000	0.19	23.57	23.57	0.040
Benzo[a]anthracene	841	4,153	0.05	5.27	5.27	0.01	0.00	0.13	0.13	0.00	1.20	148.88	148.88	0.18
Benzo[a]pyrene	965	3,840	0.04	4.12	4.12	0.00	0.00	0.18	0.18	0.00	1.00	124.07	124.07	0.13
Benzo[b]fluoranthene	979	2,169	0.04	4.24	4.24	0.004	0.00	0.39	0.39	0.000	1.20	148.88	148.88	0.152
Benzo[e]pyrene	967	4,300	0.03	3.09	3.09	0.00	0.00	0.51	0.51	0.00	0.97	120.35	120.35	0.12
Benzo[g,h,i]perylene	1,095	648	0.02	2.29	2.29	0.00	0.00	0.78	0.78	0.00	0.58	71.96	71.96	0.07
Benzo[k]fluoranthene	981	1,220	0.03	3.44	3.44	0.004	0.00	0.23	0.23	0.000	1.20	148.88	148.88	0.152
C1-Chrysenes	929	--	0.03	3.44	3.44	0.00	0.01	1.08	1.08	0.00	0.56	69.48	69.48	0.07
C1-Fluorenes	611	--	0.01	1.37	1.37	0.00	0.01	0.87	0.87	0.00	0.09	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.07	8.13	8.13	0.01	0.01	1.80	1.80	0.00	0.87	107.94	107.94	0.14
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.01	1.24	1.24	0.00	0.09	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.07	7.67	7.67	0.01	0.02	3.59	3.59	0.01	0.38	47.15	47.15	0.07
C2-Chrysenes	1,008	--	0.02	1.72	1.72	0.00	0.01	1.14	1.14	0.00	0.38	47.15	47.15	0.05
C2-Fluorenes	686	--	0.02	2.29	2.29	0.00	0.01	1.49	1.49	0.00	0.09	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.04	4.47	4.47	--	0.01	2.29	2.29	--	0.56	69.48	69.48	--
C2-Naphthalenes	510	--	0.03	3.89	3.89	0.01	0.03	4.90	4.90	0.01	0.09	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.07	8.48	8.48	0.01	0.03	4.90	4.90	0.01	0.26	32.26	32.26	0.04
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.00	0.80	0.80	0.00	0.25	31.02	31.02	0.03
C3-Fluorenes	769	--	0.03	2.98	2.98	0.00	0.01	2.12	2.12	0.00	0.09	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.02	2.75	2.75	0.00	0.01	2.12	2.12	0.00	0.36	44.67	44.67	0.05
C3-Naphthalenes	581	--	0.08	9.51	9.51	0.02	0.06	9.97	9.97	0.02	0.09	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.06	6.30	6.30	0.01	0.03	4.25	4.25	0.01	0.09	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.10	11.45	11.45	0.02	0.09	14.22	14.22	0.02	0.09	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.04	4.24	4.24	0.00	0.02	2.94	2.94	0.00	0.09	0.00	0.00	0.00
Chrysene	844	826	0.05	6.07	6.07	0.01	0.01	0.83	0.83	0.00	1.30	161.29	161.29	0.19
Dibenzo(a,h)anthracene	1,123	2,389	0.01	0.89	0.89	0.001	0.00	0.10	0.10	0.000	0.26	32.26	32.26	0.029
Fluoranthene	707	23,870	0.11	12.60	12.60	0.02	0.00	0.38	0.38	0.00	2.70	334.99	334.99	0.47
Fluorene	538	26,000	0.01	1.37	1.37	0.003	0.00	0.28	0.28	0.001	0.10	12.41	12.41	0.023
Naphthalene	385	61,700	0.00	0.53	0.53	0.00	0.00	0.80	0.80	0.00	0.09	0.00	0.00	0.00
Perylene	967	431	0.01	1.60	1.60	0.00	0.00	0.57	0.57	0.00	0.33	40.94	40.94	0.04
Phenanthrene	596	34,300	0.08	9.28	9.28	0.02	0.01	1.32	1.32	0.00	1.10	136.48	136.48	0.23
Pyrene	697	9,090	0.10	10.88	10.88	0.02	0.00	0.62	0.62	0.00	1.80	223.33	223.33	0.32
	--	**ESBTU FCVi**	--	--	--	0.20	--	--	--	0.09	--	--	--	2.72

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-19				HT18-19				HT18-19			
		Sample Name:	HT18-19-0010				HT18-19-1020				HT18-19-2030			
		Sample Date:	10/25/2018				10/25/2018				10/25/2018			
		Depth Interval (ft):	0-1				1-2.3				2.3-2.8			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	5.98	0.0598	--	--	0.768	0.00768	--	--	0.472	0.00472	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.26	4.35	4.35	0.01	0.41	0.00	0.00	0.00	0.00	0.34	0.34	0.00
2-Methylnaphthalene	447	154,800	0.41	6.86	6.86	0.015	0.41	0.00	0.00	0.000	0.00	0.40	0.40	0.001
Acenaphthene	491	33,400	2.10	35.12	35.12	0.072	0.82	106.77	106.77	0.217	0.01	2.06	2.06	0.004
Acenaphthylene	452	24,000	1.05	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	2.10	35.12	35.12	0.059	1.30	169.27	169.27	0.285	0.01	2.97	2.97	0.005
Benzo[a]anthracene	841	4,153	8.10	135.45	135.45	0.16	3.30	429.69	429.69	0.51	0.04	9.11	9.11	0.01
Benzo[a]pyrene	965	3,840	5.40	90.30	90.30	0.09	2.40	312.50	312.50	0.32	0.04	7.42	7.42	0.01
Benzo[b]fluoranthene	979	2,169	6.90	115.38	115.38	0.118	2.70	351.56	351.56	0.359	0.04	7.84	7.84	0.008
Benzo[e]pyrene	967	4,300	5.00	83.61	83.61	0.09	2.00	260.42	260.42	0.27	0.03	5.93	5.93	0.01
Benzo[g,h,i]perylene	1,095	648	3.80	63.55	63.55	0.06	1.60	208.33	208.33	0.19	0.03	5.72	5.72	0.01
Benzo[k]fluoranthene	981	1,220	6.10	102.01	102.01	0.104	2.60	338.54	338.54	0.345	0.04	7.42	7.42	0.008
C1-Chrysenes	929	--	5.10	85.28	85.28	0.09	1.30	169.27	169.27	0.18	0.02	4.66	4.66	0.01
C1-Fluorenes	611	--	1.05	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	12.00	200.67	200.67	0.26	3.80	494.79	494.79	0.64	0.06	12.50	12.50	0.02
C1-Naphthalenes	444	--	1.05	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	11.00	183.95	183.95	0.27	2.30	299.48	299.48	0.45	0.05	10.17	10.17	0.02
C2-Chrysenes	1,008	--	3.20	53.51	53.51	0.05	0.41	0.00	0.00	0.00	0.01	2.97	2.97	0.00
C2-Fluorenes	686	--	3.80	63.55	63.55	0.09	0.41	0.00	0.00	0.00	0.01	2.54	2.54	0.00
C2-Fluoranthenes/Pyrene	--	--	6.80	113.71	113.71	--	1.40	182.29	182.29	--	0.03	6.14	6.14	--
C2-Naphthalenes	510	--	5.70	95.32	95.32	0.19	0.41	0.00	0.00	0.00	0.02	4.03	4.03	0.01
C2-Phenanthrenes/Anthracenes	746	--	15.00	250.84	250.84	0.34	1.70	221.35	221.35	0.30	0.05	11.23	11.23	0.02
C3-Chrysenes	1,112	--	1.05	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	5.30	88.63	88.63	0.12	0.41	0.00	0.00	0.00	0.02	3.81	3.81	0.00
C3-Fluoranthenes/Pyrene	949	--	5.10	85.28	85.28	0.09	0.41	0.00	0.00	0.00	0.02	3.81	3.81	0.00
C3-Naphthalenes	581	--	16.00	267.56	267.56	0.46	0.93	121.09	121.09	0.21	0.04	9.32	9.32	0.02
C3-Phenanthrenes/Anthracenes	829	--	13.00	217.39	217.39	0.26	1.10	143.23	143.23	0.17	0.04	8.90	8.90	0.01
C4-Chrysenes	1,214	--	1.05	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	15.00	250.84	250.84	0.38	0.83	108.07	108.07	0.16	0.04	9.32	9.32	0.01
C4-Phenanthrenes/Anthracenes	913	--	7.70	128.76	128.76	0.14	0.41	0.00	0.00	0.00	0.03	6.99	6.99	0.01
Chrysene	844	826	9.30	155.52	155.52	0.18	3.50	455.73	455.73	0.54	0.05	10.38	10.38	0.01
Dibenzo(a,h)anthracene	1,123	2,389	1.50	25.08	25.08	0.022	0.58	75.52	75.52	0.067	0.01	1.86	1.86	0.002
Fluoranthene	707	23,870	22.00	367.89	367.89	0.52	8.90	1158.85	1158.85	1.64	0.11	23.31	23.31	0.03
Fluorene	538	26,000	1.50	25.08	25.08	0.047	0.47	61.20	61.20	0.114	0.01	1.38	1.38	0.003
Naphthalene	385	61,700	0.27	4.52	4.52	0.01	0.41	0.00	0.00	0.00	0.00	0.44	0.44	0.00
Perylene	967	431	1.60	26.76	26.76	0.03	0.73	95.05	95.05	0.10	0.02	4.45	4.45	0.00
Phenanthrene	596	34,300	13.00	217.39	217.39	0.36	6.50	846.35	846.35	1.42	0.07	15.04	15.04	0.03
Pyrene	697	9,090	18.00	301.00	301.00	0.43	7.50	976.56	976.56	1.40	0.09	18.86	18.86	0.03
	--	**ESBTU FCVi**	--	--	--	5.07	--	--	--	10.08	--	--	--	0.29

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-20				HT18-20				HT18-20			
		Sample Name:	HT18-20-SURF				HT18-20-0010				HT18-20-1020			
		Sample Date:	10/24/2018				10/25/2018				10/25/2018			
		Depth Interval (ft):	0-0.5				0-0.8				0.8-1.8			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.67	0.0167	--	--	0.531	0.00531	--	--	0.7	0.007	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.53	0.53	0.00	0.01	2.64	2.64	0.01	0.00	0.26	0.26	0.00
2-Methylnaphthalene	447	154,800	0.01	0.60	0.60	0.001	0.02	3.39	3.39	0.008	0.00	0.37	0.37	0.001
Acenaphthene	491	33,400	0.04	2.63	2.63	0.005	0.08	15.44	15.44	0.031	0.01	1.86	1.86	0.004
Acenaphthylene	452	24,000	0.01	0.48	0.48	0.00	0.01	2.64	2.64	0.01	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.09	5.15	5.15	0.009	0.10	18.83	18.83	0.032	0.01	0.76	0.76	0.001
Benzo[a]anthracene	841	4,153	0.33	19.76	19.76	0.02	0.40	75.33	75.33	0.09	0.01	1.23	1.23	0.00
Benzo[a]pyrene	965	3,840	0.27	16.17	16.17	0.02	0.26	48.96	48.96	0.05	0.01	0.96	0.96	0.00
Benzo[b]fluoranthene	979	2,169	0.34	20.36	20.36	0.021	0.40	75.33	75.33	0.077	0.01	0.91	0.91	0.001
Benzo[e]pyrene	967	4,300	0.22	13.17	13.17	0.01	0.28	52.73	52.73	0.05	0.00	0.63	0.63	0.00
Benzo[g,h,i]perylene	1,095	648	0.07	4.25	4.25	0.00	0.21	39.55	39.55	0.04	0.00	0.50	0.50	0.00
Benzo[k]fluoranthene	981	1,220	0.31	18.56	18.56	0.019	0.35	65.91	65.91	0.067	0.01	1.01	1.01	0.001
C1-Chrysenes	929	--	0.12	7.19	7.19	0.01	0.17	32.02	32.02	0.03	0.00	0.64	0.64	0.00
C1-Fluorenes	611	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.28	16.77	16.77	0.02	0.48	90.40	90.40	0.12	0.01	1.57	1.57	0.00
C1-Naphthalenes	444	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.17	10.18	10.18	0.02	0.25	47.08	47.08	0.07	0.01	1.36	1.36	0.00
C2-Chrysenes	1,008	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.15	8.98	8.98	--	0.23	43.31	43.31	--	0.01	0.87	0.87	--
C2-Naphthalenes	510	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.96	0.96	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.10	5.75	5.75	0.01	0.21	39.55	39.55	0.05	0.01	0.83	0.83	0.00
C3-Chrysenes	1,112	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.03	0.00	0.00	0.00	0.09	16.01	16.01	0.02	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.03	0.00	0.00	0.00	0.10	18.27	18.27	0.02	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.03	0.00	0.00	0.00	0.11	20.72	20.72	0.04	0.01	0.77	0.77	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.03	0.00	0.00	0.00	0.13	24.48	24.48	0.03	0.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.03	0.00	0.00	0.00	0.10	18.83	18.83	0.03	0.00	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	844	826	0.39	23.35	23.35	0.03	0.46	86.63	86.63	0.10	0.01	1.27	1.27	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.07	4.43	4.43	0.004	0.07	13.94	13.94	0.012	0.00	0.20	0.20	0.000
Fluoranthene	707	23,870	0.95	56.89	56.89	0.08	1.10	207.16	207.16	0.29	0.02	2.86	2.86	0.00
Fluorene	538	26,000	0.05	2.93	2.93	0.005	0.06	11.68	11.68	0.022	0.01	0.81	0.81	0.002
Naphthalene	385	61,700	0.02	1.08	1.08	0.00	0.03	4.71	4.71	0.01	0.01	0.76	0.76	0.00
Perylene	967	431	0.07	4.07	4.07	0.00	0.09	17.70	17.70	0.02	0.01	2.00	2.00	0.00
Phenanthrene	596	34,300	0.54	32.34	32.34	0.05	0.60	112.99	112.99	0.19	0.03	3.86	3.86	0.01
Pyrene	697	9,090	0.63	37.72	37.72	0.05	0.84	158.19	158.19	0.23	0.02	2.14	2.14	0.00
	--	**ESBTU FCVi**	--	--	--	0.41	--	--	--	1.75	--	--	--	0.04

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-20				HT18-20				HT18-21			
		Sample Name:	HT18-20-2030				HT18-20-2030-FD				HT18-21-SURF			
		Sample Date:	10/25/2018				10/25/2018				10/24/2018			
		Depth Interval (ft):	1.8-2.8				1.8-2.8				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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.987	0.00987	--	--	0.629	0.00629	--	--	2.26	0.0226	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.15	0.15	0.00	0.00	0.37	0.37	0.00	0.01	0.44	0.44	0.00
2-Methylnaphthalene	447	154,800	0.00	0.19	0.19	0.000	0.00	0.41	0.41	0.001	0.02	0.71	0.71	0.002
Acenaphthene	491	33,400	0.02	1.72	1.72	0.004	0.02	3.50	3.50	0.007	0.03	1.46	1.46	0.003
Acenaphthylene	452	24,000	0.00	0.14	0.14	0.00	0.00	0.38	0.38	0.00	0.02	0.00	0.00	0.00
Anthracene	594	1,300	0.02	1.82	1.82	0.003	0.03	5.41	5.41	0.009	0.11	4.87	4.87	0.008
Benzo[a]anthracene	841	4,153	0.04	3.85	3.85	0.00	0.07	10.65	10.65	0.01	0.20	8.85	8.85	0.01
Benzo[a]pyrene	965	3,840	0.03	3.04	3.04	0.00	0.05	7.95	7.95	0.01	0.14	6.19	6.19	0.01
Benzo[b]fluoranthene	979	2,169	0.03	2.84	2.84	0.003	0.05	7.15	7.15	0.007	0.16	7.08	7.08	0.007
Benzo[e]pyrene	967	4,300	0.02	2.23	2.23	0.00	0.04	5.56	5.56	0.01	0.16	7.08	7.08	0.01
Benzo[g,h,i]perylene	1,095	648	0.02	1.82	1.82	0.00	0.03	4.61	4.61	0.00	0.04	1.55	1.55	0.00
Benzo[k]fluoranthene	981	1,220	0.03	3.04	3.04	0.003	0.05	8.27	8.27	0.008	0.12	5.31	5.31	0.005
C1-Chrysenes	929	--	0.02	1.82	1.82	0.00	0.03	4.93	4.93	0.01	0.16	7.08	7.08	0.01
C1-Fluorenes	611	--	0.01	0.87	0.87	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.06	5.67	5.67	0.01	0.09	14.94	14.94	0.02	0.36	15.93	15.93	0.02
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.05	4.66	4.66	0.01	0.07	11.13	11.13	0.02	0.19	8.41	8.41	0.01
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.22	9.73	9.73	0.01
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.02	2.23	2.23	--	0.04	5.88	5.88	--	0.44	19.47	19.47	--
C2-Naphthalenes	510	--	0.01	1.32	1.32	0.00	0.02	2.86	2.86	0.01	0.07	3.23	3.23	0.01
C2-Phenanthrenes/Anthracenes	746	--	0.03	3.14	3.14	0.00	0.05	7.15	7.15	0.01	0.13	5.75	5.75	0.01
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.20	8.85	8.85	0.01
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.01	0.98	0.98	0.00	0.01	0.00	0.00	0.00	0.29	12.83	12.83	0.01
C3-Naphthalenes	581	--	0.02	2.13	2.13	0.00	0.03	4.45	4.45	0.01	0.08	3.45	3.45	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.02	1.62	1.62	0.00	0.02	3.82	3.82	0.00	0.14	6.19	6.19	0.01
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.09	3.94	3.94	0.00
C4-Naphthalenes	657	--	0.02	2.23	2.23	0.00	0.03	4.13	4.13	0.01	0.05	2.26	2.26	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.01	1.11	1.11	0.00	0.02	3.18	3.18	0.00	0.13	5.75	5.75	0.01
Chrysene	844	826	0.04	4.05	4.05	0.00	0.07	10.81	10.81	0.01	0.22	9.73	9.73	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.01	0.63	0.63	0.001	0.01	1.75	1.75	0.002	0.04	1.68	1.68	0.001
Fluoranthene	707	23,870	0.10	10.13	10.13	0.01	0.17	27.03	27.03	0.04	0.58	25.66	25.66	0.04
Fluorene	538	26,000	0.00	0.44	0.44	0.001	0.01	1.35	1.35	0.003	0.05	2.12	2.12	0.004
Naphthalene	385	61,700	0.00	0.27	0.27	0.00	0.00	0.59	0.59	0.00	0.01	0.35	0.35	0.00
Perylene	967	431	0.04	3.55	3.55	0.00	0.04	5.56	5.56	0.01	0.03	1.46	1.46	0.00
Phenanthrene	596	34,300	0.09	8.92	8.92	0.01	0.13	20.67	20.67	0.03	0.51	22.57	22.57	0.04
Pyrene	697	9,090	0.09	8.61	8.61	0.01	0.14	22.26	22.26	0.03	0.40	17.70	17.70	0.03
	--	**ESBTU FCVi**	--	--	--	0.11	--	--	--	0.28	--	--	--	0.27

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-21				HT18-23				HT18-23			
		Sample Name:	HT18-21-0015				HT18-23-SURF				HT18-23-0010			
		Sample Date:	10/25/2018				10/23/2018				10/24/2018			
		Depth Interval (ft):	0-1.7				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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.08	0.0108	--	--	3.3	0.033	--	--	0.943	0.00943	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.01	0.75	0.75	0.00	0.01	0.20	0.20	0.00	0.00	0.19	0.19	0.00
2-Methylnaphthalene	447	154,800	0.01	1.30	1.30	0.003	0.01	0.19	0.19	0.000	0.00	0.21	0.21	0.000
Acenaphthene	491	33,400	0.02	1.39	1.39	0.003	0.01	0.30	0.30	0.001	0.00	0.38	0.38	0.001
Acenaphthylene	452	24,000	0.00	0.36	0.36	0.00	0.03	0.00	0.00	0.00	0.00	0.16	0.16	0.00
Anthracene	594	1,300	0.02	1.67	1.67	0.003	0.02	0.67	0.67	0.001	0.01	0.74	0.74	0.001
Benzo[a]anthracene	841	4,153	0.07	6.76	6.76	0.01	0.15	4.55	4.55	0.01	0.05	4.88	4.88	0.01
Benzo[a]pyrene	965	3,840	0.06	5.93	5.93	0.01	0.17	5.15	5.15	0.01	0.04	4.14	4.14	0.00
Benzo[b]fluoranthene	979	2,169	0.08	7.41	7.41	0.008	0.24	7.27	7.27	0.007	0.07	7.10	7.10	0.007
Benzo[e]pyrene	967	4,300	0.15	13.89	13.89	0.01	0.18	5.45	5.45	0.01	0.04	4.56	4.56	0.00
Benzo[g,h,i]perylene	1,095	648	0.09	7.96	7.96	0.01	0.14	4.24	4.24	0.00	0.04	3.92	3.92	0.00
Benzo[k]fluoranthene	981	1,220	0.07	6.30	6.30	0.006	0.22	6.67	6.67	0.007	0.05	5.41	5.41	0.006
C1-Chrysenes	929	--	0.18	16.67	16.67	0.02	0.07	2.09	2.09	0.00	0.02	2.12	2.12	0.00
C1-Fluorenes	611	--	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.31	28.70	28.70	0.04	0.16	4.85	4.85	0.01	0.06	6.36	6.36	0.01
C1-Naphthalenes	444	--	0.02	1.39	1.39	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.11	10.19	10.19	0.02	0.08	2.36	2.36	0.00	0.03	3.50	3.50	0.01
C2-Chrysenes	1,008	--	0.33	30.56	30.56	0.03	0.03	0.00	0.00	0.00	0.01	1.38	1.38	0.00
C2-Fluorenes	686	--	0.04	3.61	3.61	0.01	0.03	0.00	0.00	0.00	0.01	1.27	1.27	0.00
C2-Fluoranthenes/Pyrene	--	--	0.55	50.93	50.93	--	0.09	2.76	2.76	--	0.04	3.82	3.82	--
C2-Naphthalenes	510	--	0.06	5.83	5.83	0.01	0.03	0.00	0.00	0.00	0.01	1.27	1.27	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.22	20.37	20.37	0.03	0.06	1.88	1.88	0.00	0.06	6.15	6.15	0.01
C3-Chrysenes	1,112	--	0.26	24.07	24.07	0.02	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C3-Fluorenes	769	--	0.08	7.13	7.13	0.01	0.03	0.00	0.00	0.00	0.02	2.33	2.33	0.00
C3-Fluoranthenes/Pyrene	949	--	0.48	44.44	44.44	0.05	0.03	0.00	0.00	0.00	0.02	2.01	2.01	0.00
C3-Naphthalenes	581	--	0.08	7.22	7.22	0.01	0.03	0.00	0.00	0.00	0.03	2.86	2.86	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.35	32.41	32.41	0.04	0.03	0.00	0.00	0.00	0.04	4.24	4.24	0.01
C4-Chrysenes	1,214	--	0.13	12.04	12.04	0.01	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.09	8.24	8.24	0.01	0.06	1.88	1.88	0.00	0.04	4.24	4.24	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.34	31.48	31.48	0.03	0.03	0.00	0.00	0.00	0.03	2.76	2.76	0.00
Chrysene	844	826	0.13	12.04	12.04	0.01	0.26	7.88	7.88	0.01	0.06	6.79	6.79	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.03	2.31	2.31	0.002	0.05	1.55	1.55	0.001	0.01	1.27	1.27	0.001
Fluoranthene	707	23,870	0.15	13.89	13.89	0.02	0.57	17.27	17.27	0.02	0.13	13.79	13.79	0.02
Fluorene	538	26,000	0.02	1.57	1.57	0.003	0.02	0.52	0.52	0.001	0.00	0.40	0.40	0.001
Naphthalene	385	61,700	0.01	0.91	0.91	0.00	0.03	0.00	0.00	0.00	0.00	0.20	0.20	0.00
Perylene	967	431	0.02	1.94	1.94	0.00	0.05	1.61	1.61	0.00	0.02	2.01	2.01	0.00
Phenanthrene	596	34,300	0.12	11.11	11.11	0.02	0.21	6.36	6.36	0.01	0.06	6.04	6.04	0.01
Pyrene	697	9,090	0.15	13.89	13.89	0.02	0.34	10.30	10.30	0.01	0.11	11.66	11.66	0.02
	--	**ESBTU FCVi**	--	--	--	0.43	--	--	--	0.12	--	--	--	0.15

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-23				HT18-23				HT18-23			
		Sample Name:	HT18-23-1030				HT18-23-3050				HT18-23-5070			
		Sample Date:	10/24/2018				10/24/2018				10/24/2018			
		Depth Interval (ft):	1-3				3-5				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.416	0.00416	--	--	0.635	0.00635	--	--	1.1	0.011	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.06	0.06	0.00
2-Methylnaphthalene	447	154,800	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.05	0.05	0.000
Acenaphthene	491	33,400	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.04	0.04	0.000
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	965	3,840	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b]fluoranthene	979	2,169	0.00	0.19	0.19	0.000	0.00	0.16	0.16	0.000	0.00	0.15	0.15	0.000
Benzo[e]pyrene	967	4,300	0.00	0.12	0.12	0.00	0.00	0.12	0.12	0.00	0.00	0.11	0.11	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.15	0.15	0.00	0.00	0.13	0.13	0.00	0.00	0.12	0.12	0.00
Benzo[k]fluoranthene	981	1,220	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.44	0.00
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.00	0.00	0.00	--	0.00	0.00	0.00	--	0.00	0.00	0.00	--
C2-Naphthalenes	510	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.69	0.69	0.00
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.69	0.69	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.58	0.58	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.00	0.99	0.99	0.00	0.01	1.13	1.13	0.00	0.01	1.18	1.18	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	844	826	0.00	0.20	0.20	0.00	0.00	0.22	0.22	0.00	0.00	0.21	0.21	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	0.00	0.14	0.14	0.00	0.00	0.16	0.16	0.00	0.00	0.11	0.11	0.00
Fluorene	538	26,000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.06	0.06	0.000
Naphthalene	385	61,700	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.07	0.07	0.00
Perylene	967	431	0.00	0.53	0.53	0.00	0.00	0.57	0.57	0.00	0.00	0.43	0.43	0.00
Phenanthrene	596	34,300	0.00	0.12	0.12	0.00	0.00	0.24	0.24	0.00	0.00	0.20	0.20	0.00
Pyrene	697	9,090	0.00	0.16	0.16	0.00	0.00	0.19	0.19	0.00	0.00	0.16	0.16	0.00
	--	**ESBTU FCVi**	--	--	--	0.00	--	--	--	0.00	--	--	--	0.01

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-23				HT18-24				HT18-24			
		Sample Name:	HT18-23-7010				HT18-24-SURF				HT18-24-0010			
		Sample Date:	10/24/2018				10/23/2018				10/24/2018			
		Depth Interval (ft):	7-9.2				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.76	0.0076	--	--	2.67	0.0267	--	--	0.737	0.00737	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.25	0.25	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.00	0.14	0.14	0.000	0.07	0.00	0.00	0.000	0.03	0.00	0.00	0.000
Acenaphthene	491	33,400	0.00	0.06	0.06	0.000	0.06	2.10	2.10	0.004	0.04	5.83	5.83	0.012
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.00	0.00	0.000	0.15	5.62	5.62	0.009	0.08	10.45	10.45	0.018
Benzo[a]anthracene	841	4,153	0.00	0.11	0.11	0.00	0.60	22.47	22.47	0.03	0.34	46.13	46.13	0.05
Benzo[a]pyrene	965	3,840	0.00	0.12	0.12	0.00	0.45	16.85	16.85	0.02	0.16	21.71	21.71	0.02
Benzo[b]fluoranthene	979	2,169	0.00	0.46	0.46	0.000	0.57	21.35	21.35	0.022	0.35	47.49	47.49	0.049
Benzo[e]pyrene	967	4,300	0.00	0.39	0.39	0.00	0.39	14.61	14.61	0.02	0.23	31.21	31.21	0.03
Benzo[g,h,i]perylene	1,095	648	0.00	0.00	0.00	0.00	0.27	10.11	10.11	0.01	0.18	24.42	24.42	0.02
Benzo[k]fluoranthene	981	1,220	0.00	0.13	0.13	0.000	0.55	20.60	20.60	0.021	0.28	37.99	37.99	0.039
C1-Chrysenes	929	--	0.01	0.76	0.76	0.00	0.18	6.74	6.74	0.01	0.11	14.93	14.93	0.02
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.01	1.24	1.24	0.00	0.47	17.60	17.60	0.02	0.35	47.49	47.49	0.06
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.01	1.58	1.58	0.00	0.23	8.61	8.61	0.01	0.20	27.14	27.14	0.04
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Fluorenes	686	--	0.01	0.70	0.70	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.01	1.28	1.28	--	0.19	7.12	7.12	--	0.11	14.93	14.93	--
C2-Naphthalenes	510	--	0.01	1.11	1.11	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.02	2.76	2.76	0.00	0.07	0.00	0.00	0.00	0.11	14.93	14.93	0.02
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Fluorenes	769	--	0.01	0.87	0.87	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.01	1.00	1.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.02	2.76	2.76	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.02	2.11	2.11	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.04	4.87	4.87	0.01	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.01	1.45	1.45	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Chrysene	844	826	0.01	0.71	0.71	0.00	0.74	27.72	27.72	0.03	0.42	56.99	56.99	0.07
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.00	0.00	0.000	0.12	4.49	4.49	0.004	0.07	9.91	9.91	0.009
Fluoranthene	707	23,870	0.00	0.42	0.42	0.00	2.20	82.40	82.40	0.12	1.10	149.25	149.25	0.21
Fluorene	538	26,000	0.00	0.24	0.24	0.000	0.09	3.18	3.18	0.006	0.03	4.61	4.61	0.009
Naphthalene	385	61,700	0.00	0.10	0.10	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Perylene	967	431	0.01	1.30	1.30	0.00	0.13	4.87	4.87	0.01	0.06	8.68	8.68	0.01
Phenanthrene	596	34,300	0.00	0.47	0.47	0.00	1.20	44.94	44.94	0.08	0.58	78.70	78.70	0.13
Pyrene	697	9,090	0.00	0.57	0.57	0.00	1.20	44.94	44.94	0.06	0.66	89.55	89.55	0.13
	--	**ESBTU FCVi**	--	--	--	0.04	--	--	--	0.48	--	--	--	0.98

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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-24				HT18-24				HT18-24			
		Sample Name:	HT18-24-1025				HT18-24-2550				HT18-24-5065			
		Sample Date:	10/24/2018				10/24/2018				10/24/2018			
		Depth Interval (ft):	1-2.7				2.7-5				5-6.6			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.695	0.00695	--	--	0.84	0.0084	--	--	0.755	0.00755	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.07	0.07	0.00	0.00	0.07	0.07	0.00	0.00	0.06	0.06	0.00
2-Methylnaphthalene	447	154,800	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Acenaphthene	491	33,400	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.00	0.08	0.08	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	965	3,840	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00
Benzo[b]fluoranthene	979	2,169	0.00	0.19	0.19	0.000	0.00	0.19	0.19	0.000	0.00	0.10	0.10	0.000
Benzo[e]pyrene	967	4,300	0.00	0.12	0.12	0.00	0.00	0.17	0.17	0.00	0.00	0.07	0.07	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.20	0.20	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.00	0.12	0.12	0.000	0.00	0.11	0.11	0.000	0.00	0.00	0.00	0.000
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.00	0.00	0.00	0.00	0.00	0.54	0.54	0.00	0.00	0.00	0.00	0.00
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.00	0.00	0.00	--	0.00	0.00	0.00	--	0.00	0.00	0.00	--
C2-Naphthalenes	510	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.01	1.04	1.04	0.00	0.01	0.83	0.83	0.00	0.01	0.72	0.72	0.00
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.01	1.11	1.11	0.00	0.01	1.05	1.05	0.00	0.01	0.83	0.83	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.00	0.71	0.71	0.00	0.01	0.61	0.61	0.00	0.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.02	2.45	2.45	0.00	0.02	1.90	1.90	0.00	0.01	1.72	1.72	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	844	826	0.00	0.27	0.27	0.00	0.00	0.30	0.30	0.00	0.00	0.19	0.19	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluorene	538	26,000	0.00	0.10	0.10	0.000	0.00	0.10	0.10	0.000	0.00	0.06	0.06	0.000
Naphthalene	385	61,700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Perylene	967	431	0.00	0.24	0.24	0.00	0.00	0.38	0.38	0.00	0.00	0.17	0.17	0.00
Phenanthrene	596	34,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pyrene	697	9,090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	--	**ESBTU FCVi**	--	--	--	0.01	--	--	--	0.01	--	--	--	0.01

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

Location ID:			HT18-24				HT18-24				HT18-25			
Sample Name:			HT18-24-5065-FD				HT18-24-6575				HT18-25-SURF			
Sample Date:			10/24/2018				10/24/2018				10/23/2018			
Depth Interval (ft):			5-6.6				6.6-7.8				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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.672	0.00672	--	--	0.692	0.00692	--	--	3.56	0.0356	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.09	0.09	0.00	0.00	0.62	0.62	0.00	0.01	0.15	0.15	0.00
2-Methylnaphthalene	447	154,800	0.00	0.00	0.00	0.000	0.00	0.65	0.65	0.001	0.01	0.17	0.17	0.000
Acenaphthene	491	33,400	0.00	0.00	0.00	0.000	0.00	0.05	0.05	0.000	0.03	0.70	0.70	0.001
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.00	0.00	0.000	0.00	0.08	0.08	0.000	0.06	1.60	1.60	0.003
Benzo[a]anthracene	841	4,153	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.26	7.30	7.30	0.01
Benzo[a]pyrene	965	3,840	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.00	0.24	6.74	6.74	0.01
Benzo[b]fluoranthene	979	2,169	0.00	0.18	0.18	0.000	0.00	0.39	0.39	0.000	0.32	8.99	8.99	0.009
Benzo[e]pyrene	967	4,300	0.00	0.09	0.09	0.00	0.00	0.52	0.52	0.00	0.21	5.90	5.90	0.01
Benzo[g,h,i]perylene	1,095	648	0.00	0.00	0.00	0.00	0.00	0.64	0.64	0.00	0.15	4.21	4.21	0.00
Benzo[k]fluoranthene	981	1,220	0.00	0.11	0.11	0.000	0.00	0.11	0.11	0.000	0.25	7.02	7.02	0.007
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.01	1.08	1.08	0.00	0.10	2.81	2.81	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.01	0.81	0.81	0.00	0.03	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.00	0.00	0.00	0.00	0.01	1.73	1.73	0.00	0.23	6.46	6.46	0.01
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.01	0.87	0.87	0.00	0.03	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.00	0.00	0.00	0.00	0.02	3.18	3.18	0.00	0.11	3.09	3.09	0.00
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.01	1.10	1.10	0.00	0.03	0.00	0.00	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.01	1.59	1.59	0.00	0.03	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.00	0.00	0.00	--	0.02	2.31	2.31	--	0.11	3.09	3.09	--
C2-Naphthalenes	510	--	0.00	0.00	0.00	0.00	0.03	3.76	3.76	0.01	0.03	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.01	1.09	1.09	0.00	0.03	4.48	4.48	0.01	0.06	1.63	1.63	0.00
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.01	0.88	0.88	0.00	0.03	0.00	0.00	0.00
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.01	2.02	2.02	0.00	0.03	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.00	0.00	0.00	0.00	0.01	1.59	1.59	0.00	0.03	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.01	1.28	1.28	0.00	0.06	8.53	8.53	0.01	0.03	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.01	0.82	0.82	0.00	0.03	4.05	4.05	0.00	0.03	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.02	2.68	2.68	0.00	0.10	13.73	13.73	0.02	0.03	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.00	0.65	0.65	0.00	0.02	2.89	2.89	0.00	0.03	0.00	0.00	0.00
Chrysene	844	826	0.00	0.28	0.28	0.00	0.01	0.82	0.82	0.00	0.35	9.83	9.83	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.00	0.00	0.000	0.00	0.10	0.10	0.000	0.07	1.85	1.85	0.002
Fluoranthene	707	23,870	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.00	0.77	21.63	21.63	0.03
Fluorene	538	26,000	0.00	0.09	0.09	0.000	0.00	0.23	0.23	0.000	0.03	0.87	0.87	0.002
Naphthalene	385	61,700	0.00	0.00	0.00	0.00	0.00	0.32	0.32	0.00	0.01	0.25	0.25	0.00
Perylene	967	431	0.00	0.19	0.19	0.00	0.00	0.55	0.55	0.00	0.07	1.85	1.85	0.00
Phenanthrene	596	34,300	0.00	0.00	0.00	0.00	0.01	1.05	1.05	0.00	0.35	9.83	9.83	0.02
Pyrene	697	9,090	0.00	0.00	0.00	0.00	0.00	0.62	0.62	0.00	0.46	12.92	12.92	0.02
	--	**ESBTU FCVi**	--	--	--	0.01	--	--	--	0.08	--	--	--	0.15

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-25				HT18-25				HT18-25			
		Sample Name:	HT18-25-0010				HT18-25-1030				HT18-25-3040			
		Sample Date:	10/24/2018				10/24/2018				10/24/2018			
		Depth Interval (ft):	0-1				1-3				3-4.2			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.47	0.0347	--	--	6.72	0.0672	--	--	4.95	0.0495	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.06	1.59	1.59	0.00	0.23	3.42	3.42	0.01	1.30	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.08	2.16	2.16	0.005	0.14	2.08	2.08	0.005	1.30	0.00	0.00	0.000
Acenaphthene	491	33,400	0.13	3.75	3.75	0.008	0.46	6.85	6.85	0.014	1.20	24.24	24.24	0.049
Acenaphthylene	452	24,000	0.19	0.00	0.00	0.00	0.09	1.40	1.40	0.00	1.30	0.00	0.00	0.00
Anthracene	594	1,300	0.27	7.78	7.78	0.013	0.79	11.76	11.76	0.020	3.00	60.61	60.61	0.102
Benzo[a]anthracene	841	4,153	1.60	46.11	46.11	0.05	2.80	41.67	41.67	0.05	8.80	177.78	177.78	0.21
Benzo[a]pyrene	965	3,840	1.00	28.82	28.82	0.03	2.10	31.25	31.25	0.03	6.90	139.39	139.39	0.14
Benzo[b]fluoranthene	979	2,169	1.60	46.11	46.11	0.047	2.50	37.20	37.20	0.038	7.20	145.45	145.45	0.149
Benzo[e]pyrene	967	4,300	0.79	22.77	22.77	0.02	1.80	26.79	26.79	0.03	5.30	107.07	107.07	0.11
Benzo[g,h,i]perylene	1,095	648	0.09	2.62	2.62	0.00	1.10	16.37	16.37	0.01	4.20	84.85	84.85	0.08
Benzo[k]fluoranthene	981	1,220	1.30	37.46	37.46	0.038	2.10	31.25	31.25	0.032	6.80	137.37	137.37	0.140
C1-Chrysenes	929	--	1.20	34.58	34.58	0.04	2.70	40.18	40.18	0.04	3.90	78.79	78.79	0.08
C1-Fluorenes	611	--	0.19	0.00	0.00	0.00	0.62	9.23	9.23	0.02	1.30	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	2.10	60.52	60.52	0.08	4.10	61.01	61.01	0.08	8.80	177.78	177.78	0.23
C1-Naphthalenes	444	--	0.19	0.00	0.00	0.00	0.31	0.00	0.00	0.00	1.30	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.80	51.87	51.87	0.08	4.60	68.45	68.45	0.10	5.60	113.13	113.13	0.17
C2-Chrysenes	1,008	--	0.60	17.29	17.29	0.02	1.70	25.30	25.30	0.03	1.30	0.00	0.00	0.00
C2-Fluorenes	686	--	0.59	17.00	17.00	0.02	2.00	29.76	29.76	0.04	1.30	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	1.50	43.23	43.23	--	3.00	44.64	44.64	--	3.50	70.71	70.71	--
C2-Naphthalenes	510	--	0.71	20.46	20.46	0.04	2.70	40.18	40.18	0.08	1.30	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	3.10	89.34	89.34	0.12	7.40	110.12	110.12	0.15	4.60	92.93	92.93	0.12
C3-Chrysenes	1,112	--	0.19	0.00	0.00	0.00	1.10	16.37	16.37	0.01	1.30	0.00	0.00	0.00
C3-Fluorenes	769	--	1.20	34.58	34.58	0.04	3.40	50.60	50.60	0.07	1.30	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	1.00	28.82	28.82	0.03	2.00	29.76	29.76	0.03	1.30	0.00	0.00	0.00
C3-Naphthalenes	581	--	1.80	51.87	51.87	0.09	8.30	123.51	123.51	0.21	1.30	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	3.30	95.10	95.10	0.11	7.00	104.17	104.17	0.13	3.80	76.77	76.77	0.09
C4-Chrysenes	1,214	--	0.19	0.00	0.00	0.00	0.31	0.00	0.00	0.00	1.30	0.00	0.00	0.00
C4-Naphthalenes	657	--	2.20	63.40	63.40	0.10	8.60	127.98	127.98	0.19	1.30	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	2.40	69.16	69.16	0.08	4.40	65.48	65.48	0.07	3.00	60.61	60.61	0.07
Chrysene	844	826	2.10	60.52	60.52	0.07	3.40	50.60	50.60	0.06	10.00	202.02	202.02	0.24
Dibenzo(a,h)anthracene	1,123	2,389	0.33	9.51	9.51	0.008	0.54	8.04	8.04	0.007	1.50	30.30	30.30	0.027
Fluoranthene	707	23,870	4.40	126.80	126.80	0.18	7.90	117.56	117.56	0.17	26.00	525.25	525.25	0.74
Fluorene	538	26,000	0.18	5.19	5.19	0.010	0.59	8.78	8.78	0.016	1.70	34.34	34.34	0.064
Naphthalene	385	61,700	0.05	1.50	1.50	0.00	0.08	1.19	1.19	0.00	1.30	0.00	0.00	0.00
Perylene	967	431	0.16	4.61	4.61	0.00	0.53	7.89	7.89	0.01	2.00	40.40	40.40	0.04
Phenanthrene	596	34,300	1.90	54.76	54.76	0.09	4.50	66.96	66.96	0.11	16.00	323.23	323.23	0.54
Pyrene	697	9,090	2.80	80.69	80.69	0.12	5.00	74.40	74.40	0.11	16.00	323.23	323.23	0.46
	--	**ESBTU FCVi**	--	--	--	1.54	--	--	--	1.95	--	--	--	3.95

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-25				HT18-25				HT18-26			
		Sample Name:	HT18-25-4070				HT18-25-7010				HT18-26-SURF			
		Sample Date:	10/24/2018				10/24/2018				10/23/2018			
		Depth Interval (ft):	4.2-7				7-9.5				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.14	0.0114	--	--	0.736	0.00736	--	--	1.37	0.0137	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.06	0.06	0.00	0.00	0.13	0.13	0.00	0.01	0.51	0.51	0.00
2-Methylnaphthalene	447	154,800	0.00	0.04	0.04	0.000	0.00	0.08	0.08	0.000	0.01	0.60	0.60	0.001
Acenaphthene	491	33,400	0.02	1.49	1.49	0.003	0.00	0.05	0.05	0.000	0.02	1.68	1.68	0.003
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.36	0.36	0.001	0.00	0.00	0.00	0.000	0.05	3.28	3.28	0.006
Benzo[a]anthracene	841	4,153	0.00	0.18	0.18	0.00	0.00	0.12	0.12	0.00	0.30	21.90	21.90	0.03
Benzo[a]pyrene	965	3,840	0.00	0.11	0.11	0.00	0.00	0.12	0.12	0.00	0.24	17.52	17.52	0.02
Benzo[b]fluoranthene	979	2,169	0.00	0.25	0.25	0.000	0.00	0.30	0.30	0.000	0.41	29.93	29.93	0.031
Benzo[e]pyrene	967	4,300	0.00	0.21	0.21	0.00	0.00	0.24	0.24	0.00	0.25	18.25	18.25	0.02
Benzo[g,h,i]perylene	1,095	648	0.02	1.32	1.32	0.00	0.00	0.00	0.00	0.00	0.07	5.33	5.33	0.00
Benzo[k]fluoranthene	981	1,220	0.00	0.17	0.17	0.000	0.00	0.12	0.12	0.000	0.32	23.36	23.36	0.024
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	10.22	10.22	0.01
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.00	0.40	0.40	0.00	0.01	0.82	0.82	0.00	0.27	19.71	19.71	0.03
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.01	0.69	0.69	0.00	0.01	1.05	1.05	0.00	0.14	10.22	10.22	0.02
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.00	0.00	0.00	--	0.01	0.77	0.77	--	0.15	10.95	10.95	--
C2-Naphthalenes	510	--	0.01	0.54	0.54	0.00	0.00	0.64	0.64	0.00	0.03	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.01	0.83	0.83	0.00	0.02	2.31	2.31	0.00	0.14	10.22	10.22	0.01
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	6.20	6.20	0.01
C3-Fluoranthenes/Pyrene	949	--	0.00	0.00	0.00	0.00	0.00	0.61	0.61	0.00	0.07	4.82	4.82	0.01
C3-Naphthalenes	581	--	0.01	0.96	0.96	0.00	0.01	1.63	1.63	0.00	0.08	5.62	5.62	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.01	0.55	0.55	0.00	0.01	1.35	1.35	0.00	0.12	8.76	8.76	0.01
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.02	1.67	1.67	0.00	0.02	2.99	2.99	0.00	0.09	6.50	6.50	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.00	0.41	0.41	0.00	0.01	0.96	0.96	0.00	0.08	6.13	6.13	0.01
Chrysene	844	826	0.00	0.34	0.34	0.00	0.00	0.49	0.49	0.00	0.43	31.39	31.39	0.04
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.06	0.06	0.000	0.00	0.00	0.00	0.000	0.08	6.13	6.13	0.005
Fluoranthene	707	23,870	0.01	0.96	0.96	0.00	0.00	0.43	0.43	0.00	0.84	61.31	61.31	0.09
Fluorene	538	26,000	0.00	0.32	0.32	0.001	0.00	0.18	0.18	0.000	0.03	2.04	2.04	0.004
Naphthalene	385	61,700	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.01	0.88	0.88	0.00
Perylene	967	431	0.00	0.37	0.37	0.00	0.01	1.18	1.18	0.00	0.06	4.53	4.53	0.00
Phenanthrene	596	34,300	0.04	3.77	3.77	0.01	0.00	0.49	0.49	0.00	0.32	23.36	23.36	0.04
Pyrene	697	9,090	0.01	0.61	0.61	0.00	0.00	0.49	0.49	0.00	0.51	37.23	37.23	0.05
	--	**ESBTU FCVi**	--	--	--	0.02	--	--	--	0.02	--	--	--	0.49

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-26				HT18-26				HT18-26			
		Sample Name:	HT18-26-0010				HT18-26-1030				HT18-26-3050			
		Sample Date:	10/24/2018				10/24/2018				10/24/2018			
		Depth Interval (ft):	0-1				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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.729	0.00729	--	--	1.26	0.0126	--	--	0.929	0.00929	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.10	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.13	0.13	0.00
2-Methylnaphthalene	447	154,800	0.10	0.00	0.00	0.000	0.00	0.06	0.06	0.000	0.00	0.10	0.10	0.000
Acenaphthene	491	33,400	0.09	11.66	11.66	0.024	0.00	0.10	0.10	0.000	0.00	0.06	0.06	0.000
Acenaphthylene	452	24,000	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.32	43.90	43.90	0.074	0.00	0.22	0.22	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.89	122.09	122.09	0.15	0.01	0.87	0.87	0.00	0.00	0.12	0.12	0.00
Benzo[a]pyrene	965	3,840	0.69	94.65	94.65	0.10	0.01	0.78	0.78	0.00	0.00	0.09	0.09	0.00
Benzo[b]fluoranthene	979	2,169	0.81	111.11	111.11	0.113	0.01	0.87	0.87	0.001	0.00	0.27	0.27	0.000
Benzo[e]pyrene	967	4,300	0.56	76.82	76.82	0.08	0.01	0.65	0.65	0.00	0.00	0.24	0.24	0.00
Benzo[g,h,i]perylene	1,095	648	0.49	67.22	67.22	0.06	0.01	0.67	0.67	0.00	0.00	0.23	0.23	0.00
Benzo[k]fluoranthene	981	1,220	0.68	93.28	93.28	0.095	0.01	0.79	0.79	0.001	0.00	0.00	0.00	0.000
C1-Chrysenes	929	--	0.34	46.64	46.64	0.05	0.01	0.58	0.58	0.00	0.00	0.00	0.00	0.00
C1-Fluorenes	611	--	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	1.00	137.17	137.17	0.18	0.02	1.19	1.19	0.00	0.01	0.68	0.68	0.00
C1-Naphthalenes	444	--	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.55	75.45	75.45	0.11	0.01	0.74	0.74	0.00	0.01	0.58	0.58	0.00
C2-Chrysenes	1,008	--	0.10	0.00	0.00	0.00	0.00	0.39	0.39	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.36	49.38	49.38	--	0.01	0.70	0.70	--	0.01	0.62	0.62	--
C2-Naphthalenes	510	--	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.51	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.42	57.61	57.61	0.08	0.01	0.95	0.95	0.00	0.01	0.98	0.98	0.00
C3-Chrysenes	1,112	--	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.10	0.00	0.00	0.00	0.00	0.33	0.33	0.00	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.10	0.00	0.00	0.00	0.01	0.48	0.48	0.00	0.00	0.50	0.50	0.00
C3-Naphthalenes	581	--	0.10	0.00	0.00	0.00	0.01	0.77	0.77	0.00	0.01	1.08	1.08	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.28	38.41	38.41	0.05	0.02	1.27	1.27	0.00	0.01	1.08	1.08	0.00
C4-Chrysenes	1,214	--	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.10	0.00	0.00	0.00	0.02	1.19	1.19	0.00	0.02	1.83	1.83	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.10	0.00	0.00	0.00	0.01	0.74	0.74	0.00	0.01	0.71	0.71	0.00
Chrysene	844	826	0.97	133.06	133.06	0.16	0.01	1.11	1.11	0.00	0.00	0.41	0.41	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.17	23.32	23.32	0.021	0.00	0.17	0.17	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	2.40	329.22	329.22	0.47	0.03	2.14	2.14	0.00	0.00	0.36	0.36	0.00
Fluorene	538	26,000	0.05	6.45	6.45	0.012	0.00	0.08	0.08	0.000	0.00	0.06	0.06	0.000
Naphthalene	385	61,700	0.10	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.14	0.14	0.00
Perylene	967	431	0.21	28.81	28.81	0.03	0.01	0.79	0.79	0.00	0.01	0.85	0.85	0.00
Phenanthrene	596	34,300	1.40	192.04	192.04	0.32	0.01	1.03	1.03	0.00	0.00	0.31	0.31	0.00
Pyrene	697	9,090	2.00	274.35	274.35	0.39	0.02	1.67	1.67	0.00	0.00	0.38	0.38	0.00
	--	**ESBTU FCVi**	--	--	--	2.61	--	--	--	0.03	--	--	--	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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-26				HT18-26				HT18-26			
		Sample Name:	HT18-26-3050-FD				HT18-26-5070				HT18-26-7010			
		Sample Date:	10/24/2018				10/24/2018				10/24/2018			
		Depth Interval (ft):	3-5				5-7				7-9.5			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	0.773	0.00773	--	--	0.831	0.00831	--	--	0.796	0.00796	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.14	0.14	0.00	0.00	0.18	0.18	0.00	0.00	0.13	0.13	0.00
2-Methylnaphthalene	447	154,800	0.00	0.12	0.12	0.000	0.00	0.12	0.12	0.000	0.00	0.08	0.08	0.000
Acenaphthene	491	33,400	0.00	0.06	0.06	0.000	0.00	0.06	0.06	0.000	0.00	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	965	3,840	0.00	0.08	0.08	0.00	0.00	0.14	0.14	0.00	0.00	0.00	0.00	0.00
Benzo[b]fluoranthene	979	2,169	0.00	0.34	0.34	0.000	0.00	0.24	0.24	0.000	0.00	0.23	0.23	0.000
Benzo[e]pyrene	967	4,300	0.00	0.22	0.22	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.34	0.34	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.08	0.08	0.000
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.01	0.71	0.71	0.00	0.01	0.76	0.76	0.00	0.01	0.69	0.69	0.00
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.01	0.67	0.67	0.00	0.01	0.85	0.85	0.00	0.01	0.90	0.90	0.00
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.01	0.66	0.66	--	0.01	0.72	0.72	--	0.01	0.70	0.70	--
C2-Naphthalenes	510	--	0.00	0.00	0.00	0.00	0.00	0.59	0.59	0.00	0.00	0.62	0.62	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.01	1.05	1.05	0.00	0.01	1.32	1.32	0.00	0.02	1.88	1.88	0.00
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.54	0.00
C3-Naphthalenes	581	--	0.01	1.19	1.19	0.00	0.01	1.32	1.32	0.00	0.01	1.76	1.76	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.01	1.13	1.13	0.00	0.01	1.20	1.20	0.00	0.01	1.09	1.09	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.02	2.33	2.33	0.00	0.02	2.41	2.41	0.00	0.02	2.76	2.76	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.01	0.76	0.76	0.00	0.01	0.85	0.85	0.00	0.01	0.80	0.80	0.00
Chrysene	844	826	0.00	0.44	0.44	0.00	0.00	0.39	0.39	0.00	0.00	0.40	0.40	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.12	0.12	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	0.00	0.38	0.38	0.00	0.00	0.22	0.22	0.00	0.00	0.23	0.23	0.00
Fluorene	538	26,000	0.00	0.07	0.07	0.000	0.00	0.11	0.11	0.000	0.00	0.15	0.15	0.000
Naphthalene	385	61,700	0.00	0.16	0.16	0.00	0.00	0.17	0.17	0.00	0.00	0.06	0.06	0.00
Perylene	967	431	0.01	0.92	0.92	0.00	0.02	2.05	2.05	0.00	0.01	1.21	1.21	0.00
Phenanthrene	596	34,300	0.00	0.28	0.28	0.00	0.00	0.30	0.30	0.00	0.00	0.45	0.45	0.00
Pyrene	697	9,090	0.00	0.39	0.39	0.00	0.00	0.28	0.28	0.00	0.00	0.30	0.30	0.00
	--	**ESBTU FCVi**	--	--	--	0.02	--	--	--	0.02	--	--	--	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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-27				HT18-27				HT18-29			
		Sample Name:	HT18-27-0010				HT18-27-1020				HT18-29-SURF			
		Sample Date:	10/24/2018				10/24/2018				10/22/2018			
		Depth Interval (ft):	0-0.8				0.8-2.4				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 Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.52	0.0152	--	--	1.47	0.0147	--	--	0.936	0.00936	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.39	25.66	25.66	0.06	0.59	40.14	40.14	0.09	0.02	1.82	1.82	0.00
2-Methylnaphthalene	447	154,800	0.49	32.24	32.24	0.072	0.54	36.73	36.73	0.082	0.11	0.00	0.00	0.000
Acenaphthene	491	33,400	1.00	65.79	65.79	0.134	0.57	38.78	38.78	0.079	0.04	3.95	3.95	0.008
Acenaphthylene	452	24,000	0.08	5.00	5.00	0.01	0.11	0.00	0.00	0.00	0.09	9.40	9.40	0.02
Anthracene	594	1,300	0.53	34.87	34.87	0.059	0.29	19.73	19.73	0.033	0.18	19.23	19.23	0.032
Benzo[a]anthracene	841	4,153	2.60	171.05	171.05	0.20	0.20	13.61	13.61	0.02	1.20	128.21	128.21	0.15
Benzo[a]pyrene	965	3,840	1.60	105.26	105.26	0.11	0.14	9.52	9.52	0.01	0.32	34.19	34.19	0.04
Benzo[b]fluoranthene	979	2,169	2.00	131.58	131.58	0.134	0.17	11.56	11.56	0.012	0.68	72.65	72.65	0.074
Benzo[e]pyrene	967	4,300	1.50	98.68	98.68	0.10	0.14	9.52	9.52	0.01	0.24	25.64	25.64	0.03
Benzo[g,h,i]perylene	1,095	648	1.20	78.95	78.95	0.07	0.14	9.52	9.52	0.01	0.04	4.49	4.49	0.00
Benzo[k]fluoranthene	981	1,220	2.00	131.58	131.58	0.134	0.21	14.29	14.29	0.015	0.75	80.13	80.13	0.082
C1-Chrysenes	929	--	0.99	65.13	65.13	0.07	0.11	0.00	0.00	0.00	0.53	56.62	56.62	0.06
C1-Fluorenes	611	--	0.44	28.95	28.95	0.05	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	3.40	223.68	223.68	0.29	0.25	17.01	17.01	0.02	1.40	149.57	149.57	0.19
C1-Naphthalenes	444	--	0.59	38.82	38.82	0.09	0.76	51.70	51.70	0.12	0.11	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.60	105.26	105.26	0.16	0.29	19.73	19.73	0.03	0.86	91.88	91.88	0.14
C2-Chrysenes	1,008	--	0.22	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.23	24.57	24.57	0.02
C2-Fluorenes	686	--	0.22	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	1.00	65.79	65.79	--	0.11	0.00	0.00	--	0.90	96.15	96.15	--
C2-Naphthalenes	510	--	1.60	105.26	105.26	0.21	1.30	88.44	88.44	0.17	0.11	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	1.30	85.53	85.53	0.11	0.11	0.00	0.00	0.00	0.52	55.56	55.56	0.07
C3-Chrysenes	1,112	--	0.22	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluorenes	769	--	0.22	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.22	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.31	33.12	33.12	0.03
C3-Naphthalenes	581	--	1.60	105.26	105.26	0.18	0.38	25.85	25.85	0.04	0.28	29.91	29.91	0.05
C3-Phenanthrenes/Anthracenes	829	--	0.62	40.79	40.79	0.05	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.22	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.87	57.24	57.24	0.09	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.22	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Chrysene	844	826	2.60	171.05	171.05	0.20	0.22	14.97	14.97	0.02	0.97	103.63	103.63	0.12
Dibenzo(a,h)anthracene	1,123	2,389	0.44	28.95	28.95	0.026	0.04	2.72	2.72	0.002	0.18	19.23	19.23	0.017
Fluoranthene	707	23,870	6.40	421.05	421.05	0.60	0.66	44.90	44.90	0.06	1.90	202.99	202.99	0.29
Fluorene	538	26,000	0.84	55.26	55.26	0.103	0.99	67.35	67.35	0.125	0.09	9.83	9.83	0.018
Naphthalene	385	61,700	0.45	29.61	29.61	0.08	0.57	38.78	38.78	0.10	0.11	0.00	0.00	0.00
Perylene	967	431	0.45	29.61	29.61	0.03	0.05	3.06	3.06	0.00	0.05	5.45	5.45	0.01
Phenanthrene	596	34,300	1.90	125.00	125.00	0.21	2.20	149.66	149.66	0.25	1.00	106.84	106.84	0.18
Pyrene	697	9,090	5.20	342.11	342.11	0.49	0.53	36.05	36.05	0.05	1.20	128.21	128.21	0.18
	--	**ESBTU FCVi**	--	--	--	4.05	--	--	--	1.19	--	--	--	1.82

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	**HT18-29**				**HT18-30**				**HT18-30**			
		Sample Name:	**HT18-29-0010**				**HT18-30-SURF**				**HT18-30-0010**			
		Sample Date:	**10/23/2018**				**10/22/2018**				**10/23/2018**			
		Depth Interval (ft):	**0-1.2**				**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**	**Cocb**	**ESBTU FCVi**	**µg/g dry wt.**	**µg/g oc**	**Cocb**	**ESBTU FCVi**	**µg/g dry wt.**	**µg/g oc**	**Cocb**	**ESBTU FCVi**
Total Organic Carbon (%)	--	--	0.865	0.00865	--	--	2.57	0.0257	--	--	3.08	0.0308	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.04	4.28	4.28	0.01	0.01	0.34	0.34	0.00	0.01	0.39	0.39	0.00
2-Methylnaphthalene	447	154,800	0.04	4.16	4.16	0.009	0.01	0.28	0.28	0.001	0.01	0.32	0.32	0.001
Acenaphthene	491	33,400	0.18	20.81	20.81	0.042	0.01	0.32	0.32	0.001	0.04	1.14	1.14	0.002
Acenaphthylene	452	24,000	0.03	3.24	3.24	0.01	0.00	0.19	0.19	0.00	0.02	0.00	0.00	0.00
Anthracene	594	1,300	0.32	36.99	36.99	0.062	0.02	0.66	0.66	0.001	0.08	2.53	2.53	0.004
Benzo[a]anthracene	841	4,153	0.77	89.02	89.02	0.11	0.12	4.67	4.67	0.01	0.24	7.79	7.79	0.01
Benzo[a]pyrene	965	3,840	0.48	55.49	55.49	0.06	0.06	2.45	2.45	0.00	0.17	5.52	5.52	0.01
Benzo[b]fluoranthene	979	2,169	0.60	69.36	69.36	0.071	0.18	7.00	7.00	0.007	0.29	9.42	9.42	0.010
Benzo[e]pyrene	967	4,300	0.46	53.18	53.18	0.05	0.06	2.18	2.18	0.00	0.20	6.49	6.49	0.01
Benzo[g,h,i]perylene	1,095	648	0.39	45.09	45.09	0.04	0.01	0.47	0.47	0.00	0.18	5.84	5.84	0.01
Benzo[k]fluoranthene	981	1,220	0.61	70.52	70.52	0.072	0.14	5.45	5.45	0.006	0.26	8.44	8.44	0.009
C1-Chrysenes	929	--	0.29	33.53	33.53	0.04	0.06	2.22	2.22	0.00	0.09	2.79	2.79	0.00
C1-Fluorenes	611	--	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.85	98.27	98.27	0.13	0.15	5.84	5.84	0.01	0.26	8.44	8.44	0.01
C1-Naphthalenes	444	--	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.65	75.14	75.14	0.11	0.08	2.92	2.92	0.00	0.16	5.19	5.19	0.01
C2-Chrysenes	1,008	--	0.10	0.00	0.00	0.00	0.03	1.28	1.28	0.00	0.02	0.00	0.00	0.00
C2-Fluorenes	686	--	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.48	55.49	55.49	--	0.09	3.62	3.62	--	0.13	4.22	4.22	--
C2-Naphthalenes	510	--	0.10	0.00	0.00	0.00	0.04	1.63	1.63	0.00	0.06	2.01	2.01	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.37	42.77	42.77	0.06	0.07	2.76	2.76	0.00	0.09	3.02	3.02	0.00
C3-Chrysenes	1,112	--	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluorenes	769	--	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.10	0.00	0.00	0.00	0.04	1.36	1.36	0.00	0.02	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.10	0.00	0.00	0.00	0.07	2.84	2.84	0.00	0.08	2.47	2.47	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.23	26.59	26.59	0.03	0.05	1.95	1.95	0.00	0.05	1.62	1.62	0.00
C4-Chrysenes	1,214	--	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.10	0.00	0.00	0.00	0.11	4.28	4.28	0.01	0.07	2.31	2.31	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.10	0.00	0.00	0.00	0.03	1.17	1.17	0.00	0.02	0.00	0.00	0.00
Chrysene	844	826	0.82	94.80	94.80	0.11	0.16	6.23	6.23	0.01	0.31	10.06	10.06	0.01
Dibenzo(a,h)anthracene	1,123	2,389	0.14	16.18	16.18	0.014	0.03	1.17	1.17	0.001	0.05	1.75	1.75	0.002
Fluoranthene	707	23,870	1.90	219.65	219.65	0.31	0.32	12.45	12.45	0.02	0.71	23.05	23.05	0.03
Fluorene	538	26,000	0.18	20.81	20.81	0.039	0.02	0.66	0.66	0.001	0.06	1.88	1.88	0.004
Naphthalene	385	61,700	0.06	6.36	6.36	0.02	0.00	0.18	0.18	0.00	0.01	0.23	0.23	0.00
Perylene	967	431	0.16	18.50	18.50	0.02	0.01	0.47	0.47	0.00	0.07	2.21	2.21	0.00
Phenanthrene	596	34,300	1.70	196.53	196.53	0.33	0.13	5.06	5.06	0.01	0.51	16.56	16.56	0.03
Pyrene	697	9,090	1.60	184.97	184.97	0.27	0.17	6.61	6.61	0.01	0.54	17.53	17.53	0.03
	--	**ESBTU FCVi**	--	--	--	2.02	--	--	--	0.11	--	--	--	0.20

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-30				HT18-30				HT18-30			
		Sample Name:	HT18-30-1030				HT18-30-3050				HT18-30-5070			
		Sample Date:	10/23/2018				10/23/2018				10/23/2018			
		Depth Interval (ft):	1-3				3-5				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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.64	0.0364	--	--	4.11	0.0411	--	--	4.7	0.047	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.05	1.37	1.37	0.00	0.04	1.00	1.00	0.00	0.06	1.21	1.21	0.00
2-Methylnaphthalene	447	154,800	0.05	1.35	1.35	0.003	0.04	1.05	1.05	0.002	0.06	1.34	1.34	0.003
Acenaphthene	491	33,400	0.08	2.14	2.14	0.004	0.06	1.41	1.41	0.003	0.07	1.47	1.47	0.003
Acenaphthylene	452	24,000	0.05	1.29	1.29	0.00	0.04	1.00	1.00	0.00	0.04	0.74	0.74	0.00
Anthracene	594	1,300	0.15	4.12	4.12	0.007	0.11	2.68	2.68	0.005	0.11	2.34	2.34	0.004
Benzo[a]anthracene	841	4,153	0.64	17.58	17.58	0.02	0.56	13.63	13.63	0.02	0.55	11.70	11.70	0.01
Benzo[a]pyrene	965	3,840	0.45	12.36	12.36	0.01	0.42	10.22	10.22	0.01	0.41	8.72	8.72	0.01
Benzo[b]fluoranthene	979	2,169	0.67	18.41	18.41	0.019	0.66	16.06	16.06	0.016	0.56	11.91	11.91	0.012
Benzo[e]pyrene	967	4,300	0.49	13.46	13.46	0.01	0.43	10.46	10.46	0.01	0.42	8.94	8.94	0.01
Benzo[g,h,i]perylene	1,095	648	0.37	10.16	10.16	0.01	0.33	8.03	8.03	0.01	0.31	6.60	6.60	0.01
Benzo[k]fluoranthene	981	1,220	0.57	15.66	15.66	0.016	0.47	11.44	11.44	0.012	0.45	9.57	9.57	0.010
C1-Chrysenes	929	--	0.49	13.46	13.46	0.01	0.37	9.00	9.00	0.01	0.50	10.64	10.64	0.01
C1-Fluorenes	611	--	0.21	5.77	5.77	0.01	0.12	2.92	2.92	0.00	0.12	2.55	2.55	0.00
C1-Fluoranthenes/pyrene	770	--	1.10	30.22	30.22	0.04	0.91	22.14	22.14	0.03	1.00	21.28	21.28	0.03
C1-Naphthalenes	444	--	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	1.30	35.71	35.71	0.05	0.86	20.92	20.92	0.03	0.99	21.06	21.06	0.03
C2-Chrysenes	1,008	--	0.41	11.26	11.26	0.01	0.30	7.30	7.30	0.01	0.40	8.51	8.51	0.01
C2-Fluorenes	686	--	0.78	21.43	21.43	0.03	0.48	11.68	11.68	0.02	0.45	9.57	9.57	0.01
C2-Fluoranthenes/Pyrene	--	--	0.91	25.00	25.00	--	0.70	17.03	17.03	--	0.89	18.94	18.94	--
C2-Naphthalenes	510	--	0.75	20.60	20.60	0.04	0.39	9.49	9.49	0.02	0.63	13.40	13.40	0.03
C2-Phenanthrenes/Anthracenes	746	--	2.60	71.43	71.43	0.10	1.80	43.80	43.80	0.06	2.10	44.68	44.68	0.06
C3-Chrysenes	1,112	--	0.27	7.42	7.42	0.01	0.21	5.11	5.11	0.00	0.26	5.53	5.53	0.00
C3-Fluorenes	769	--	1.20	32.97	32.97	0.04	0.84	20.44	20.44	0.03	0.88	18.72	18.72	0.02
C3-Fluoranthenes/Pyrene	949	--	0.80	21.98	21.98	0.02	0.58	14.11	14.11	0.01	0.72	15.32	15.32	0.02
C3-Naphthalenes	581	--	2.60	71.43	71.43	0.12	1.20	29.20	29.20	0.05	1.30	27.66	27.66	0.05
C3-Phenanthrenes/Anthracenes	829	--	2.80	76.92	76.92	0.09	2.00	48.66	48.66	0.06	2.30	48.94	48.94	0.06
C4-Chrysenes	1,214	--	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C4-Naphthalenes	657	--	3.30	90.66	90.66	0.14	1.70	41.36	41.36	0.06	1.60	34.04	34.04	0.05
C4-Phenanthrenes/Anthracenes	913	--	2.10	57.69	57.69	0.06	1.50	36.50	36.50	0.04	1.80	38.30	38.30	0.04
Chrysene	844	826	0.92	25.27	25.27	0.03	0.78	18.98	18.98	0.02	0.77	16.38	16.38	0.02
Dibenzo(a,h)anthracene	1,123	2,389	0.14	3.85	3.85	0.003	0.12	2.92	2.92	0.003	0.11	2.34	2.34	0.002
Fluoranthene	707	23,870	1.70	46.70	46.70	0.07	1.50	36.50	36.50	0.05	1.30	27.66	27.66	0.04
Fluorene	538	26,000	0.12	3.30	3.30	0.006	0.10	2.36	2.36	0.004	0.09	1.98	1.98	0.004
Naphthalene	385	61,700	0.03	0.85	0.85	0.00	0.04	0.88	0.88	0.00	0.04	0.94	0.94	0.00
Perylene	967	431	0.16	4.40	4.40	0.00	0.14	3.41	3.41	0.00	0.12	2.55	2.55	0.00
Phenanthrene	596	34,300	0.98	26.92	26.92	0.05	0.78	18.98	18.98	0.03	0.74	15.74	15.74	0.03
Pyrene	697	9,090	1.20	32.97	32.97	0.05	1.10	26.76	26.76	0.04	1.00	21.28	21.28	0.03
	--	**ESBTU FCVi**	--	--	--	1.08	--	--	--	0.67	--	--	--	0.61

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
ESBTU= equilibrium sediment benchmark toxic unit.
FCV= final chronic value.
Koc = organic carbon-water partition coefficient.
µg/kg - micrograms per kilogram.
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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-30				HT18-31				HT18-31			
		Sample Name:	HT18-30-7010				HT18-31-SURF				HT18-31-0010			
		Sample Date:	10/23/2018				10/23/2018				10/25/2018			
		Depth Interval (ft):	7-10				0-0.5				0-1.3			
	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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	3.63	0.0363	--	--	2.9	0.029	--	--	2.55	0.0255	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.17	4.68	4.68	0.01	0.00	0.10	0.10	0.00	0.00	0.12	0.12	0.00
2-Methylnaphthalene	447	154,800	0.17	4.68	4.68	0.010	0.00	0.07	0.07	0.000	0.00	0.13	0.13	0.000
Acenaphthene	491	33,400	0.11	3.03	3.03	0.006	0.00	0.00	0.00	0.000	0.00	0.06	0.06	0.000
Acenaphthylene	452	24,000	0.06	1.54	1.54	0.00	0.00	0.03	0.03	0.00	0.00	0.05	0.05	0.00
Anthracene	594	1,300	0.25	6.89	6.89	0.012	0.00	0.00	0.00	0.000	0.00	0.09	0.09	0.000
Benzo[a]anthracene	841	4,153	0.90	24.79	24.79	0.03	0.01	0.27	0.27	0.00	0.01	0.55	0.55	0.00
Benzo[a]pyrene	965	3,840	0.72	19.83	19.83	0.02	0.01	0.23	0.23	0.00	0.01	0.51	0.51	0.00
Benzo[b]fluoranthene	979	2,169	0.91	25.07	25.07	0.026	0.02	0.59	0.59	0.001	0.03	1.10	1.10	0.001
Benzo[e]pyrene	967	4,300	0.66	18.18	18.18	0.02	0.01	0.18	0.18	0.00	0.02	0.82	0.82	0.00
Benzo[g,h,i]perylene	1,095	648	0.49	13.50	13.50	0.01	0.00	0.07	0.07	0.00	0.02	0.75	0.75	0.00
Benzo[k]fluoranthene	981	1,220	0.76	20.94	20.94	0.021	0.01	0.38	0.38	0.000	0.02	0.86	0.86	0.001
C1-Chrysenes	929	--	1.10	30.30	30.30	0.03	0.00	0.00	0.00	0.00	0.01	0.55	0.55	0.00
C1-Fluorenes	611	--	0.30	8.26	8.26	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	2.80	77.13	77.13	0.10	0.01	0.45	0.45	0.00	0.03	0.98	0.98	0.00
C1-Naphthalenes	444	--	0.25	6.89	6.89	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	2.60	71.63	71.63	0.11	0.01	0.34	0.34	0.00	0.02	0.82	0.82	0.00
C2-Chrysenes	1,008	--	0.91	25.07	25.07	0.02	0.00	0.00	0.00	0.00	0.01	0.36	0.36	0.00
C2-Fluorenes	686	--	1.20	33.06	33.06	0.05	0.00	0.00	0.00	0.00	0.01	0.33	0.33	0.00
C2-Fluoranthenes/Pyrene	--	--	2.30	63.36	63.36	--	0.01	0.34	0.34	--	0.02	0.75	0.75	--
C2-Naphthalenes	510	--	2.20	60.61	60.61	0.12	0.01	0.38	0.38	0.00	0.02	0.71	0.71	0.00
C2-Phenanthrenes/Anthracenes	746	--	5.50	151.52	151.52	0.20	0.01	0.45	0.45	0.00	0.03	1.14	1.14	0.00
C3-Chrysenes	1,112	--	0.48	13.22	13.22	0.01	0.00	0.00	0.00	0.00	0.01	0.24	0.24	0.00
C3-Fluorenes	769	--	1.70	46.83	46.83	0.06	0.00	0.00	0.00	0.00	0.02	0.59	0.59	0.00
C3-Fluoranthenes/Pyrene	949	--	1.70	46.83	46.83	0.05	0.00	0.00	0.00	0.00	0.01	0.47	0.47	0.00
C3-Naphthalenes	581	--	3.90	107.44	107.44	0.18	0.02	0.69	0.69	0.00	0.04	1.45	1.45	0.00
C3-Phenanthrenes/Anthracenes	829	--	6.50	179.06	179.06	0.22	0.01	0.38	0.38	0.00	0.02	0.90	0.90	0.00
C4-Chrysenes	1,214	--	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	3.80	104.68	104.68	0.16	0.03	1.14	1.14	0.00	0.05	1.84	1.84	0.00
C4-Phenanthrenes/Anthracenes	913	--	4.80	132.23	132.23	0.14	0.00	0.00	0.00	0.00	0.02	0.67	0.67	0.00
Chrysene	844	826	1.40	38.57	38.57	0.05	0.01	0.45	0.45	0.00	0.03	1.14	1.14	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.19	5.23	5.23	0.005	0.00	0.09	0.09	0.000	0.00	0.18	0.18	0.000
Fluoranthene	707	23,870	2.20	60.61	60.61	0.09	0.02	0.79	0.79	0.00	0.05	2.04	2.04	0.00
Fluorene	538	26,000	0.17	4.68	4.68	0.009	0.00	0.07	0.07	0.000	0.00	0.13	0.13	0.000
Naphthalene	385	61,700	0.08	2.31	2.31	0.01	0.00	0.04	0.04	0.00	0.00	0.09	0.09	0.00
Perylene	967	431	0.19	5.23	5.23	0.01	0.00	0.06	0.06	0.00	0.01	0.51	0.51	0.00
Phenanthrene	596	34,300	1.30	35.81	35.81	0.06	0.01	0.38	0.38	0.00	0.02	0.86	0.86	0.00
Pyrene	697	9,090	1.90	52.34	52.34	0.08	0.01	0.45	0.45	0.00	0.04	1.37	1.37	0.00
	--	ESBTU FCVi	--	--	--	1.89	--	--	--	0.01	--	--	--	0.03

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-31				HT18-31				HT18-31			
		Sample Name:	HT18-31-1025				HT18-31-2555				HT18-31-5565			
		Sample Date:	10/25/2018				10/25/2018				10/25/2018			
		Depth Interval (ft):	1.3-2.6				2.6-5.7				5.7-6.6			
	Coc, PAHi, FCVi[a] µg/g oc	Coc, PAHi, Maxi[a] µg/g oc	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi	Conc µg/g dry wt.	Coc µg/g oc	Final Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	4.65	0.0465	--	--	0.218	0.00218	--	--	0.29	0.0029	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylnaphthalene	447	154,800	0.02	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Acenaphthene	491	33,400	0.02	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.02	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	965	3,840	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b]fluoranthene	979	2,169	0.02	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.34	0.34	0.000
Benzo[e]pyrene	967	4,300	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.00
Benzo[g,h,i]perylene	1,095	648	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[k]fluoranthene	981	1,220	0.02	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
C1-Chrysenes	929	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluorenes	611	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Naphthalenes	444	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Chrysenes	1,008	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.02	0.00	0.00	--	0.00	0.00	0.00	--	0.00	0.00	0.00	--
C2-Naphthalenes	510	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Chrysenes	1,112	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluoranthenes/Pyrene	949	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Naphthalenes	581	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Chrysenes	1,214	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	844	826	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.34	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.02	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluorene	538	26,000	0.02	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Naphthalene	385	61,700	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Perylene	967	431	0.42	9.03	9.03	0.01	0.01	5.50	5.50	0.01	0.00	0.83	0.83	0.00
Phenanthrene	596	34,300	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00
Pyrene	697	9,090	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.31	0.00
	--	**ESBTU FCVi**	--	--	--	0.01	--	--	--	0.01	--	--	--	0.00

Notes:

[a]PAHs and corresponding Coc PAHi, FCVi and Coc PAHi, Maxi values are from Table 3-4 in EPA, 2003).

[b] COC,PAHi,Maxi is the maximum solubility limited PAH concentration in

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-32				HT18-32				HT18-32			
		Sample Name:	HT18-32-SURF				HT18-32-SURF-FD				HT18-32-0010			
		Sample Date:	10/23/2018				10/23/2018				10/24/2018			
		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	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	2.18	0.0218	--	--	2.33	0.0233	--	--	1.67	0.0167	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)														
1-Methylnaphthalene	446	165,700	0.00	0.07	0.07	0.00	0.00	0.19	0.19	0.00	0.01	0.35	0.35	0.00
2-Methylnaphthalene	447	154,800	0.00	0.06	0.06	0.000	0.00	0.12	0.12	0.000	0.01	0.38	0.38	0.001
Acenaphthene	491	33,400	0.00	0.05	0.05	0.000	0.00	0.10	0.10	0.000	0.00	0.24	0.24	0.000
Acenaphthylene	452	24,000	0.00	0.04	0.04	0.00	0.00	0.13	0.13	0.00	0.00	0.25	0.25	0.00
Anthracene	594	1,300	0.00	0.00	0.00	0.000	0.00	0.10	0.10	0.000	0.01	0.43	0.43	0.001
Benzo[a]anthracene	841	4,153	0.01	0.26	0.26	0.00	0.02	0.86	0.86	0.00	0.04	2.57	2.57	0.00
Benzo[a]pyrene	965	3,840	0.00	0.11	0.11	0.00	0.01	0.43	0.43	0.00	0.04	2.28	2.28	0.00
Benzo[b]fluoranthene	979	2,169	0.01	0.41	0.41	0.000	0.03	1.37	1.37	0.001	0.05	3.23	3.23	0.003
Benzo[e]pyrene	967	4,300	0.00	0.13	0.13	0.00	0.01	0.36	0.36	0.00	0.04	2.51	2.51	0.00
Benzo[g,h,i]perylene	1,095	648	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.03	1.86	1.86	0.00
Benzo[k]fluoranthene	981	1,220	0.01	0.32	0.32	0.000	0.02	0.90	0.90	0.001	0.04	2.57	2.57	0.003
C1-Chrysenes	929	--	0.00	0.00	0.00	0.00	0.02	0.64	0.64	0.00	0.04	2.22	2.22	0.00
C1-Fluorenes	611	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.66	0.66	0.00
C1-Fluoranthenes/pyrene	770	--	0.01	0.44	0.44	0.00	0.03	1.37	1.37	0.00	0.08	4.85	4.85	0.01
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.49	0.49	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.01	0.32	0.32	0.00	0.02	1.03	1.03	0.00	0.05	3.17	3.17	0.00
C2-Chrysenes	1,008	--	0.00	0.00	0.00	0.00	0.01	0.52	0.52	0.00	0.03	1.50	1.50	0.00
C2-Fluorenes	686	--	0.00	0.00	0.00	0.00	0.01	0.52	0.52	0.00	0.02	1.02	1.02	0.00
C2-Fluoranthenes/Pyrene	--	--	0.01	0.36	0.36	--	0.02	1.03	1.03	--	0.06	3.53	3.53	--
C2-Naphthalenes	510	--	0.01	0.35	0.35	0.00	0.02	0.94	0.94	0.00	0.03	1.74	1.74	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.01	0.46	0.46	0.00	0.03	1.46	1.46	0.00	0.08	4.79	4.79	0.01
C3-Chrysenes	1,112	--	0.00	0.00	0.00	0.00	0.01	0.36	0.36	0.00	0.01	0.84	0.84	0.00
C3-Fluorenes	769	--	0.00	0.00	0.00	0.00	0.01	0.52	0.52	0.00	0.03	1.92	1.92	0.00
C3-Fluoranthenes/Pyrene	949	--	0.00	0.00	0.00	0.00	0.01	0.60	0.60	0.00	0.04	2.34	2.34	0.00
C3-Naphthalenes	581	--	0.01	0.64	0.64	0.00	0.04	1.80	1.80	0.00	0.05	3.23	3.23	0.01
C3-Phenanthrenes/Anthracenes	829	--	0.01	0.39	0.39	0.00	0.03	1.29	1.29	0.00	0.08	4.73	4.73	0.01
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.02	0.83	0.83	0.00	0.07	3.00	3.00	0.00	0.07	4.37	4.37	0.01
C4-Phenanthrenes/Anthracenes	913	--	0.01	0.32	0.32	0.00	0.02	0.86	0.86	0.00	0.06	3.59	3.59	0.00
Chrysene	844	826	0.01	0.37	0.37	0.00	0.03	1.16	1.16	0.00	0.06	3.65	3.65	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.00	0.08	0.08	0.000	0.01	0.23	0.23	0.000	0.01	0.60	0.60	0.001
Fluoranthene	707	23,870	0.02	0.69	0.69	0.00	0.05	2.32	2.32	0.00	0.11	6.59	6.59	0.01
Fluorene	538	26,000	0.00	0.07	0.07	0.000	0.01	0.23	0.23	0.000	0.01	0.45	0.45	0.001
Naphthalene	385	61,700	0.00	0.03	0.03	0.00	0.00	0.07	0.07	0.00	0.01	0.41	0.41	0.00
Perylene	967	431	0.00	0.06	0.06	0.00	0.00	0.19	0.19	0.00	0.04	2.22	2.22	0.00
Phenanthrene	596	34,300	0.01	0.25	0.25	0.00	0.02	0.94	0.94	0.00	0.05	2.87	2.87	0.00
Pyrene	697	9,090	0.01	0.36	0.36	0.00	0.03	1.16	1.16	0.00	0.10	5.69	5.69	0.01
	--	**ESBTU FCVi**	--	--	--	0.01	--	--	--	0.03	--	--	--	0.10

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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-1 ESBTUs FOR PAHS, HT

		Location ID:	HT18-32				HT18-32				HT18-32				HT18-32			
		Sample Name:	HT18-32-0010-FD				HT18-32-1030				HT18-32-3050				HT18-32-5070			
		Sample Date:	10/24/2018				10/24/2018				10/24/2018				10/24/2018			
		Depth Interval (ft):	0-1				1-3				3-5				5-7			
	Coc, PAHi, FCVi[a]	Coc, PAHi, Maxi[a]	Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final		Conc	Coc	Final	
	µg/g oc	µg/g oc	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi	µg/g dry wt.	µg/g oc	Cocb	ESBTU FCVi
Total Organic Carbon (%)	--	--	1.42	0.0142	--	--	0.805	0.00805	--	--	0.913	0.00913	--	--	1.44	0.0144	--	--
Polycyclic Aromatic Hydrocarbons (PAH) (µg/kg)																		
1-Methylnaphthalene	446	165,700	0.01	0.37	0.37	0.00	0.00	0.24	0.24	0.00	0.00	0.18	0.18	0.00	0.00	0.13	0.13	0.00
2-Methylnaphthalene	447	154,800	0.01	0.42	0.42	0.001	0.00	0.17	0.17	0.000	0.00	0.13	0.13	0.000	0.00	0.09	0.09	0.000
Acenaphthene	491	33,400	0.00	0.24	0.24	0.000	0.00	0.07	0.07	0.000	0.00	0.05	0.05	0.000	0.00	0.00	0.00	0.000
Acenaphthylene	452	24,000	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	594	1,300	0.01	0.42	0.42	0.001	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Benzo[a]anthracene	841	4,153	0.04	2.68	2.68	0.00	0.00	0.12	0.12	0.00	0.00	0.07	0.07	0.00	0.00	0.05	0.05	0.00
Benzo[a]pyrene	965	3,840	0.04	2.46	2.46	0.00	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b]fluoranthene	979	2,169	0.05	3.59	3.59	0.004	0.00	0.45	0.45	0.000	0.00	0.25	0.25	0.000	0.00	0.19	0.19	0.000
Benzo[e]pyrene	967	4,300	0.04	2.75	2.75	0.00	0.00	0.40	0.40	0.00	0.00	0.21	0.21	0.00	0.00	0.15	0.15	0.00
Benzo[g,h,i]perylene	1,095	648	0.03	2.04	2.04	0.00	0.00	0.52	0.52	0.00	0.00	0.26	0.26	0.00	0.00	0.20	0.20	0.00
Benzo[k]fluoranthene	981	1,220	0.04	2.75	2.75	0.003	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
C1-Chrysenes	929	--	0.04	2.75	2.75	0.00	0.01	0.83	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	0.00
C1-Fluorenes	611	--	0.01	0.70	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Fluoranthenes/pyrene	770	--	0.08	5.49	5.49	0.01	0.01	1.37	1.37	0.00	0.01	0.84	0.84	0.00	0.01	0.62	0.62	0.00
C1-Naphthalenes	444	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1-Phenanthrenes/Anthracenes	670	--	0.05	3.59	3.59	0.01	0.01	1.20	1.20	0.00	0.01	0.82	0.82	0.00	0.01	0.83	0.83	0.00
C2-Chrysenes	1,008	--	0.03	1.90	1.90	0.00	0.01	0.81	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluorenes	686	--	0.02	1.34	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2-Fluoranthenes/Pyrene	--	--	0.06	4.30	4.30	--	0.01	1.37	1.37	--	0.01	0.84	0.84	--	0.01	0.59	0.59	--
C2-Naphthalenes	510	--	0.03	1.97	1.97	0.00	0.01	1.01	1.01	0.00	0.01	0.72	0.72	0.00	0.01	0.52	0.52	0.00
C2-Phenanthrenes/Anthracenes	746	--	0.08	5.63	5.63	0.01	0.02	2.11	2.11	0.00	0.02	1.75	1.75	0.00	0.02	1.32	1.32	0.00
C3-Chrysenes	1,112	--	0.02	1.06	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-Fluorenes	769	--	0.03	2.32	2.32	0.00	0.01	0.86	0.86	0.00	0.00	0.49	0.49	0.00	0.01	0.38	0.38	0.00
C3-Fluoranthenes/Pyrene	949	--	0.04	2.75	2.75	0.00	0.01	0.99	0.99	0.00	0.01	0.66	0.66	0.00	0.01	0.46	0.46	0.00
C3-Naphthalenes	581	--	0.05	3.66	3.66	0.01	0.02	2.61	2.61	0.00	0.02	1.64	1.64	0.00	0.02	1.25	1.25	0.00
C3-Phenanthrenes/Anthracenes	829	--	0.08	5.77	5.77	0.01	0.02	2.48	2.48	0.00	0.01	1.31	1.31	0.00	0.01	0.97	0.97	0.00
C4-Chrysenes	1,214	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-Naphthalenes	657	--	0.07	5.00	5.00	0.01	0.04	4.72	4.72	0.01	0.03	2.74	2.74	0.00	0.03	1.94	1.94	0.00
C4-Phenanthrenes/Anthracenes	913	--	0.06	4.51	4.51	0.00	0.01	1.61	1.61	0.00	0.01	0.95	0.95	0.00	0.01	0.69	0.69	0.00
Chrysene	844	826	0.06	3.87	3.87	0.00	0.01	0.72	0.72	0.00	0.00	0.43	0.43	0.00	0.00	0.34	0.34	0.00
Dibenzo(a,h)anthracene	1,123	2,389	0.01	0.68	0.68	0.001	0.00	0.06	0.06	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000
Fluoranthene	707	23,870	0.10	6.69	6.69	0.01	0.00	0.41	0.41	0.00	0.00	0.27	0.27	0.00	0.00	0.28	0.28	0.00
Fluorene	538	26,000	0.01	0.50	0.50	0.001	0.00	0.14	0.14	0.000	0.00	0.07	0.07	0.000	0.00	0.08	0.08	0.000
Naphthalene	385	61,700	0.00	0.35	0.35	0.00	0.00	0.21	0.21	0.00	0.00	0.15	0.15	0.00	0.00	0.10	0.10	0.00
Perylene	967	431	0.03	2.25	2.25	0.00	0.01	1.24	1.24	0.00	0.01	0.70	0.70	0.00	0.01	0.40	0.40	0.00
Phenanthrene	596	34,300	0.04	2.89	2.89	0.00	0.00	0.34	0.34	0.00	0.00	0.25	0.25	0.00	0.00	0.33	0.33	0.00
Pyrene	697	9,090	0.09	5.99	5.99	0.01	0.00	0.52	0.52	0.00	0.00	0.34	0.34	0.00	0.00	0.28	0.28	0.00
	--	**ESBTU FCVi**	--	--	--	0.11	--	--	--	0.03	--	--	--	0.02	--	--	--	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

ESBTU= equilibrium sediment benchmark toxic unit.

FCV= final chronic value.

Koc = organic carbon-water partition coefficient.

µg/kg - micrograms per kilogram.

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TABLE 4-2 ESBTUs FOR SEM/AVS METALS, HT

	Location ID:	HT18-01	HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06
	Sample Name:	HT18-01-SURF	HT18-01-SURF-FD	HT18-02-SURF	HT18-03-SURF	HT18-04-SURF	HT18-05-SURF	HT18-06-SURF
	Sample Date:	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
	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	0.47	0.32	0.12	0.22	0.12	0.22	0.32
Σ SEM	µmole/g dry	1.7990	1.9264	1.5691	8.0521	1.2453	5.6741	3.3231
AVS	µmole/g dry	3.8	5.9	12.8	37.5	10.4	25.8	10.5
foc	fraction	0.0299	0.0293	0.0234	0.0531	0.0177	0.0418	0.0476
(Σ SEM - AVS) / foc	µmole/g dry	-67	-136	-480	-555	-517	-481	-151

NOTES:
Bolded values exceed 1 SEM/AVS ratio.
Bolded and shaded values exceed 130 µmole/g_{oc}.
µmole/g dry = micromole per gram dry weight basis.
AVS = Acid Volatile Sulfides.
foc = fraction organic carbon.
FD = Field Duplicate.
SEM = Simultaneously Extracted Metals.
Qualifier:
U = Indicates the analyte was analyzed but not detected.

TABLE 4-2 ESBTUs FOR SEM/AVS METALS, HT

	Location ID:	HT18-07	HT18-08	HT18-09	HT18-10	HT18-11	HT18-12
	Sample Name:	HT18-07-SURF	HT18-08-SURF	HT18-09-SURF	HT18-10-SURF	HT18-11-SURF	HT18-12-SURF
	Sample Date:	10/29/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018
	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	0.32	0.20	0.24	**1.10**	0.33	0.18
Σ SEM	µmole/g dry	1.7298	2.7021	2.2683	0.5070	2.6390	2.9690
AVS	µmole/g dry	5.3	14	9.3	0.47 J	8	16.3
foc	fraction	0.0192	0.0345	0.0415	0.0023	0.0495	0.0275
(Σ SEM - AVS) / foc	µmole/g dry	-186	-327	-169	16	-108	-485

NOTES:
Bolded values exceed 1 SEM/AVS ratio.
Bolded and shaded values exceed 130 µmole/g_{oc}.
µmole/g dry = micromole per gram dry weight basis.
AVS = Acid Volatile Sulfides.
foc = fraction organic carbon.
FD = Field Duplicate.
SEM = Simultaneously Extracted Metals.
Qualifier:
U = Indicates the analyte was analyzed but not detected.

TABLE 4-2 ESBTUs FOR SEM/AVS METALS, HT

	Location ID:	HT18-12	HT18-13	HT18-14	HT18-15	HT18-16	HT18-17	HT18-18
	Sample Name:	HT18-12-SURF-FD	HT18-13-SURF	HT18-14-SURF	HT18-15-SURF	HT18-16-SURF	HT18-17-SURF	HT18-18-SURF
	Sample Date:	10/22/2018	10/29/2018	10/29/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018
	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	0.16	0.30	--	0.23	0.25	**1.09**	0.29
Σ SEM	µmole/g dry	3.8421	2.1899	1.1339	0.7589	1.6032	0.4572	1.4741
AVS	µmole/g dry	23.4	7.6	0.71 U	3.3	6.5	0.41 J	5.1
foc	fraction	0.0274	0.0332	0.0173	0.0133	0.0336	0.0062	0.0311
(Σ SEM - AVS) / foc	µmole/g dry	-714	-163	25	-191	-146	8	-117

NOTES:
Bolded values exceed 1 SEM/AVS ratio.
Bolded and shaded values exceed 130 µmole/g_{oc}.
µmole/g dry = micromole per gram dry weight basis.
AVS = Acid Volatile Sulfides.
foc = fraction organic carbon.
FD = Field Duplicate.
SEM = Simultaneously Extracted Metals.
Qualifier:
U = Indicates the analyte was analyzed but not detected.

TABLE 4-2 ESBTUs FOR SEM/AVS METALS, HT

	Location ID:	HT18-19	HT18-20	HT18-21	HT18-23	HT18-24	HT18-25	HT18-26
	Sample Name:	HT18-19-SURF	HT18-20-SURF	HT18-21-SURF	HT18-23-SURF	HT18-24-SURF	HT18-25-SURF	HT18-26-SURF
	Sample Date:	10/24/2018	10/24/2018	10/24/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
	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	**1.29**	0.24	0.51	0.17	0.24	0.26	0.81
Σ SEM	µmole/g dry	1.4244	1.7373	1.2615	2.2853	1.6237	2.4759	2.3987
AVS	µmole/g dry	1.1	7.2	2.5	13.5	6.8	9.4	3
foc	fraction	0.0081	0.0167	0.0226	0.0330	0.0267	0.0356	0.0137
(Σ SEM - AVS) / foc	µmole/g dry	40	-327	-55	-340	-194	-194	-44

NOTES:
Bolded values exceed 1 SEM/AVS ratio.
Bolded and shaded values exceed 130 µmole/g_{oc}.
µmole/g dry = micromole per gram dry weight basis.
AVS = Acid Volatile Sulfides.
foc = fraction organic carbon.
FD = Field Duplicate.
SEM = Simultaneously Extracted Metals.
Qualifier:
U = Indicates the analyte was analyzed but not detected.

TABLE 4-2 ESBTUs FOR SEM/AVS METALS, HT

	Location ID:	HT18-29	HT18-30	HT18-31	HT18-32	HT18-32
	Sample Name:	HT18-29-SURF	HT18-30-SURF	HT18-31-SURF	HT18-32-SURF	HT18-32-SURF-FD
	Sample Date:	10/22/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018
	Depth Interval (feet):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**Unit**					
SEM/AVS Ratio	none	0.96	0.28	0.30	0.09	0.09
Σ SEM	µmole/g dry	0.9830	2.4299	1.4321	1.5078	1.2665
AVS	µmole/g dry	1	8.4	4.8	16.4	14.5
foc	fraction	0.0094	0.0257	0.0290	0.0218	0.0233
(Σ SEM - AVS) / foc	µmole/g dry	-2	-232	-116	-683	-568

NOTES:
Bolded values exceed 1 SEM/AVS ratio.
Bolded and shaded values exceed 130 µmole/g_{oc}.
µmole/g dry = micromole per gram dry weight basis.
AVS = Acid Volatile Sulfides.
foc = fraction organic carbon.
FD = Field Duplicate.
SEM = Simultaneously Extracted Metals.
Qualifier:
U = Indicates the analyte was analyzed but not detected.

TABLE 5-1 PEC-Qs, HT

Location ID	Field Sample ID	mean PEC-Q metals	PEC-Q Total 17PAHs ND= 1/2	PEC-Q Total PCBs ND=0	mean PEC-Q
HT18-01	HT18-01-0010	0.23	0.16	0.07	0.16
HT18-01	HT18-01-1030	0.25	0.16	0.11	0.18
HT18-01	HT18-01-3050	0.26	0.12	0.14	0.17
HT18-01	HT18-01-5070	0.18	0.06	0.00	0.08
HT18-01	HT18-01-5070-FD	0.20	0.24	0.00	0.15
HT18-01	HT18-01-7085	0.11	0.10	0.00	0.07
HT18-01	HT18-01-SURF	0.32	0.11	0.05	0.16
HT18-01	HT18-01-SURF-FD	0.28	0.07	0.05	0.13
HT18-02	HT18-02-0010	0.27	0.09	0.07	0.15
HT18-02	HT18-02-1030	0.17	0.12	0.00	0.10
HT18-02	HT18-02-3060	0.25	0.60	0.00	0.28
HT18-02	HT18-02-6080	0.32	0.53	0.00	0.28
HT18-02	HT18-02-8090	0.10	0.21	0.00	0.10
HT18-02	HT18-02-SURF	0.27	0.14	0.05	0.15
HT18-03	HT18-03-0010	0.86	0.71	0.67	0.75
HT18-03	HT18-03-1030	1.79	0.64	2.80	1.74
HT18-03	HT18-03-1030-FD	1.77	0.65	4.29	2.24
HT18-03	HT18-03-3045	2.07	0.52	1.48	1.36
HT18-03	HT18-03-4560	0.21	0.00	0.00	0.07
HT18-03	HT18-03-SURF	0.75	0.43	0.33	0.50
HT18-04	HT18-04-0005	0.11	0.01	0.01	0.04
HT18-04	HT18-04-0530	0.14	0.00	0.00	0.05
HT18-04	HT18-04-0530-FD	0.13	0.00	0.00	0.04
HT18-04	HT18-04-3040	0.09	0.00	0.00	0.03
HT18-04	HT18-04-SURF	0.19	0.02	0.02	0.08
HT18-05	HT18-05-0010	0.34	0.13	0.14	0.21
HT18-05	HT18-05-1030	0.52	0.21	0.31	0.34
HT18-05	HT18-05-3050	1.28	0.98	2.62	1.62
HT18-05	HT18-05-5060	0.62	0.68	0.62	0.64
HT18-05	HT18-05-SURF	0.58	0.45	0.14	0.39
HT18-06	HT18-06-0010	0.37	0.07	0.14	0.19
HT18-06	HT18-06-1030	0.42	0.10	0.48	0.34
HT18-06	HT18-06-1030-FD	0.41	0.08	0.26	0.25
HT18-06	HT18-06-3060	0.98	0.31	1.05	0.78
HT18-06	HT18-06-6070	0.67	0.31	1.72	0.90
HT18-06	HT18-06-7080	1.01	0.35	8.88	3.41
HT18-06	HT18-06-8010	1.00	0.37	1.58	0.98
HT18-06	HT18-06-SURF	0.32	0.07	0.09	0.16
HT18-07	HT18-07-0020	0.13	0.14	0.49	0.25
HT18-07	HT18-07-2050	1.17	0.31	2.37	1.28
HT18-07	HT18-07-5070	0.69	0.27	1.07	0.68
HT18-07	HT18-07-7090	1.15	0.29	0.31	0.58
HT18-07	HT18-07-SURF	0.17	0.05	0.12	0.12

TABLE 5-1 PEC-Qs, HT

Location ID	Field Sample ID	mean PEC-Q metals	PEC-Q Total 17PAHs ND= 1/2	PEC-Q Total PCBs ND=0	mean PEC-Q
HT18-08	HT18-08-0010	0.33	0.09	0.04	0.15
HT18-08	HT18-08-1020	0.42	0.51	0.11	0.35
HT18-08	HT18-08-1020-FD	0.36	0.39	0.08	0.28
HT18-08	HT18-08-2045	0.65	3.78	0.02	1.48
HT18-08	HT18-08-4565	0.17	0.03	0.00	0.07
HT18-08	HT18-08-6580	0.09	0.00	0.00	0.03
HT18-08	HT18-08-SURF	0.31	0.08	0.05	0.15
HT18-09	HT18-09-0010	0.42	0.12	0.04	0.20
HT18-09	HT18-09-1030	0.34	0.13	0.10	0.19
HT18-09	HT18-09-3050	0.35	0.07	0.12	0.18
HT18-09	HT18-09-3050-FD	0.36	0.21	0.17	0.25
HT18-09	HT18-09-5070	0.56	0.16	0.22	0.31
HT18-09	HT18-09-7010	0.63	0.35	0.68	0.55
HT18-09	HT18-09-SURF	0.27	0.09	0.07	0.14
HT18-10	HT18-10-0010	0.08	0.01	0.00	0.03
HT18-10	HT18-10-SURF	0.11	0.09	0.01	0.07
HT18-11	HT18-11-0010	0.31	0.06	0.06	0.14
HT18-11	HT18-11-1030	0.34	0.13	0.05	0.17
HT18-11	HT18-11-3050	0.18	0.07	0.09	0.11
HT18-11	HT18-11-5070	0.10	0.00	0.00	0.03
HT18-11	HT18-11-7010	0.09	0.00	0.00	0.03
HT18-11	HT18-11-SURF	0.32	0.07	0.02	0.14
HT18-12	HT18-12-0010	0.72	0.33	0.18	0.41
HT18-12	HT18-12-1030	1.03	0.68	0.32	0.68
HT18-12	HT18-12-3050	0.48	0.72	0.00	0.40
HT18-12	HT18-12-5070	0.13	0.01	0.00	0.05
HT18-12	HT18-12-7010	0.11	0.00	0.00	0.04
HT18-12	HT18-12-SURF	0.36	0.11	0.13	0.20
HT18-12	HT18-12-SURF-FD	0.39	0.10	0.14	0.21
HT18-13	HT18-13-0010	0.55	0.23	0.22	0.33
HT18-13	HT18-13-1030	1.04	0.29	0.12	0.48
HT18-13	HT18-13-3050	0.72	0.23	0.02	0.33
HT18-13	HT18-13-5060	0.37	0.11	0.00	0.16
HT18-13	HT18-13-6090	0.28	0.04	0.00	0.11
HT18-13	HT18-13-6090-FD	0.30	0.06	0.00	0.12
HT18-13	HT18-13-9010	0.10	0.04	0.00	0.05
HT18-13	HT18-13-SURF	0.37	0.04	0.04	0.15
HT18-14	HT18-14-0010	0.29	1.71	0.19	0.73
HT18-14	HT18-14-1020	0.26	0.22	0.02	0.17
HT18-14	HT18-14-SURF	0.14	0.08	0.03	0.08
HT18-15	HT18-15-0005	0.10	0.01	0.01	0.04
HT18-15	HT18-15-0530	0.20	0.00	0.00	0.07
HT18-15	HT18-15-3050	0.22	0.00	0.00	0.07
HT18-15	HT18-15-3050-FD	0.21	0.00	0.00	0.07

TABLE 5-1 PEC-Qs, HT

Location ID	Field Sample ID	mean PEC-Q metals	PEC-Q Total 17PAHs ND= 1/2	PEC-Q Total PCBs ND=0	mean PEC-Q
HT18-15	HT18-15-SURF	0.14	0.31	0.07	0.17
HT18-16	HT18-16-SURF	0.51	0.07	0.03	0.20
HT18-17	HT18-17-0010	0.19	0.01	0.00	0.07
HT18-17	HT18-17-1030	0.21	0.00	0.00	0.07
HT18-17	HT18-17-3050	0.20	0.00	0.00	0.07
HT18-17	HT18-17-SURF	0.14	0.02	0.02	0.06
HT18-18	HT18-18-0020	1.90	3.81	0.01	1.91
HT18-18	HT18-18-2030	0.20	0.01	0.00	0.07
HT18-18	HT18-18-3035	0.09	0.03	0.00	0.04
HT18-18	HT18-18-3555	0.31	0.00	0.00	0.10
HT18-18	HT18-18-SURF	0.36	0.19	0.04	0.19
HT18-19	HT18-19-0010	1.65	4.62	0.00	2.09
HT18-19	HT18-19-1020	0.25	1.97	0.00	0.74
HT18-19	HT18-19-2030	0.09	0.02	0.00	0.04
HT18-19	HT18-19-SURF	0.20	0.61	0.03	0.28
HT18-20	HT18-20-0010	0.41	0.23	0.31	0.32
HT18-20	HT18-20-1020	0.20	0.01	0.00	0.07
HT18-20	HT18-20-2030	0.10	0.02	0.00	0.04
HT18-20	HT18-20-2030-FD	0.10	0.04	0.00	0.05
HT18-20	HT18-20-SURF	0.25	0.19	0.02	0.16
HT18-21	HT18-21-0015	0.37	0.05	0.04	0.15
HT18-21	HT18-21-SURF	0.13	0.12	0.01	0.09
HT18-23	HT18-23-0010	0.13	0.03	0.04	0.07
HT18-23	HT18-23-1030	0.08	0.00	0.00	0.03
HT18-23	HT18-23-3050	0.09	0.00	0.00	0.03
HT18-23	HT18-23-5070	0.14	0.00	0.00	0.05
HT18-23	HT18-23-7010	0.15	0.00	0.00	0.05
HT18-23	HT18-23-SURF	0.36	0.11	0.02	0.16
HT18-24	HT18-24-0010	0.10	0.20	0.00	0.10
HT18-24	HT18-24-1025	0.11	0.00	0.00	0.04
HT18-24	HT18-24-2550	0.15	0.00	0.00	0.05
HT18-24	HT18-24-5065	0.10	0.00	0.00	0.03
HT18-24	HT18-24-5065-FD	0.09	0.00	0.00	0.03
HT18-24	HT18-24-6575	0.19	0.00	0.00	0.06
HT18-24	HT18-24-SURF	0.39	0.38	0.04	0.27
HT18-25	HT18-25-0010	0.80	0.83	0.03	0.55
HT18-25	HT18-25-1030	1.61	1.56	0.00	1.06
HT18-25	HT18-25-3040	0.88	5.15	0.00	2.01
HT18-25	HT18-25-4070	0.12	0.01	0.00	0.04
HT18-25	HT18-25-7010	0.11	0.00	0.00	0.04
HT18-25	HT18-25-SURF	0.33	0.16	0.00	0.16
HT18-26	HT18-26-0010	0.12	0.51	0.00	0.21
HT18-26	HT18-26-1030	0.09	0.01	0.00	0.03
HT18-26	HT18-26-3050	0.11	0.00	0.00	0.04

TABLE 5-1 PEC-Qs, HT

Location ID	Field Sample ID	mean PEC-Q metals	PEC-Q Total 17PAHs ND= 1/2	PEC-Q Total PCBs ND=0	mean PEC-Q
HT18-26	HT18-26-3050-FD	0.11	0.00	0.00	0.04
HT18-26	HT18-26-5070	0.12	0.00	0.00	0.04
HT18-26	HT18-26-7010	0.12	0.00	0.00	0.04
HT18-26	HT18-26-SURF	0.29	0.17	0.07	0.18
HT18-27	HT18-27-0010	0.30	1.33	0.03	0.56
HT18-27	HT18-27-1020	0.28	0.34	0.00	0.20
HT18-29	HT18-29-0010	0.24	0.45	0.03	0.24
HT18-29	HT18-29-SURF	0.21	0.40	0.04	0.22
HT18-30	HT18-30-0010	0.32	0.16	0.02	0.16
HT18-30	HT18-30-1030	0.92	0.37	0.18	0.49
HT18-30	HT18-30-3050	1.23	0.33	0.10	0.55
HT18-30	HT18-30-5070	1.24	0.30	0.10	0.55
HT18-30	HT18-30-7010	1.13	0.53	0.04	0.57
HT18-30	HT18-30-SURF	0.37	0.06	0.05	0.16
HT18-31	HT18-31-0010	0.23	0.01	0.06	0.10
HT18-31	HT18-31-1025	0.15	0.01	0.00	0.06
HT18-31	HT18-31-2555	0.13	0.00	0.00	0.04
HT18-31	HT18-31-5565	0.15	0.00	0.00	0.05
HT18-31	HT18-31-SURF	0.31	0.01	0.03	0.12
HT18-32	HT18-32-0010	0.21	0.03	0.03	0.09
HT18-32	HT18-32-0010-FD	0.24	0.02	0.03	0.10
HT18-32	HT18-32-1030	0.13	0.00	0.00	0.04
HT18-32	HT18-32-3050	0.16	0.00	0.00	0.05
HT18-32	HT18-32-5070	0.16	0.00	0.00	0.06
HT18-32	HT18-32-SURF	0.53	0.00	0.01	0.18
HT18-32	HT18-32-SURF-FD	0.28	0.01	0.03	0.11

NOTES:
FD = Field Duplicate.
ND = Non Detect.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.
PEC-Q = Probable effects concentration quotient.
Mean PEC-Q = mean PEC-Q metals + PEC-Q Total 17PAHs + PEC-Q Total PCBs/3.

Location ID:		HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06	HT18-07	HT18-08	HT18-09
Analyte	**PEC**									
PAHs (µg/kg)										
Total PAH17 ND=1/2RL	22800	5570	13693	16202	490.35	22260	8515	7112	**86080**	7898
PCB Aroclors (µg/kg)										
Total PCBs ND=0	676	93	48	**2900**	11	**1770**	**6000**	**1600**	75	460
Metals (mg/kg)										
Arsenic	33	10.1	8.3	11.6	5.3	10.4	11.1	9.4	**34.1**	12
Cadmium	4.98	1.4	1.1 U	**25.1**	0.8 U	**8.3**	**12**	**16.2**	1.9	**5**
Chromium	111	26.3	23.1	**232**	15.6	100	**117**	**134**	31.9	53
Copper	149	32.4	69.9	**196**	19.2	**162**	100	124	143	64.5
Iron	40000	22100	19700	23200	13100	26300	26000	19400	25600	28700
Lead	128	55	85.4	**502**	15.4	**461**	**317**	**248**	**175**	125 J
Mercury	1.06	0.12 U	0.23 J	**1.5 J**	0.13 U	**1.2 J**	0.96	0.65	**1.3**	0.67
Nickel	48.6	29.7	28.8	**101**	17.9	**61.5**	**78.9**	**55.2**	40.2	**53.5**
Silver	2.2	2.7 U	2.2 U	**4.8**	1.6 U	1.8	**2.9**	**3.3**	1.2 U	2.8 U
Zinc	459	119	121	**1010**	70.9	**715**	**584**	**659**	287	274

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

Bolded and shaded detected values ≥ PEC screening value.
Bolded and shaded detected values ≥ 2X PEC screening value.
Bolded and shaded detected values ≥ 3X PEC screening value.

NOTES:
µg/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.

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

	Location ID:	HT18-10	HT18-11	HT18-12	HT18-14	HT18-15	HT18-16	HT18-17	HT18-18	HT18-19	HT18-20	HT18-21	HT18-23	HT18-24
Analyte	**PEC**													
PAHs (µg/kg)														
Total PAH17 ND=1/2RL	22800	2071.1	2925.9	16470	**38970**	6964	1637.9	440.9	**86820**	**105330**	5205	2738.8	2620.4	8741
PCB Aroclors (µg/kg)														
Total PCBs ND=0	676	8.2	58	218	130	49	18	11	24	22	210	25	24	29
Metals (mg/kg)														
Arsenic	33	2.5	9.1	11.1	6.2	9.8	5.2	9.3	9.8	11.4	5.5	5.1	8	5.9
Cadmium	4.98	0.53 U	1.3	**9.1**	2.6	0.7 U	1.2	0.48 U	**14.4**	**10.8**	3.7	0.56 U	1.3 U	0.92 U
Chromium	111	11.7	32.3	82.9	28.4	21.2	39.6	18.6	36.7	35.1	27.6	96.8	29.5	19.8
Copper	149	5	45.6	**156**	40.7	19.5	44.3	18.2	**302**	**274**	125	26.5	41.2	51
Iron	40000	6750	25700	21800	15600	20600	15700	19600	21200	16100	21100	21100	23900	19000
Lead	128	22.9 J-	49.4 J-	**306**	93.5	13.6 J	**288 J**	22.2 J	**623 J**	**624**	**157**	**143**	41.4 J	45.5 J
Mercury	1.06	0.11 U	0.21	0.8	0.13 J	0.12 R	0.11 J	0.13 U	**4.8 J-**	**3.5 J-**	0.19 J-	0.059 J	0.29 U	**1.4**
Nickel	48.6	7.5	36.3	**54**	17.6	26	43.8	25.1	42.7	36.7	27.2	8.5	34.3	24.8
Silver	2.2	1.1 U	1 U	1.1 J	1.1 U	1.4 U	0.16 J	1 U	**2.6**	1.9	1.5 U	1.1 U	2.6 U	1.8 U
Zinc	459	26.6	167	**535**	121	68.6	139	51.3	**772**	**769**	108	46.7	146	133

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

Bolded and shaded detected values ≥ PEC screening value.
Bolded and shaded detected values ≥ 2X PEC screening value.
Bolded and shaded detected values ≥ 3X PEC screening value.

NOTES:
µg/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.

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

	Location ID:	HT18-25	HT18-26	HT18-27	HT18-29	HT18-30	HT18-31	HT18-32
Analyte	**PEC**							
PAHs (µg/kg)								
Total PAH17 ND=1/2RL	22800	**117500**	11712	**30426**	10179	12100	297.5	595.9
PCB Aroclors (µg/kg)								
Total PCBs ND=0	676	21.3	50	18	25	120	41	23.6
Metals (mg/kg)								
Arsenic	33	12.8	4.2	8.1	7.3	13.6	10.6	7
Cadmium	4.98	**10.3**	1.8	0.55 J	0.58	**20**	1.2 U	0.89
Chromium	111	76.3	21.7	38.5	21.3	**160**	26.6	23.3
Copper	149	**217**	35.1	25.9	36.6	134	30	27.1
Iron	40000	22000	11200	24400	11500	27000	23700	19700
Lead	128	**524**	113 J	52.1	98.7 J-	**252**	21.1 J-	26.6
Mercury	1.06	**3.4 J-**	0.16 U	0.3	0.17	**1.2**	0.17 J	**2.8**
Nickel	48.6	39.4	19.8	**48.8**	10.8	**53.6**	33.1	30.8
Silver	2.2	**3**	1.2 U	1.1 U	1 U	2.2 U	2.3 U	1.5 U
Zinc	459	**837**	137	98.5	96.3	**532**	93.6	103

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

Bolded and shaded detected values ≥ PEC screening value.
Bolded and shaded detected values ≥ 2X PEC screening value.
Bolded and shaded detected values ≥ 3X PEC screening value.

NOTES:
µg/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.

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

TABLE 6-2 Hot Spot PAH ESBTUs

	HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06	HT18-07	HT18-08	HT18-09	HT18-10
Analyte										
PAH ESBTUs	**1.23**	**2.75**	**1.17**	**0.07**	**1.55**	**3.50**	**1.32**	**3.83**	0.98	**1.83**

	HT18-11	HT18-12	HT18-13	HT18-14	HT18-15	HT18-16	HT18-17	HT18-18	HT18-19	HT18-20
Analyte										
PAH ESBTUs	0.20	**1.96**	**1.28**	**4.16**	0.95	0.09	0.14	4.07	**10.08**	**1.75**

	HT18-21	HT18-23	HT18-24	HT18-25	HT18-26	HT18-27	HT18-29	HT18-30	HT18-31	HT18-32
Analyte										
PAH ESBTUs	0.43	0.15	0.98	**3.95**	**2.61**	**4.05**	**2.02**	**1.89**	0.03	0.11

Bolded and shaded values 1≤ ESBTU < 7.5.
Bolded and shaded values 7.5 ≤ ESBTU < 10.
Bolded and shaded values ≥ 10 ESBTU.

NOTES:
ESBTU = Equilibrium Partitioning Sediment Benchmark Toxic Unit
PAH = Polycyclic aromatic hydrocarbon.

	HT18-01	HT18-02	HT18-03	HT18-04	HT18-05	HT18-06	HT18-07	HT18-08	HT18-09	HT18-10
Analyte										
PEC-Qs	0.08	0.10	0.07	0.08	**1.62**	**3.41**	**1.28**	0.07	**0.55**	0.07

	HT18-11	HT18-12	HT18-13	HT18-14	HT18-15	HT18-16	HT18-17	HT18-18	HT18-19	HT18-20
Analyte										
PEC-Qs	0.03	0.05	0.05	0.08	0.07	0.20	0.07	0.07	0.04	0.07

	HT18-21	HT18-23	HT18-24	HT18-25	HT18-26	HT18-27	HT18-29	HT18-30	HT18-31	HT18-32
Analyte										
PEC-Qs	0.09	0.05	0.06	0.04	0.04	**0.56**	0.24	**0.57**	0.10	0.10

Bolded and shaded values 0.5 ≤ PECQ < 1.
Bolded and shaded values 1 ≤ PECQ < 5.
Bolded and shaded values ≥ 5 PECQ.

NOTES:
HT = Harbortown
PAH = Polycyclic aromatic hydrocarbon.
PEC-Q = Probable effects concentration quotient.

Appendix A

Field Logbooks and Data Collection Forms

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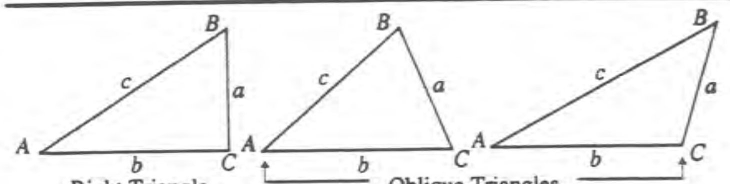
A1. Field Team Lead Logbook

TRIGONOMETRIC FORMULÆ



Right Triangle Oblique Triangles

Solution of Right Triangles

For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\text{cosec} = \frac{c}{a}$

Given	Required	
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B$, $c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B$, $b = \sqrt{(c + a)(c - a)} = c\sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90° - A$, $b = a \cot A$, $c = \frac{a}{\sin A.}$
A, b	B, a, c	$B = 90° - A$, $a = b \tan A$, $c = \frac{b}{\cos A.}$
A, c	B, a, b	$B = 90° - A$, $a = c \sin A$, $b = c \cos A$,

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C$, $\tan \frac{1}{2}(A - B) = \frac{(a-b) \tan \frac{1}{2}(A+B)}{a + b}$, $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{b\,c}}$, $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{a\,c}}$, $C = 180° - (A + B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, $\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	$\text{area} = \frac{b\,c \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN CHINA

6256136 HARBORTOWN - UPSTREAM 10-22-18

0800 EA (R. DARNTON / D. SHIMSHOCK)
ON-SITE. D. Shimshock complete
utility locate.
R. DARNTON ON mudpuppy w/ EPA
1000 - M. Durbano + E. Cline ON-SITE
FIELD BOOKS:
#1 - PM with K. Kowalk
#2 - Processing with M. Durbano
#3 - Collection with R. Darnton
1830 Cores picked up from mudpuppy
1900 EA Off-SITE

6256136 HARBORTOWN - UPSTREAM 10/23/18

0830 Crew on site → R. Damton, M. Durbano, E. Cline, D. Shimshock.
Book #2 with M. Durbano in core processing area
Book #3 with R. Damton on mudpuppy - core collection
1030 K. Kowalk on-site
1215 Pick up cores from mudpuppy
1400 K. Kowalk off-site
1840 EA off site

K.

6256136 HARBORTOWN - UPSTREAM 10/24/18

0730 EA on-site - same crew + log books with same as 10/23/18.
1900 EA off site

62560136 HARBORTOWN-UPSTREAM 10/25/18

0730 EA ON SITE
MUDPUPPY CREW NOT AT SITE
1000 PROCESSING CONTINUES
NO MUDPUPPY CAPTAIN (HOSPITAL)
AVAILABLE = NO COLLECTION TODAY
1600 EA off site

62560136 HARBORTOWN-UPSTREAM 10/26/18

0800 EA ON-SITE (M. Durbano + E. Cline)
M. Durbano w/ Field Book #2
0915 off-site
No Mudpuppy sample collection or processing today.

62561B6 HARBORTOWN- UPSTREAM 10/29/18
0800 EA (R. DARNTON + D. Shimshock)
ON-SITE W/ Mudpuppy
R. DARNTON W/ FIELD BOOK #3.
- NO CORE PROCESSING TODAY - AM
1100 EA ON-SITE - collect cores
from Mudpuppy + process - M. Dobano Book #2.
1900 EA off SITE

62561B6 HARBORTOWN - UPSTREAM 10/30/18
0730 EA ON-SITE (M. Dubano w/ Book #2)
R. DARNTON (Book #3)
+ D. Shimshock +
E. Cline to process
remaining cores.
1730 EA - off SITE

10/31/18 HARBORTOWN-UPSTREAM 6256136

N/A

8.

A2. Core Processing Logbook

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CONTENTS

PAGE	REFERENCE	DATE

Location Detroit Date 10/22

Project / Client EPA R5

1200 arrive @ Belle Isle processing facility with Ryder truck.

crew: EA
M. Darbano
E. Cline
D. Shimshock

1300 Home depot visit ~~for~~ supplies

1430 H+S Briefing. setting up core processing area.

1540 Drums and roll off delivered

1830 pick up cores from St. Jean street boat ramp

1900 scan forms and log book

MRD

Location Belle Isle, MI Date 10/23
Project / Client EPA R5

0830 arrive on site

crew: EA 35°F sunny
m. Durbano
D. Shimshock
E. Cline

0950 HT18-30 opened
PID calibrated

		PID ppm
1035	collected: 0-1 ft	1.7
	1-3 ft	3.3
	3-5 ft	4.2
	5-7 ft	6.3
	7-10 - archive	4.7

1135 HT18-29 opened

1200 collected: 0-1.2 ft
PID = 0.8

~~1200 HT 18~~

Location Belle Isle, MI Date 10/23
Project / Client EPA R5

1310 HT18-09 opened
1345 collected: 0-1 ft
1-3 ft - MS/MSD
3-5 ft - FD
5-7 ft
7-10 archive

1520 HT 18-12 opened

1540 collected: 0-1 ft
1-3 ft
3-5 ft
5-7 ft
7-10 ft - 7-9.7'

1650 opened HT18-08

1710 collected: 0-1'
1-2 - 1-2.3' - FD
2-4 - 2.3-4.6'
4.5-6.5 - 4.6-6.5'
6.5-8.0 - 6.5-8.0' archive

Location Belle Isle, MI Date 10/23

Project / Client EPA R5

1840 pack up. scanning. Prep for tomorrow.

MRD

Location Belle Isle, MI Date 10/24

Project / Client EPA R5

0730 arrive on site 30°F cloudy

Crew: EA
M. Dalbono
E. Cline
D. Shimshock

0810 HT18-11 opened

0830 collected: 0-1'
1-3'
3-5'
5-7'
7-10 archive

0905 TA courier pick up
3 coolers.

0930 opened HT18-10

0940 collected: 0-1'
only 1' of recovery total

Location Belle Isle, MI Date 10/24
Project / Client EPA R5

1000 HT18-23 opened
1015 collected: 0-1'
1-3'
3-5'
5-7' - MS/MSD
7-10 archive

1115 opened HT18-24
1140 collected: 0-1'
1-2.5'
2.5-5'
5-6.5' - FD
6.5-7.5' archive
1200 Diane en route to pick cores from St. Jean street Boat ramp.

1440 opened HT18-25
1510 collected: 0-1' 4.2-7
1-3' 7-10 arch
3-4.2

Location Belle Isle, MI Date 10/24
Project / Client EPA R5

1555 opened HT18-26
1610 collected; 0-1'
1-3'
3-5' - FD
5-7'
7-10 archive
1650 opened HT18-27
1710 collected: 0-1'
1-2'
Only 2' of recovery possible draw down in core see core logs for more information.

1740 opened HT18-32
1800 collected: 0-1' - FD
1-3'
3-5'
5-7
1900 Breakdown leaving site
/MRD

Location Belle Isle, MI Date 10/25

Project / Client EPA R5

0730 arrive on site

crew: EA 30°F Sunny

M. Durbano | DEQ | EPA
E. Cline | L. Schoen | R. Elison
D. Shimshock | S. Bital

0825 opened HT 18-31

0830 collected: 0-1',
1-2.5',
2.5-5.5',
5.5-6.5'

0900 TA courier pick up

1000 opened HT 18-15

1010 collected: 0-0.5'
0.5-3.0' - MS/MSD
3-5' - FD

1105 opened HT 18-17

1120 collected: 0-1'
1-3'
3-5'

Location Belle Isle, MI Date 10/25

Project / Client EPA R5

1150 opened HT 18-18

1205 collected: 0-1.9',
1.9-2.8',
2.8-3.6',
3.6-5.4'

1420 opened HT 18-19

1435 collected: 0-.9'
.9-2.3',
2.3-2.8'

1455 opened HT 18-20

1505 collected: 0-0.8'
0.8-1.8'
1.8-2.8' - FD

1535 opened HT 18-21

1545 collected: 0-1.7'

1600 packing up for end of day

/MRD

Location Belle Isle, MI Date 10/26
Project / Client EPA R5

0800 arrive on site

40° f cloudy crew: EA
M. Durbano
E. Cline

0820 sampling waste drums
Drums labeled

0900 TA courier pick up.

0905 leaving site

MRD

Location Belle Isle, MI Date 10/29
Project / Client EPA R5

1100 arrive on site

30° F cloudy crew: EA
M. Durbano
E. Cline

1115 fill ryder truck with gas.

1240 waiting on cores collected after lunch.

1345 opend HT18-06

1410 collected: 0-1'
1-3' - FD
3-6' - MS/MSD
6-7.1'
7.1-8.1'
~~8.1-9.7'~~
8.1-10'

Location Belle Isle, MI Date 10/29
Project / Client EPA R5

1500 opened HJ 18-04
1520 collected: 0-0.6'
0.6-3.3' - FD
3.3-4.3'

1605 opened HJ 18-07
1630 collected: 0-1.8'
1.8-4.8'
4.8-7.0'
7.0-8.9'

1720 HJ18-13 opened
1755 collected: 0-1'
1-3'
3-5'
5-6.3'
6.3-8.8' - FD
8.8-10.1'

Location Belle Isle, MI Date 10/29
Project / Client EPA R5

1840 cores loaded into ryder truck. core collection complete 22 + 28 abandoned

1900 scanning daily sheets

/ MRD

Location Belle Isle, MI Date 10/30

Project / Client EPA R5

0730 arrive on site

30°F still dark crew: EA

M. Durbano
E. Cline
R. Darnton
D. Shimshock

opened 0825 HT 18-14

0850 collected: 0-1.3'
1.3-1.4'

0915 opened HT 18-01

0940 collected: 0-1'
1-3' - MS/MSD
3-5'
5-7' - FD
7-8.6'

1040 HT 18-02 opened

1100 collected 0-1'
1-3'
3-6.1'
6.1-7.8'
7.8-9.8'

Location Belle Isle, MI Date 10/30

Project / Client EPA R5

1330 HT18-03 opened

1355 collected: 0-1'
1-3' - FD
3-4.6'
4.6-6.0'

1410 opened HT18-05

1430 collected - 0-1'
1-2.7'
2.7-5.05'
5.05-5.9'

1600 Core processing complete. checking COCs, coolers and breaking down processing center

1730 leaving site

MRD

A3. Core Collection Logbook

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Location Detroit, MI Date 15 October 2018

Project / Client Harbortown-Upstream / EPA GLNPO

50°F cloudy

1045 – EA onsite at AB Ford Park, Lakewood St entrance for utility ~~entra~~ (RWO) locate MISSDIG Joint Meet.

1130 – No utilities at meet. ~~Move~~ RWO Move to the entrance to ~~Riverfront~~ - LakewoodEast Park to see if any utilities went there instead as address on ticket was ambiguous.

– Nextel and Light Tower Fiber Networks closed tickets while we're waiting.

1215 – EA offsite from Joint Meet.

1300 – Investigate shoreline access around GLWA and DTE Connor Creek Plant sites to look for any signage indicating where pipe crossings might be located.

)

October 15, 2018

Location Detroit, MI Date 19 Oct 2018

Project / Client Harbortown-Upstream / EPA GLNPO

45°F mostly cloudy Scale

0800 – EA (RWO) onsite at AB Ford Park

0900 – DTE Gas (Dennis) arrives onsite for utility meet. Unable to identify utilities of clear the ticket. DTE is attempting to contact a supervisor to determine if the ticket can be cleared.

1030 – Travel to Belle Isle staging area. Coordinate with MDNR and off load an initial set of equipment and supplies.

– Contact Maher Abbasi with City of Detroit regarding utility ticket. Mr. Abbasi is looking into whether water utilities have been marked.

October 19, 2018

Location Detroit, MI Date 22 Oct 2018

Project / Client Harbortown - Upstream

45°F partly cloudy Wind West 10-15 knots

0840 - EA (RWD) onsite at Kean's Marina
- R/V Mudpuppy crew (Kaitlin, Mark, and Joe), EPA (Rose Ellison) onboard. Load gear.

0915 - Safety meeting. Discuss chemicals of concern, utilities,

0925 - Depart dock

0935 - Check control point.

0950 - On location at HT18-30. First location east of MacArthur Bridge
- Collect core. 10 ft push, no refusal. 9.2 ft net recovery (92%). Collect Ponar at 1025

1045 - Sampling complete anchors up

1055 - Anchors down. On location at HT18-29
- Probing indicates gravel

1115 - Collect Ponar. Three attempts consolidated into one tray. sand with some gravel and lots of mussel shells, → 5 jars

1135 - Collect core. Refusal at 1.5 ft net recovery 1.2 ft.

1145 - Anchors up. Depart HT18-29 RWD

Location Detroit, MI Date 22 Oct 2018

Project / Client Harbortown - Upstream / EPA GLNPO

55°F partly cloudy Scale

1200 - Offload samples at Detroit Police Station on Belle Isle

1230 - Tie up at Kean's marina for lunch.

1355 - Depart Keans marina

1405 - Anchors down. On location at HT18-12.

1420 Collect core. no refusal, full 10 ft push. recover 9.7 ft, no loss.

1435 Collect ponar. Dark gray/brown silt with some SAV. Collected FD → 10 jars
live juvenile lamprey in grab. Took photos.

1455 anchors up. Depart HT18-12

1500 - tied up along seawall for HT18-11

1515 - Collect ponar. brown/gray silt with a few pieces of SAV. → 5 jars

1521 - Collect core. no refusal. 10 ft push, 9.4 net recovery.

1535 - Depart from HT18-11

1540 - Anchors down. On location at HT18-10

RWD

Location Detroit, MI Date 22 Oct 2018
Project / Client Harbortown-Upstream/EPA GLNPO
55°F mostly clear

1555 - Collect core. Refusal at 2.0 ft
gross recovery 1.35 ft, net
recovery 1.05 ft
1610 - Collect ponar. ~~mostly sand~~
brown/gray sand with a few
pieces of SAV
1620 - Anchors up. Depart location HT18-10
- Discussion with EPA (Rose Ellison)
regarding relocating locations
HT18-20 and HT18-22 from
their current coordinates to points
within Connor Creek.
1625 - Anchors down. On location at
HT18-09
1635 - Collect Ponar. Gray/brown silt
Collect MS/MSD → 13 jars
1655 - Collect core. Full 10 ft push,
no refusal. Net recovery
9.6 ft.
1705 - Anchors up. Depart from HT18-09
1720 - Anchors down. On location at
HT 18-08
Water depth 8.8 ft

RWO

Location Detroit, MI Date 22 Oct 2018
Project / Client Harbortown-Upstream/EPA GLNPO
55°F mostly clear Scale

1730 - Collect core. Full 10 ft push, no
refusal. 8.0 ft net recovery.
1745 - collect ponar. Gray/brown silt
with a couple pieces of organic debris
→ 5 jars
1755 - Anchors up. Depart from
HT18-08
1805 - Transfer samples and cores to
EA personnel onshore at St. Jean
Boat ramp
1815 - Tie up at Keans marina, Offload
remaining gear
1835 - Restock decon chemicals and
scan data sheets at processing
center.

October 22, 2018

Location Detroit, MI Date 23 Oct 2018

Project / Client Harbortown-Upstream/EPA GLNPO

47 °F partly cloudy

0745 - EA onsite at Keans Marina.
0800 - Load equipment onto Mudpuppy
0830 - Untie, depart from Kean's marina after checking GPS reference point.
0845 - Anchors down. On location at HT18-28. Probing indicated hard pack sand. EPA opted to abandon the location and move it elsewhere.
0900 - Anchors up. HT18-28 abandoned but may be established at a different location per EPA.
0905 - Anchors down. On location at HT18-27 probing indicates gravel, 1st attempt will be with a 5ft core tube.
- 3 ponar attempts yielded almost all mussel shells with <10% sand. No samples collected per EPA.

0935 - ~~0935~~ RWO 1st attempt core unsuccessful - no recovery. shift ≈10 ft toward shore for 2nd attempt

RWO

Location Detroit, MI Date 23 OCT 2018

Project / Client Harbortown-Upstream/EPA GLNPO

50 °F sunny and clear wind NW 5-10 Scale

0945 - 2nd attempt core, refusal at 3 ft, net recovery ~~at~~ RWO 2.0 ft
- 3 additional attempts at getting a surface grab after shifting ≈10ft during coring. Mussels and sand, very little recovery. No samples collected.
1015 - Anchors up. Depart HT18-27
1020 - Anchors down. On location of HT18-32
1030 - Collect ponar. dark gray silt with some clay, a few pieces of organic detritus. Collect FD → 10 jars
1050 - Collect core. ~~7.0~~ RWO Refusal at 7.0 ft, net recovery 7.1 ft.
1100 - Anchors up. Depart from HT18-32
1115 - Anchors down. On location at HT18-31
1125 - Collect core. Refusal at 6.75 ft net recovery 6.6 ft.
1135 - Collect ponar. dark gray silt, light brown surface ~~layer~~ film, a few pieces of SAV. → 5 jars
1155 - Anchors up. Depart HT18-31.
1210 - Tie up at police dock. Offload cores and surface samples to EA processing personnel

RWO

Rite in the Rain

Location Detroit, MI Date 23Oct2018
Project / Client Harbortown - Upstream / EPA GLNPO
52°F partly cloudy

1220 - Measure reference point west of MacArthur Bridge.
1245 - Tie up at Sinbad's for lunch,
1400 - Untie and Depart from Sinbad's
1420 - Anchors down. On location at HT18-26
1425 - Collect ponar, Two attempts consolidated into one tray. gray/brown silt with sand and mussel shell fragments with a few pieces of SAV. → 5 jars
1440 - Collect core, full 10 ft push, no ~~recovery~~ RWO refusal, net recovery 9.5 ft, hydrocarbon odor and sheen
~~15~~ 1450 - Anchors up. Depart HT18-26
1455 - tie up along seawall for HT18-25
1500 - Collect core, full 10 ft push, no refusal, net recovery 9.5 ft
1510 - Collect Ponar, gray/brown silt with some very fine sand and SAV Collect MS/MSD → 13 jars
1530 - Anchors up. Depart HT18-25
1535 - Anchors down. On location at HT18-24

RWO

Location Detroit, MI Date 23 OCT 2018
Project / Client Harbortown - Upstream / EPA GLNPO
52°F partly cloudy Northwind 5 mph

1545 - Collect ponar, gray/brown silt with sand. → 5 jars
1600 - 1st core attempt. Used 5 ft tube, no refusal, saved, but noted "do not use" on cap and tube
1610 - 2nd attempt core ~~refu~~ RWO using 10 ft tube. refusal at 9 ft, net recovery 7.8 ft.
1630 - Anchors up. Depart HT18-24
1640 - Anchors down. On location at HT18-23.
1655 - 1st core attempt. refusal at 3.5 ft, net recovery 1.7 ft
1700 - 2nd core attempt using 5 ft tube. Full 5 ft push, no refusal
1715 - 3rd attempt core, full 10 ft tube full 10 ft ~~core~~ RWO, no refusal net recovery 9.2 ft.
1730 - collect ponar, gray silt with SAV → 5 jars
1745 - Anchors up. Depart HT18-23
1800 - Offload samples and gear at Detroit Police dock. EA (RWO) RWO

Rite in the Rain

Location Detroit, MI Date 23 Oct 2018

Project / Client Harbortown - Upstream / EPA GLNPO

disembarks from R/V Mudpuppy.

1830 - Transfer samples to fridge truck. Restock supplies for the next day of sampling.

Ryan

October 23, 2018

Location Detroit, MI Date 24 Oct 2018

Project / Client Harbortown - Upstream / EPA GLNPO

40 °F sunny and clear Scale

0730 EA (RWO) onsite at Reams Marina

0800 - Load sampling gear and prep for departure

0845 - Untie from dock. Depart Reams Marina

0900 - Anchors down. On location at HT18-21

0915 - Collect ponar. four attempts consolidated into one tray to get adequate volume. brown/gray silt, sand, gravel mix with SAV and one juvenile goby.

RWO → 5 jars

~~0935~~ ~~0930~~

0925 1st attempt core, penetration 4 ft, poor recovery, material not kept

0930 2nd attempt core, Refusal at 2 ft, net recovery 1.75 ft.

0955 - Anchors up. Depart HT18-21

1000 - Anchors down. On location at HT18-20, EPA shifted location to west of the marina mouth.

- Depth 25.9 ft

1015 - collect core, refusal at 3.25 ft net recovery 3.0 ft

RWO

Location Detroit, MI Date 24 OCT 2018

Project / Client Harbortown-Upstream / EPA GLNPO

42°F mostly clear, sunny. North wind 5 mph

1025 – Collect ponar, gray/brown silt with sand and mussel shells, and a live invertebrate → 5 jars

1040 – Anchors up. Depart HT18-20

1050 – Anchors down. On location at HT18-19

1100 – Collect ponar, two attempts consolidated in to one tray. gray/brown silt sand mix with mussel shells and a few pieces of SAV. Both native and dreissenid mussels → 5 jars

1115 – Collect core. Refusal at 3.25 ft. Net recovery 3.0 ft

1125 – Anchors up. Depart HT18-19

1130 – Anchors ~~up.~~ RWO down. On location at HT18-18

1145 – Collect core, refusal at 6.0 ft, net recovery 5.4 ft. sheen and odor observed during core retrieval.

1200 – Collect ponar, gray silt, light brown film, few pieces of SAV → 5 jars

RWO

Location Detroit, MI Date 24 OCT 2018

Project / Client Harbortown-Upstream / EPA GLNPO

42°F mostly clear, sunny North wind 5 mph Scale

1220 Anchors up. Depart HT18-18

1230 Tie up at St. Jean boat launch transfer cores and surface samples to EA personnel onshore at St. Jean Boat Ramp

1245 – Tie up at Kean's Marina for lunch

1425 – Untie from dock. Depart Keans Marina.

1435 – Anchors down. On location at HT18-17. Location shifted offshore by EPA, south of Manoogian Mansion (Detroit Mayor's Residence).

1445 – Collect ponar, brown/gray sand/silt mix with mussel shells and invertebrates → 5 jars

1500 – Collect core, ~~full 5 ft push, no refusal. EPA instructed 5 ft core is sufficient because bottom material appears to be native clay.~~ refusal at 4.5 ft, net recovery 4.6 ft

1515 Anchors up. Depart HT18-17

RWO

Location Detroit, MI Date 24 Oct 2018

Project / Client Harbortown - Upstream / EPA GLNPO

48°F mostly cloudy N wind 5mph

1525 - Anchors down. On location at HT18-16. water depth 5.7 ft

1540 - 1st attempt core, <1 ft penetration, no recovery. shift 5 ft north

1543 - 2nd attempt core, 0.5 ft penetration, no recovery. shift 10 ft west

1545 - 3rd attempt core. <1 ft penetration, no recovery,

- no core collected

1545 - Collect ponar. gray silt/sand mix with brown film, a few mussel shells and SAV → 5 jars

1605 - Anchors up. Depart from HT18-16

1615 - Anchors down. On location at HT18-15. Location shifted west to avoid water pipeline.

1635 - Collect Ponar. gray/brown silt with sand, mussel shells, and a few pieces of SAV → 5 jars

1650 - Collect core, refusal at 6.5 ft net recovery 6.8 ft

1715 - Anchors up. Depart from HT18-15

RWO

Location Detroit, MI Date 24 Oct 2018

Project / Client Harbortown - Upstream / EPA GLNPO

48°F partly cloudy N wind 5mph Scale

1730 - Tie up at St. Jean Boat Ramp. Offload cores, sample and equipment to EA onshore personnel. ~~EA disembarks~~ EA (RWO) disembarks from R/V Mudpuppy

1800 - Transfer samples to fridge truck restock supplies for next day sampling

[signature] October 24, 2018

Location Detroit, MI Date 25 Oct 2018

Project / Client Harbortown-Upstream/EPA GLNPO

45°F sunny and clear

0745- EA (RWD) onsite at Rean's Marina
- EPA (Rose Ellison) and MDEQ (Sam Noffke and Lee) onsite

0915- R/V Mudpuppy crew has not arrived. EPA and MDEQ departs to processing are to oversee core logging

0940- News that R/V Mudpuppy captain is ill and in the hospital. No vessel work for the day.

1000- EA personnel consolidates at processing center.

Ryan
October 25, 2018

Location Detroit, MI Date 29 Oct 2018

Project / Client Harbortown-Upstream/EPA GLNPO

44°F cloudy North wind 5mph Scale

0745- EA (RWD, DS) onsite at Rean's Marina.

800 - Load equipment and sample jars on to R/V Mudpuppy.

0830- Untie. Depart dock. Crew: Cetacean (Joe Bonem, Kaitlin, Mark)
EPA (Rose Ellison)
EA (Ryan Darnton, Diane Shimshak)

0840 - Anchors down. On location at HT18-~~15~~ 14 RWD

0855 - First core attempt. <1 ft penetration no recovery

0900 - 2nd core attempt, refusal at 3 ft ~~gross~~ net recovery 1.9 ft sheen and odor from core.

0910 - Collect ponar. two attempts consolidated into one tray.
~~Shee~~ → 5 jars RWD

0920 - Anchors up. Depart HT18-~~15~~ 14 (RWD)

0930 - Anchors down. On location at HT18-13

RWD

Location Detroit, MI Date 29 OCT 2018

Project / Client Harbortown - Upstream / EPA GLNPO

45 °F cloudy, wind North 5mph

0940 - Collect ponar sample. 5 Jars
Gray silt with light brown film
on top.

0950 - Collect core. full 10 ft push,
no refusal. net recovery 9.8 ft

1005 - Anchors up. Depart HT 18-13

1015 - Anchors down. On location at HT18-07

1030 - Collect core. full 10 ft push,
no refusal. net recovery 8.6 ft

1040 - Collect ponar sheen observed from both ponar and core
Dark Gray Silt w/ fine grained
~~organics~~ DMS sand, Trace Organics
Brown film, Sheen

~~1048~~ 1050 DMS - Anchor up. Depart to
location HT18-6

1100 - Anchor Down @ HT18-6, Location
Shifted ~25ft Southwest - South
east of Connor Creek Power plant

1105 - Collect ponar. Dark gray silt
with trace sand and trace organics,
light brown film on top. organic odor.
PID reading 0.4 ppm

1120 - Collect core. full 10 ft push,
no refusal, net recovery 9.2 ft

RWO

Location Detroit, MI Date 29 OCT 2018

Project / Client Harbortown - Upstream / EPA GLNPO

45 °F cloudy wind WNW 5-10 mph Scale

- pockets of air noted inside core

1130 - Anchors up. Depart HT 18-06

1140 - Anchors down. On location at
HT 18 ~~05~~ 04 RWO
- SE of Bayview Yacht Club, shifted
≈ 50 ft south per EPA

1155 - Collect core, 1st attempt refusal at
6 ft. net recovery 4.2 ft

1200 - Collect ponar. Gray Brown
Silt with Some ~~organics~~ DMS
Sand. Trace Organics Brown
Film 5 Jars.

1215 - Anchors up. Depart from HT 18-04

1230 - Tie up at Kean's Marina gas dock
Offload cores and surface
Samples to EA truck onshore.

1240 - Tie up at Kean's Marina slip for lunch

1425 - Untie. Depart Kean's Marina
Crew: Joe, Caitlin, Mark (Cetacean)
Rose Ellison (EPA)
Ryan Darnton (EA)

1440 - check GPS reference point at AB Ford
park.

1450 - Anchors down, On location at
HT18-01

RWO

Location Detroit, MI Date 29 Oct 2018

Project / Client Harbortown - Upstream / EPA GLNPO

partly cloudy 52 °F wind NW 10 mph

1455 - Collect ponar. brown/gray silt with trace organics. Collect FD → 10 jars

1510 - Collect core, refusal at 8.75 ft, net recovery 8.2 ft.

1525 - Anchors up. Depart HT18-01

1535 - Anchors down. ~~Onsite~~ RWD location at HT18-02

1545 - Collect core full 10 ft push, no refusal, net recovery 9.0 ft

1555 - collect ponar. dark gray silt with fibrous organics and trace sand, light brown film on top → 5 jars

1610 - Anchors up. Depart HT18-02

1620 - Anchors down. On location at HT18-05. Mouth of Connor Creek.

1625 - Collect ponar. dark brown silt with trace organic fibers, light brown film on top. sewage smell. → 5 jars

1635 - Collect core. refusal at 6.5 ft, net recovery 5.5 ft.

RWD

Location Detroit, MI Date 29 Oct 2018

Project / Client Harbortown - Upstream / EPA GLNPO

partly cloudy 52 °F wind NW 10 mph Scale

1650 Anchors up. Depart from HT18-05

1700 Anchors down. On location at HT18-03 Location moved into Connor Creek by EPA. Probing initially indicated rocks close to outfall. Anchors up to shift location farther downstream within Connor Creek.

1715 Anchors down. On location at HT18-03

1720 - Collect core. ~~Full 10 ft push~~ RWD ~~no refusal~~ Refusal at 6.25 ft net recovery 5.9 ft. black CSO material

1725 Collect ponar. black silt, sewage odor. → 5 jars

1750 Anchors up. Depart HT18-03

~~EPA~~ Locations HT18-22 and HT18-28 abandoned/not sampled per EPA field guidance. Vessel based sampling complete

1800 - Tie up at St. Jean boat ramp. Offload cores to EA truck onshore.

1810 - EA disembarks

1845 - Offload gear and samples at processing center.

RWD October 29, 2018

A4. Field Data Collection Forms

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EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18- 01	Sheet 1 of 1

1 Geologist Name/Signature	5 Project Number	CORE COLLECTION INFO	
Emily Cline EBC	6256136	8 Date/Time Collected: 29Oct.18/1510	Date/Time Processed: 30Oct18/0940
2 Drilling Subcontractor/Equipment Operator: EPA R/V Mudpuppy	6 Latitude/Northing/Grid: 42°21.360451'N	9 Sed Surface Elevation 568.2 ft	
		10 Coordinate System H NAD83 V NAVD88	
		11 Depth of Water, ft (start/end): 7.1	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°56.568433'W	12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain NW 10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: 10 -ft barrel 4 -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
8.75	8.2	93.7%

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' 100%	fine to medium sandy silt with trace roots and shell. 10YR 4/1 Dark Gray	0010 0-1'	0.4	ML
1-3'	2' 100%	fine sandy clay and clayey silt with trace granules and shell. 10YR 4/1 Dark Gray	1030 1-3' MS/MSD	0.5	CL/ ML
3-5'	2' 100%	Clayey silt with trace roots and shell. 10YR 4/1 Dark Gray	3050 3-5'	0.6	~~CL~~ EBC ML
5-7'	2' 100%	alternating layers of clayey silt and very fine silty sand with trace pebbles. 10YR 4/1 Dark Gray	5070 5-7' FD	0.6	ML/ SM
7'-8.6'	1.6' 100%	clayey silt to silty clay with trace shell and organics. Fine silty sand layer at 7.8'-7.9' 10YR 3/1 Very Dark Gray	7085 7-8.6' Archive	0.7	ML/ CL

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 02	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline / ~~Effe~~	5 Project Number: **6256136**	**CORE COLLECTION INFO** 8 Date/Time Collected: 29Oct18/1545; Date/Time Processed: 30Oct18/1100	
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42° 21.325964'N	9 Sed Surface Elevation: 565.2 ft	
		10 Coordinate System: H **NAD83** V **NAVD88**	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°56.779133'W	11 Depth of Water, ft (start/end): 10.1	
		12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain NW 10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: **10** -ft barrel **4** -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	9.0	90%

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' 100%	Clayey silt with some fine sand and trace shell and construction debris. 10YR 4/1 Dark Gray	0010 0-1'	0.5	ML
1'-3'	2' 100%	Clayey fine sand 10YR 4/1 Dark Gray	1030 1-3'	0.3	SC
3-6.1'	3.1' 100%	with trace medium sand	3060 3-6.1'	0.2	SC
6.1-7.8'	1.7' 100%	fine to very coarse silty sand with stiff clay nodules through section. 10YR 2/1 ~~Very~~ Black	6080 6.1'-7.8'	0.6	SM/CH
7.8-9.2'	1.4' 100%	Silty fine sand with trace clay. 10YR 3/1 Very Dark Gray	8090 7.8-9.2'	0.5	SM

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 03	Sheet 1 of 1
1 Geologist Name/Signature Emily Cline / EC	5 Project Number **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 29Oct18/1720 **Date/Time Processed** 30Oct18/1355	
2 Drilling Subcontractor/Equipment Operator **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid 42°21.533856'N	9 Sed Surface Elevation 557.8 ft 10 Coordinate System H **NAD83** V **NAVD88** 11 Depth of Water, ft (start/end) 17.5	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°57.306525'W	12 Weather (Temp, circle conditions, wind direction) 52°F Sunny/Cloudy/Rain NW 10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: **10** -ft barrel **4** -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
6.25'	5.9'	94.4%

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' 100%	Very fine sandy silt with trace medium to coarse sand and ~~with~~ organics. Hydrocarbon odor 10YR 3/1 Very Dark Gray	0010 0-1'	0.2	OL
1-3'	2' 100%	As above, increasing organics with depth. 10YR 3/1 Very Dark Grey	1030 1-3' FD	8.0	OL
3-~~5~~ 4.6'	1.6' 100%	Organic silt with trace fine to coarse sand and roots. 10YR 2/1 Black	3045 3-4.6'	8.5	OL
4.6-6'	1.4' 100%	Stiff clay with few fine sand and trace pebbles and granules. 10Y 4/1 Dark Grey	4560 4.6-6'	0.9	CH
6'-6.35	0.35' 100%	Fine to medium sandy organic silt. Trace granules, pebbles, and coarse sand. 10YR 2/1 Black	No sample; not enough material.	3.0	OL

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 04	Sheet 1 of 1
1 Geologist Name/Signature Emily Cline / ECC	5 Project Number **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 29 Oct 18/1155 **Date/Time Processed** 29 Oct 18/1520	
2 Drilling Subcontractor/Equipment Operator **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid 42°21.291181' N	9 Sed Surface Elevation 566.9 *ft* 10 Coordinate System H **NAD83** V **NAVD88** 11 Depth of Water, ft (start/end) 8.4	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°57.042887' W	12 Weather (Temp, circle conditions, wind direction) 45°F Sunny/Cloudy/Rain WNW 5-10mph	

4 Sampling Equipment and Methodology (Check One)

- Rotosonic: ____ -ft barrel ____ -in diameter
- Core: 10 -ft barrel 4 -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
6.0	4.2	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*
0-0.6'	0.6' 100%	Clayey fine sand with organic silt in the top 0.2'. Trace granules + few coarse sand. 10YR 5/1 Gray	0005 0-0.6'	0.2	SC
0.6'-3.3'	2.7' 100%	very fine sandy clay with clayey fine sand layer at 1.1-1.2' with trace coarse sand and trace clay. 10YR 4/1 Dark Gray	0530 0.6-3.3'	0.3	CL
3.3'-4.3'	1' 100%	Clayey fine sand grading to fine to very coarse sand with trace clay and wood 10YR 2/1 ~~FF~~ Black	3040 3.3-4.3'	0.2	SC/SW

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 05	Sheet **1** of **1**
1 Geologist Name/Signature: Emily Cline / [signature]	5 Project Number: **6256136**	**CORE COLLECTION INFO** 8 Date/Time Collected: 29Oct18/1635	Date/Time Processed: 30Oct18/1630
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42°21.313827'N	9 Sed Surface Elevation: 559.8 ft; 10 Coordinate System: H **NAD83** V **NAVD88**; 11 Depth of Water, ft (start/end): 15.5	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°57.217096'W	12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain NW 10 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: **10** -ft barrel **4** -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
6.5'	5.5'	84.6%

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' 100%	Very fine sandy silt with trace organics. 2.5YR 5/1 Gray	0010 0-1'	0.2	ML
1-2.7'	1.7' 100%	Clayey silt with organics layer from 1-1.3' and trace v. fine sand, wood and roots. 2.5YR 4/1 Dark Gray	1030 1-2.7' Dup	0.2	OL
2.7-5.05'	2.35' 100%	fine to medium sandy organic silt with trace roots and coarse sand. 2.5YR 2.5/1 Black	3050 2.7-5.05' MS/MSD	3.1	OL
5.05-5.9	0.85' 100%	fine to medium sand with some silt and trace shell. thin, stiff clay layer at 5.1' 2.5YR 3/1 Very dark gray.	5060 5.05-5.9'	0.8	SM

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 06	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline / EAC	5 Project Number: 6256136	CORE COLLECTION INFO	
		8 Date/Time Collected: 29Oct18 / 1120	Date/Time Processed: 29Oct18 / 1410
2 Drilling Subcontractor/Equipment Operator: EPA R/V Mudpuppy	6 Latitude/Northing/Grid: 42°21.270563'N	9 Sed Surface Elevation: 558.3 ft	
		10 Coordinate System: H NAD83 V NAVD88	
		11 Depth of Water, ft (start/end): 17.1	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°57.28943 8'W	12 Weather (Temp, circle conditions, wind direction): 44°F Sunny/Cloudy/Rain N/NW 5-10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: 10 -ft barrel 4 -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	9.2	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*
0-1	1' 100%	Clayey silt with trace organics 10YR 4/1 Dark Gray	0010 0-1'	0.1	CL
1-3'	2' 100%	Same as above, increasing clay with depth.	1030 1-3'	0.1	CL
3'-6'	3' 100%	Clayey silt interbedded with organic layers. Hydrocarbon odor and trace medium to coarse sand ~~and angular pebbles~~ EAC 10YR 3/1 Very Dark Grey	3060 3-6'	1.3	MH
6'-7.1'	1.1' 100%	Fine to medium silty sand with trace organics and shell and angular pebbles. 10YR 4/1 Dark Grey	6070 6-7.1'	4.2	SM
7.1-8.1'	1' 100%	fine to medium Sandy Silt with some organics and cultural debris (ie. comb) and wood. 10YR 2/1 Black	7080 7.1-8.1'	4.2	OH
8.1'-9.7'	1.6' 100%	sandy clay and organics with trace pebbles 10YR 3/1 very dark gray. Hydrocarbon odor.	8010 8.1-9.7'	10.3	OH

EA

LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC

Client Name and Project Name
GLAES
Harbortown - Upstream

Location/Boring Name
HT18- 07

Sheet
1 of 1

1 Geologist Name/Signature
Emily Cline

5 Project Number
6256136

CORE COLLECTION INFO

8 **Date/Time Collected** 29Oct18 / 1030
Date/Time Processed 29Oct18 / 1430

2 Drilling Subcontractor/Equipment Operator
EPA R/V Mudpuppy

6 Latitude/Northing/Grid
42° 21.272053 'N

9 Sed Surface Elevation 565.3 ft

10 Coordinate System H **NAD83** V **NAVD88**

11 Depth of Water, ft (start/end)
10.1

3 Operator Name *(License # If Required)*
Joe Bonem

7 Longitude/Easting/Grid
82° 57.468904'W

12 Weather (Temp, circle conditions, wind direction)
45°F Sunny/Cloudy/Rain W 5-10mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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): 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
0-1.8'	1.8' 100%	fine to medium Silty Sand. 10YR 4/1 Dark Gray	0020 0-1.8'	0.4	SM
1.8'-4.8'	3' 100%	Very fine sandy Silt with some clay + organics. Hydrocarbon odor 10YR 2/1 Black	2050 1.8-4.8'	15.2	MH
4.8-7'	2.2' 100%	Very fine Sandy Silt with layers of silty fine sand and clay. Trace shell. 10YR 3/1 Very Dark Grey	5070 4.8'-7'	4.1	ML
7-8.9	1.9' 100%	Clayey Silt with Some fine Sand. Hydrocarbon odor, Clay at bottom. 10YR 2/1 Black	7090 7-8.9'	9.4	ML

EA — LITHOLOGIC LOG *Sediment Collection Log* EA Engineering, Science, & Technology, Inc., PBC	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18-08	Sheet 1 of 1

1 Geologist Name/Signature: Emily Cline EJC	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 Date/Time Collected: 22Oct2018/1730; Date/Time Processed: 23Oct2018/1710
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.286307'N	9 Sed Surface Elevation 566.6 ft; 10 Coordinate System H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 8.8
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°57.543814'W	12 Weather (Temp, circle conditions, wind direction): 55°F Sunny/Cloudy/Rain SW 3-5mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: _____ -ft barrel _____ -in diameter
- [X] Core: 10 -ft barrel 4 -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
10.0	8.0	80%

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' ~~100%~~ 70% EJC	very fine sandy silt with trace clay. with trace roots. 10YR 4/1, Dark grey.	0010 0-1'	0.3	ML
1-2.3	1.3' 100%	Some granules at bottom of interval.	1020 1-2.3'	0.2	ML
2.3-4.6	2.3 100%	Fine to very coarse sand with trace silt, granules ~~silt~~ EJC and few pebbles. Hydrocarbon odor. 10B 2.5/1 Bluish Black Whole Clamshell	2045 2.3-4.6'	0.5	SW
4.6-6.5	1.9' 100%	.3' layer of coarse sandy silt overlying silty fine sand. Bluish Black (as above) to 10YR 4/1 Dark Grey	4565 4.6-6.5'	4.4	SM
6.5-8.0	1.5 100%	Silty fine sand 10YR 4/1 Dark Grey	6580 6.5-8.0'	0.5	SM
~~8-10~~	~~No Recovery~~	EJC 23Oct2018			

EA LITHOLOGIC LOG *Sediment Collection Log* EA Engineering, Science, & Technology, Inc., PBC	Client Name and Project Name: GLAES Harbortown-Upstream	Location/Boring Name: HT18-09	Sheet 1 of 1

1 Geologist Name/Signature	Emily Cline / Emily A Cline
2 Drilling Subcontractor/Equipment Operator	Cetacean
3 Operator Name *(License # If Required)*	Joe Bonem
5 Project Number	6256136
6 Latitude/Northing/Grid	42° 21.289201' N
7 Longitude/Easting/Grid	82°57.670667

CORE COLLECTION INFO

8 Date/Time Collected	22 Oct 2018 / 1630
Date/Time Processed	23 Oct 2018 / 1345
9 Sed Surface Elevation	565.7 ft
10 Coordinate System	H NAD83 V NAVD88
11 Depth of Water, ft (start/end)	9.7
12 Weather (Temp, circle conditions, wind direction)	55°F Sunny/Cloudy/Rain
13 Boring Depth (ft)	10
14 Recovery (ft)	9.6
15 % Recovery	96%
16 Location Notes	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: 10 -ft barrel 4 -in diameter Manual Push/Vibracore/Sonic
- [ ] Grab Sample: ___ -ft x ___ -ft x ___ -ft Box/~~Ponar~~/Van Veen/Other EAC 23Oct18
- [ ] Other:
- [ ] Sample Collection Method:

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' 100%	Wet Silt with little fine Sand and trace Clay. 10YR 4/1 Dark greenish gray	0001 0-1'	1.7	ML
1-3	2' 100%	↓ with trace roots	1030 1-3'	1.4	ML
3-5	2' 100%	↓ hydrocarbon odor	3050 3-5'	1.2	ML
5-7	2' 100%	Clayey Silt and trace organics + roots. 10YR 3/1 Dark greenish gray dark black layer w/ hydrocarbon odor @ 5.3'	5070 5-7'	0.8	OL-ML
7-10	~~3'~~ EAC 23Oct18 2.7' 90%	10YR 3/1 Dark greenish gray Clayey Silt with trace organics, roots, and fine sand.	7010 7-9.7' Archive	0.6	OL-ML

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-10	Sheet 1 of 1

1 Geologist Name/Signature Emily Cline [signature]	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Date/Time Collected** 22Oct2018/1555 **Date/Time Processed** 24Oct2018/0940
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42°21.289611'N	9 Sed Surface Elevation 570.4 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 5.0
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°57.782160'W	12 Weather (Temp, circle conditions, wind direction) 55°F Sunny/Cloudy/Rain W 5-10mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: 5 -ft barrel 4 -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
2.0	1.05	52.5%

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	1.05' 100%	Very fine to medium clean sand with trace shell. 10YR 4/1 Dark Grey few angular pebbles	0010 0-1.05'	0.2	SP

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLA	Location/Boring Name: HT18-11	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline / [signature]	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 **Date/Time Collected**: 22Oct2018/1521	**Date/Time Processed**: 24Oct2018/0830
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.309866'N	9 Sed Surface Elevation 566 ft; 10 Coordinate System H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 9.4	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°57.925609'W	12 Weather (Temp, circle conditions, wind direction): 55°F Sunny/Cloudy/Rain WSW	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -in diameter Manual Push/Vibracore/Sonic
- [x] Grab Sample: ~~0~~ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
- [ ] Other: EDO 10/24/18
- [ ] Sample Collection Method:

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
10ft	9.4ft	94%

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' 100%	Wet silt with trace plant debris soft 10YR 4/1 Dark Grey	0010 0-1'	0.2	ML
1-3'	2' 100%	with trace fine sand	1030 1-3'	0.2	ML
3'-5'	2' 100%	Clayey silt with some fine sand and trace organics grading to silty fine sand. 10YR 3/1 Very dark grey	3050 3-5'	0.2	ML/SM
5-7'	2' 100%	Silty fine sand with trace organics 10YR 4/1 Dark Grey	5070 5-7'	0.2	SM
7-10'	~~3~~ 2.4' 80%	Silty fine sand. 10YR 4/1 Dark Grey	7010 7-9.4'	0.2	SM

EA	LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-12	Sheet 1 of 1

1 Geologist Name/Signature Emily Cline [signature]	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Date/Time Collected** 22Oct2018/1420 | **Date/Time Processed** 23Oct2018/1540
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.331013' N	9 Sed Surface Elevation 568.7 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 6.7ft
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°58. 089107' W	12 Weather (Temp, circle conditions, wind direction) 55°F Sunny/Cloudy/Rain

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: 10 -ft barrel 4 -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	9.7	97%

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' 100%	wet soft silt with some very fine sand trace organic. 7.5YR 4/1 Dark Grey	0010 0-1'	31.8	ML
1-3	2' 100%	Hydrocarbon odor ↓ w/ trace clay 5YR 2.5/1 Black interbedded silty fine sand	1030 1-3'	17.2	ML
3-5	2' 100%	5YR 2.5/1 Silty very fine to fine sand with few granules and Black interbedded clay.	3050 3-5'	2.2	SM
5-7	2' 100%	7.5YR 4/1 Dark Grey Fine sandy clay grading to Clayey sand. Trace wood, granules, and pebbles.	5070 5-7'	1.1	CL/SC
7-10	2.7' 90%	7.5YR 4/1 Dark Grey fine sandy clay medium to low plasticity.	7010 7-9.7'	22.8	CL

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 13	Sheet 1 of 1

1 Geologist Name/Signature Emily Cline [signature]	5 Project Number **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 29Oct18/0950 — **Date/Time Processed** 29Oct18/1755
		9 Sed Surface Elevation 561.8 ft
2 Drilling Subcontractor/Equipment Operator **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid 42° 21.313187' N	10 Coordinate System H **NAD83** V **NAVD88**
		11 Depth of Water, ft (start/end) 13.6
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 58.382027 W	12 Weather (Temp, circle conditions, wind direction) 44°F Sunny/Cloudy/Rain N 5mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: **10** -ft barrel **4** -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'	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*
0-1'	1' 100%	very fine to medium sandy silt with trace shells and pebbles 10YR 4/1 Dark Grey	0010 0-1'	0.5	ML
1-3'	2' 100%	Silt with trace clay and fine sand. Hydrocarbon odor. 10YR 4/1 Dark Grey	1030 1-3'	1.5	ML
3-5'	2' 100%	Clayey silt with trace fine clay and shell. 10YR 4/1 Dark Grey	3050 3-5'	0.5	ML
5-6.3'	1.3' 100%	Silty clay with trace fine sand and shell. 10YR 4/1 Dark Grey	5060 5-6.3'	0.9	CL
6.3-8.8'	2.5' 100%	Clayey silt with trace fine sand and shell: and interbeds of clay with trace fine sand and shell. 10YR 3/1 very Dark Grey	6090 6.3'-8.8'	0.5	ML
8.8'-10.1'	1.3' 100%	Silty fine sand with trace coarse sand and shell and pebbles 10YR 3/1 Very Dark Grey	9010 8.8'-10.1'	0.5	SM

EA — LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 14	Sheet 1 of 1
1 Geologist Name/Signature Emily Cline / Emily Cline	5 Project Number **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 29Oct18/0900 **Date/Time Processed** 30Oct18/0850	
2 Drilling Subcontractor/Equipment Operator **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid 42°21.250149'N	9 Sed Surface Elevation 555.96 ft 10 Coordinate System H **NAD83** V **NAVD88**	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°58.648377'W	11 Depth of Water, ft (start/end) 19.4 12 Weather (Temp, circle conditions, wind direction) 44°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: **10** -ft barrel **4** -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
3	1.9	63.3

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
0-1.3'	1.3' 100%	Silty fine to very coarse sand with trace granules, and construction debris and shell. 10YR 2/1 Black	0010 0-1.3'	2.4	SM
1.3'-1.9'	0.6' 100%	Silty Clay with some fine to very coarse sand and trace shell. 10YR 3/1 Very Dark Gray	1020 1.3-1.9'	0.5	CL

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 15	Sheet 1 of 1

1 Geologist Name/Signature Emily Cline [signature]	5 Project Number **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 24Oct18/1650 — **Date/Time Processed** 25Oct18/1010
2 Drilling Subcontractor/Equipment Operator **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid 42°21.211720'N	9 Sed Surface Elevation 556.1 ft 10 Coordinate System H **NAD83** V **NAVD88** 11 Depth of Water, ft (start/end) 19.4ft
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°58.731659'W	12 Weather (Temp, circle conditions, wind direction) 48°F Sunny/Cloudy/Rain N 5mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: **10** -ft barrel **4** -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
6.5'	6.6'	~~100~~ ~~105~~ 101%

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
0-0.5	.5' 100%	Fine to coarse clayey sand with oyster shell. 2.5YR 3/1 Very Dark Grey	0005 0-.5'	0.9	SC
0.5-3'	2.5' 100%	Clay with trace granules and coarse sand. 2.5YR 4/1 Dark Grey	0530 0.5-~~2.5~~ 3.0	0.5 ~~4.0~~	CH
3-5'	2' 100%	Same as above	3050 3.0 - 5.0'	0.4	CH
5-6.6'	1.6' 100%	Same as above.	No Sample Collected.	0.4	CH

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** ~~10~~0 HT18-17	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline / Emily Cline	5 Project Number: **6256136**	CORE COLLECTION INFO — 8 **Date/Time Collected**: 24Oct18/1500 · **Date/Time Processed**: 25Oct18/1120	
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42° 21.130291' N	9 Sed Surface Elevation: 548.4 ft · 10 Coordinate System: H **NAD83** V **NAVD88** · 11 Depth of Water, ft (start/end): 27.1	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82.58.818345' W	12 Weather (Temp, circle conditions, wind direction): 48°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
4.5	4.6	102%

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' 100%	Clayey gravel with fine to coarse sand at 0-0.2'; Clay with some trace coarse sand and granules. 2.5YR 5/1 Gray	0010 0-1'	0.7	GC/CH
1-3'	2' 100%	Clay with trace coarse sand and granules. 2.5YR 5/1 Gray	1030 1-3'	0.5	CH
3-4.7	1.7' 100%	Same as above	3050 3-4.7'	0.5	CH

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 18	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline [signature]	5 Project Number: **6256136**	**CORE COLLECTION INFO**	
		8 **Date/Time Collected**: 24Oct18/1145	**Date/Time Processed**: 25Oct18/1205
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42° 21.162420'N	9 Sed Surface Elevation: 560.5 ft	
		10 Coordinate System: H **NAD83** V **NAVD88**	
		11 Depth of Water, ft (start/end): 15	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 58.895003'W	12 Weather (Temp, circle conditions, wind direction): 42°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: **10** -ft barrel **4** -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
6.0	5.4	90%

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
0-1.9	1.9' 100%	Fine to medium sandy silt with trace shell at top and some organics in bottom 0.5' of interval. Hydrocarbon odor + sheen 2.5Y 2.5/1 Black	0020 0-1.9'	8.2	ML/OL
1.9-2.8	0.9' 100%	Clay with trace coarse sand and granules. Soft. 5YR 5/1 Gray	2030 1.9-2.8'	0.6	CL
2.8-3.6'	0.8' 100%	fine to very coarse sand with some clay; coarsening downward with granules and pebbles at the bottom. trace shell. 10YR 4/1 Dark gray	3035 2.8-3.6'	0.6	SC
3.6-5.4'	1.8' 100%	Clay with trace medium sand, granules, and angular pebbles. 10YR 5/1 Gray	3550 3.6-5.4'	0.6	CH

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 19	Sheet **1** of *1*
1 Geologist Name/Signature Emily Cline / [signature]	5 Project Number **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 24 Oct 18/1115 **Date/Time Processed** 25 Oct 18/1435	
2 Drilling Subcontractor/Equipment Operator **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid 42°21.145827'N	9 Sed Surface Elevation 554.6 *ft* 10 Coordinate System H **NAD83** V **NAVD88**	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°58.952226'W	11 Depth of Water, ft (start/end) 20.9 12 Weather (Temp, circle conditions, wind direction) 42° Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: **10** -ft barrel **4** -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
3.25 ft	3.0 ft	92.3%

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' 100%	medium sandy silt with some organics. trace angular pebbles. sheen and strong hydrocarbon odor. 10YR 2/1 Black	0010 0-0.9'	9.4	OL
1-2.3	1.3' 100%	Sandy fine silt with strong hydrocarbon odor and sheen. Numerous large shells. 10YR 3/1 Very Dark Grey	1020 0.9-2.3'	0.8	ML
2.3-2.8	0.5 100%	Fine to coarse sand with some shell and trace silt and pebbles. 10YR 4/1 Dark Grey	2030 2.3'-2.8'	0.7	SM

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 20	Sheet 1 of 1

1 Geologist Name/Signature: Emily Cline [signature]	5 Project Number: **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected:** 24 Oct 18/1015	**Date/Time Processed:** 25 Oct 18/1505
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42° 21.111178' N	9 Sed Surface Elevation: 549.6' ft; 10 Coordinate System: H **NAD83** V **NAD88**	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 59.102033' W	11 Depth of Water, ft (start/end): 25.9; 12 Weather (Temp, circle conditions, wind direction): 42°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: **10** -ft barrel **4** -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
3.25 ft	3.0 ft	92.3%

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
0-0.8'	0.8' 100%	Silty fine to medium sand with trace pebbles 10YR 2/1 Black	0010 0-0.8'	0.5	SM
0.8-1.8'	1' 100%	Stiff clay, high plasticity 10G 5/1 Greenish Gray	1020 0.8-1.8'	0.4	CH
1.8-2.8	1' 100%	Silty fine sand with trace clay, shell, wood, + cobble at bottom of core. EBO ~~2.5YR~~ 2.5Y 4/1 Dark Grey	2030 1.8-2.8'	0.5	SM

EA — LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 21	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline / [signature]	5 Project Number: **6256136**	**CORE COLLECTION INFO** 8 Date/Time Collected: 24Oct18/0930; Date/Time Processed: 25Oct18/1545	
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42°21.090310'N	9 Sed Surface Elevation: 564.5 ft; 10 Coordinate System: H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 11.0ft	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°59.206108'W	12 Weather (Temp, circle conditions, wind direction): 40°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
2 ft	1.75ft	87.5%

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
0-1.7'	1.7' 100%	silty fine to very coarse sand and gravel. Trace shell + pebbles. building debris (i.e. Brick)	0015 0-1.7'	0.4	SM

EA LITHOLOGIC LOG *Sediment Collection Log* EA Engineering, Science, & Technology, Inc., PBC	Client Name and Project Name: GLAES Harbortown-Upstream	Location/Boring Name: HT18-23	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 **Date/Time Collected**: 23Oct18/1715 **Date/Time Processed**: 24Oct18/1015	
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.066846'N	9 Sed Surface Elevation: 568.9 ft	
		10 Coordinate System: H NAD83 V NAVD88	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°59.390311'W	11 Depth of Water, ft (start/end): 6.5	
		12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [X] Core: 10 -ft barrel 4 -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 ft	9.2	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
0-1	1' 100%	Fine sandy silt with vegetation in the top 0.3'. 10YR 4/1 Dark Grey	0010 0-1'	0.6	OH
1-3'	2' 100%	Silty fine sand with trace granules and pebbles + shell 10YR 4/1 Dark Grey	1030 1-3'	0.2	SM
3-5'	2' 100%	Clayey fine sand with trace silt and silty clay interbeds. 10YR 4/1 Dark Grey	3050 3-5'	2.9	SC/CL
5-7'	2' 100%		5070 5-7' MS/MSD	0.3	SC/CL
7-10'	2.2' 73%	Clay interbeds increase with depth.	7010 ~~7-10~~ 7-9.2' Archive	0.3	SC/CL

EA **LITHOLOGIC LOG** *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown-Upstream	Location/Boring Name: HT18-24 — Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline / [signature]	5 Project Number: 6256136	**CORE COLLECTION INFO** — 8 Date/Time Collected: 23Oct2018/1610; Date/Time Processed: 24Oct18/1140
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.036536	9 Sed Surface Elevation: 560.7 ft
		10 Coordinate System: H NAD83 V NAVD88
		11 Depth of Water, ft (start/end): 14.7
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°59.420921'W	12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain N 5mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
9'	7.8'	87%

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' 100%	Silty very fine to fine sand with large cobble. 10YR 4/1 Dark Grey	0010 0-1'	0.3	SM
1-2.7'	1.7' 100%	fine to medium Sand with some silt interbedded with clayey silt. 10YR 4/1 Dark Grey	1025 1-2.7'	0.3	SM/ML
2.7-5'	2.3' 100%	Silty Clay with trace fine Sand. low plasticity 10YR 4/1 Dark Grey	2550 2.7-5'	0.3	CL
5'-6.6'	1.6' 100%	Clayey fine Sand w/ fine to coarse Sand layer at 6.4-6.6'. trace Shell, granules and pebbles 10YR 4/1 Dark Grey	5065 5'-6.6'	0.3	SC
6.6-7.8'	1.2' 100%	Clay with trace medium Sand. medium to high plasticity 10YR 4/1 Dark Grey.	6575 6.6-7.8' Archive	0.3	CL

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-25	Sheet 1 of 1

1 Geologist Name/Signature	Emily Cline [signature]
5 Project Number	6256136
CORE COLLECTION INFO	
8 Date/Time Collected	23Oct2018/1500
Date/Time Processed	24Oct2018/1510
2 Drilling Subcontractor/Equipment Operator	Cetacean Marine
6 Latitude/Northing/Grid	42°21.023073'N
9 Sed Surface Elevation	566.4 ft
10 Coordinate System	H NAD83 V NAVD88
11 Depth of Water, ft (start/end)	8.5ft
3 Operator Name *(License # If Required)*	Joe Bonem
7 Longitude/Easting/Grid	82°59.468149'W
12 Weather (Temp, circle conditions, wind direction)	52°F Sunny/Cloudy/Rain N 5-10mph
13 Boring Depth (ft)	10'
14 Recovery (ft)	9.5'
15 % Recovery	95%
16 Location Notes	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -in diameter Manual Push/Vibracore/Sonic
- [ ] Grab Sample: ____ -ft x ____ -ft x ____ -ft Box/Ponar/Van Veen/Other
- [ ] Other:
- Sample Collection Method:

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' 100%	Medium sandy silt with layer of silty coarse sand and pebbles at 0.7-0.8' 10YR 4/1 Dark Grey	0010 0-1'	3.6	ML
1-3'	2' 100%	Fine sandy silt with trace shell. Sheen observed + strong hydrocarbon odor. 10YR 2/1 Black	1030 1-3'	7.2	ML
3-4.2	1.2' 100%	~~fine to medium sand~~ Same as above	3040 3-4.2'	2.3	ML
4.2-7'	2.8' 100%	fine to medium sand with silty clay interbeds and trace organics. 10YR 4/1 Dark Grey.	4070 4.2-7'	4.6	SM/CL
7-10	2.5' ~~100%~~ ~~90%~~ 83%	Same as above	7010 7-9.5'	3.7	SM

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 26	Sheet **1** of **1**

1 Geologist Name/Signature: Emily Cline / Emily Cline	5 Project Number: **6256136**	**CORE COLLECTION INFO**	
		8 **Date/Time Collected**: 23Oct 2018/1440	**Date/Time Processed**: 24Oct18/1610
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42°20.976594'N	9 Sed Surface Elevation: 568.5 *ft*	
		10 Coordinate System: H **NAD83** V **NAVD88**	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°59.557515'W	11 Depth of Water, ft (start/end): 6.9	
		12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

- Rotosonic: ____ -ft barrel ____ -in diameter
- Core: **10** -ft barrel **4** -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'	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
0-1	1' 100%	Silty fine to medium sand 10YR 4/1 Dark Grey	0010 0-1'	2.4	SM
1-3	2' 100%	silty fine to medium sand to clayey fine to medium sand. Trace shell and pebbles. 10YR 4/1 Dark Grey	1030 1-3'	1.4	SM/SC
3-5	2' 100%	silty fine to medium sand interbedded with sandy clay trace shell. 10YR 4/1 Dark Grey.	3050 3-5'	0.9	SM/CL
5-7'	2' 100%	As above with trace organics	5070 5-7'	4.0	SM/CL
7-10'	2.5' 83%	As above, clay increasing with depth.	7010 7-9.5'	2.2	SM/CL

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18- 27	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 Date/Time Collected: 23Oct.2018/945	Date/Time Processed: 24Oct18/
2 Drilling Subcontractor/Equipment Operator: EPA R/V Mudpuppy	6 Latitude/Northing/Grid: 42° 20.879894'N	9 Sed Surface Elevation: 560.34 ft; 10 Coordinate System: H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 15.0ft.	
3 Operator Name (*License # If Required*): Joe Bonem	7 Longitude/Easting/Grid: 82° 59.707928'W	12 Weather (Temp, circle conditions, wind direction): 48°F Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
3.0	2.0	67%

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-.8	0.8' 100% ~~0-0.0~~ ~~EAO~~	Silty gravel to silty medium sand. Hydrocarbon odor, ~~trace~~ Shell. Black 10YR 2/1	0010 0-0.8'	3.8	GM/SM
.8-2.4	1.1' 68%	Stiff clay with few ~~gra~~ EAO ~~grav~~ EAO pebbles (angular, possibly slag). Black sand and gravel draw down on sides of core. 2.5YR 5/2 grayish brown	1020 0.8-1.9'	1.2	CH

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown Upstream	Location/Boring Name HT18-29	Sheet 1 of 1
1 Geologist Name/Signature Emily Cline / Emily Cline	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Date/Time Collected** 22 Oct 18 / 1135 **Date/Time Processed** 23 Oct 18 / 1200	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42°20.770424' N	9 Sed Surface Elevation 552.0 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 23.4	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°59.880960' W	12 Weather (Temp, circle conditions, wind direction) 50°F Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
1.5	1.2	80%

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*
0-1.2'	1.2' 80%	Fine to very coarse sand with some silt, little angular granules and gravel. Construction debris — brick + concrete + clay. Trace shell. 7YR 4/1 Dark Grey	~~0012~~ 0010 0-1.2'	0.8	SM

EA	LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown-Upstream	Location/Boring Name HT18-30	Sheet 1 of 1
1 Geologist Name/Signature Emily Cline		5 Project Number 6256136	CORE COLLECTION INFO 8 **Date/Time Collected** 22Oct2018/0955 **Date/Time Processed** 23Oct2018 1035	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine		6 Latitude/Northing/Grid 42° 20.531980' N	9 Sed Surface Elevation 563.98 ft ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 11.4ft	
3 Operator Name *(License # If Required)* Joe Bonem		7 Longitude/Easting/Grid 82°59.984068'W	12 Weather (Temp, circle conditions, wind direction) 45°F Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
10ft	9.2ft	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*
0-10'	9.2' 92%	Soft clayey silt with little fine sand, to silty clay w/ trace pebbles. 5GY 3/1 Dark greenish gray. Hydrocarbon odor	Intervals: 0-1, 1-3, 3-5, 5-7, Archive		ML/CL
		PID readings: 0-1 1.7 ppm; 1-3 3.3 ppm; 3-5 4.2 ppm			
		5-7 6.3 ppm; 7-10 4.7 ppm			

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 31	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline	5 Project Number: **6256136**	**CORE COLLECTION INFO** 8 **Date/Time Collected** 23Oct18/1125 **Date/Time Processed** 25Oct18/0830	
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42°20.949171'N	9 Sed Surface Elevation: Not collected *ft*; 10 Coordinate System H **NAD83** V **NAVD88**; 11 Depth of Water, ft (start/end): 6.3	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°59.047716'W	12 Weather (Temp, circle conditions, wind direction): 50°F Sunny/Cloudy/Rain NW 10-15	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
6.75 ft	6.6 ft	97.8%

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
0-1.3'	1.3' 100%	fine to coarse sandy silt w/ trace roots, granules, and angular pebbles. Cobble at 1-1.3'. 5Y 3/1 Very Dark grey	0010 0-1'	0.9	ML
1.3-2.6	1.3' 100%	Peat and organic silt with trace medium sand. 5Y 2.5/2 Black	1025 1.3-2.6'	0.9	OL
2.6-5.7	3.1' 100%	medium sandy clay layer from 2.6-3.2 transitions to ~~sandy~~ Clayey medium sand. 10BG 5/1 Greenish Grey.	2555 2.6-5.7'	0.8	CL/SC
5.7-6.6	0.9' 100%	clayey ~~medium to very coarse sand~~ gravel with ~~some granules and pebbles.~~ some f-vc sand and few pebbles (angular). 10BG 5/1 Greenish Grey	5565 5.7-6.6'	0.8	GC

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name **GLAES** **Harbortown - Upstream**	Location/Boring Name **HT18-** 32	Sheet 1 of 1
1 Geologist Name/Signature: Emily Cline ~~ECline~~	5 Project Number: **6256136**	**CORE COLLECTION INFO** 8 Date/Time Collected: 23Oct2018/1050; Date/Time Processed: 24Oct18/1800	
2 Drilling Subcontractor/Equipment Operator: **EPA R/V Mudpuppy**	6 Latitude/Northing/Grid: 42° 20.712008' N	9 Sed Surface Elevation 565.65 ft; 10 Coordinate System H **NAD83** V **NAVD88**; 11 Depth of Water, ft (start/end): 9.7	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 59.571313' W	12 Weather (Temp, circle conditions, wind direction): 50°F Sunny/Cloudy/Rain NW5-10	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [x] Core: 10 -ft barrel 4 -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
7.0	7.0	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*
0-1	1' 100%	Silty fine to coarse sand with trace clay trace angular pebbles. 2.5YR 4/1 Dark Grey	0010 0-1'	1.9	SM
1-3	2' 100%	Clayey silt with some fine sand. and trace roots 2.5YR 5/1 grey	1030 1-3'	1.6	ML
3-5	2' 100%	Silty clay with trace roots and fine sand	3050 3-5'	1.4	CL
5-7	2' 100%	Same as above	5070 5-7'	1.4	CL

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-01	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	CORE COLLECTION INFO 8 Start Date/Time 29OCT2018/1450	Stop Date/Time 29OCT2018/1525
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42°21.360451'N	9 Sed Surface Elevation 568.2 ft	
		10 Coordinate System H NAD83 V NAVD88	
		11 Depth of Water, ft (start/end) 7.1	
3 Operator Name *(License # If Required)* Joe Ponem	7 Longitude/Easting/Grid 82° 56.568433'W	12 Weather (Temp, circle conditions, wind direction) 52°F Sunny/Cloudy/Rain NW 10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: _____ -ft barrel _____ -in diameter
- [ ] Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
- [x] 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
8.75	8.2	93.7

16 Location Notes
southeast of Keelson Rd canal

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)	1455 brown/gray silt with trace organics collect FD → 10 jars	HT18-01	

Other:

1510 collect core refusal at 8.75 ft

gross recovery 8.3 ft
net recovery 8.2 ft

water surface elevation 575.29 ft

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 02		Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	CORE COLLECTION INFO		
		8 Start Date/Time 29OCT2018/1535	Stop Date/Time 29OCT2018/1610	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.325964'N	9 Sed Surface Elevation 565.2 ft		
		10 Coordinate System H NAD83 V NAVD88		
		11 Depth of Water, ft (start/end) 10.1		
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 56.779133'W	12 Weather (Temp, circle conditions, wind direction) 52°F Sunny/Cloudy/Rain NW 10 mph		
4 Sampling Equipment and Methodology (Check One)		13 Boring Depth (ft) 10	14 Recovery (ft) 9.0	15 % Recovery 90
[ ] Rotosonic: ____ -ft barrel ____ -in diameter				
[ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore		16 Location Notes Southeast corner of Maheras Gentry Park. West of Peelson Rd. Shifted west to avoid structures in the water.		
[x] Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/Ponar/Van Veen/Other				
[ ] Other:				
Sample Collection Method:				

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)	1555 dark gray silt with fibrous organics and trace sand, light brown film on top. → 5 jars	HT18-02	

Other:

1545 collect core: full 10 ft push, no refusal

gross ~~net~~ recovery 9.3 ft
net recovery 9.0 ft

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 03	Sheet 1 of 1

1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 Start Date/Time: 29OCT2018/ ~~1700~~ 1700 — Stop Date/Time: 29OCT2018/ 1750
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.533856'N	9 Sed Surface Elevation: 557.8 ft
		10 Coordinate System: H NAD83 V NAVD88
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 57.306525'W	11 Depth of Water, ft (start/end): 17.5
		12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain NW 10mph

4 Sampling Equipment and Methodology (Check One)

		13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
	Rotosonic: ____ -ft barrel ____ -in diameter	6.25	5.9	94.4
	Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore			
X	Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/Ponar/Van Veen/Other	16 Location Notes: Location shifted into Connor Creek by EPA. See not below.		
	Other:			
	Sample Collection Method:			

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)	~~1525~~ 1725 black silt sewage odor → 5 jars	HT18-03	

Other:

~~Initi~~ Probing initially indicated rocks close to the outfall, location shifted downstream within Connor Creek.

1720 ~~1520~~ collect core. refusal at 6.25 ft
core material is dark black, appears to be CSO material
sewage odor
gross recovery 5.9 ft
net recovery 5.9 ft

EA — LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18-04	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Parnton	5 Project Number: 6256136	CORE COLLECTION INFO — 8 Start Date/Time: 29OCT2018/1140; Stop Date/Time: 29OCT2018/1215	
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.29118'N	9 Sed Surface Elevation: 566.9 ft; 10 Coordinate System: H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 8.4	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 57.042	12 Weather (Temp, circle conditions, wind direction): 45°F Sunny/Cloudy/Rain WNW 5-10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
6.0	4.2	70

16 Location Notes: southeast of Bayview Yacht Club. shifted ≈50 ft south per EPA

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)	- ~~Dark gray~~ gray / Brown silt with some Sand. Trace Organics. 1200 - ~~B~~ Light Brown film -5 Jars	HT18-04	

Other: water elevation - 575.33

1155 1st core attempt. refusal at 6.0 ft

gross recovery 4.5 ft
loss 0.3 ft (below core catcher)
net recovery 4.2 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-05	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	CORE COLLECTION INFO 8 Start Date/Time: 29 OCT 2018/1620 Stop Date/Time: 29 OCT 2018/1650	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.313827'N	9 Sed Surface Elevation 559.8 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 15.5	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 57.217096'W	12 Weather (Temp, circle conditions, wind direction) 52°F Sunny/Cloudy/Rain NW 10 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
6.5	5.5	84.6

16 Location Notes: Mouth of Connor Creek

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)	1625 dark brown silt with trace sand and trace organic fibers, light brown film on top sewage smell → 5 jars	HT18-05	

Other:

water surface elevation 575.28 ft

1635 collect core, refusal at 6.5 ft

~~6.5~~

gross recovery 5.6 ft

net recovery 5.5 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-6	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 29Oct2018/1100 **Stop Date/Time** 29 Oct 2018/1130	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.270563'N	9 Sed Surface Elevation 558.3 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 17.1	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 57.289438'W	12 Weather (Temp, circle conditions, wind direction) W/NW 44°F Sunny/Cloudy/Rain 5-10 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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: location shifted ~25ft ~~SW~~ South West. South East of connor creek Powerplant.

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)	1105 - dark gray silt with trace sand and trace organics, light brown film on top. → Sjars organic odor PID reading 0.2 ppm from ponar	HT18-6	

Other:

water level elevation - 575.37

1120 collect core, 10ft push, No refusal

gross Recovery - 9.5
net Recovery - 9.2

- Air pockets detected in sed core

EA — LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18- 07	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** — 8 **Start Date/Time:** 29Oct2018/1015 — **Stop Date/Time:** 29Oct2018/~~1048~~ 1050 DMS	
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.272053'N	9 Sed Surface Elevation: 565.3 ft — 10 Coordinate System: H NAD83 V NAVD88 — 11 Depth of Water, ft (start/end): 10.1	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82°57.468904'W	12 Weather (Temp, circle conditions, wind direction): 45°F Sunny/Cloudy/Rain W 5-10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: _____ -ft barrel _____ -in diameter
- [ ] Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
- [x] 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: south of Edison Boat club

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)	1040 collect ponar. Dark Gray ~~Brown~~ DMS Silt w/ some fine grained Sand. Trace organics Brown film. Sheen on ponar	HT18-07	

Other:

water surface elevation 575.35 ft

1030 - collect core. Full 10ft push, no refusal

gross Recovery - 8.9 ft
loss - 0.3 ft
net Recovery - 8.6 ft
sheen observed from core

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-08	Sheet 1 of 1

1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 22Oct2018/1720 · **Stop Date/Time** 22Oct2018/1755
2 Drilling Subcontractor/Equipment Operator Cetacean	6 Latitude/Northing/Grid 42° 21.286307'N	9 Sed Surface Elevation 566.6 *ft* 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 8.8
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 57.543814'W	12 Weather (Temp, circle conditions, wind direction) 55°F Sunny/Cloudy/Rain SW 3-5mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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	8.0	80

16 Location Notes
Mouth of channel/slip just east of Sand Bar Lane houses and west of Connor Creek power plant

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)	~~HT~~ RWD 1745 gray/brown silt with a couple pieces of organic debris → 5 jars	HT18-08	

Other:

1730 - collect core. full 10 ft push, no refusal

gross recovery 8.3 ft

loss 0.3 ft

net recovery 8.0 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 09	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 22Oct2018/1625	**Stop Date/Time** 22Oct2018/1105
2 Drilling Subcontractor/Equipment Operator Cetacean	6 Latitude/Northing/Grid 42° 41.~~288706~~ 289201'N	9 Sed Surface Elevation 565.7 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 9.7	
3 Operator Name *(License # If Required)* Joe Bowen	7 Longitude/Easting/Grid 82° 57.~~667865~~ 670667'W	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
- [x] 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
Mouth of the channel just west of Sand Bar Lane houses, east of St. Jean ~~Marina~~ Boat Ramp

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)	1635 gray/brown silt collect MS/MSD → 13 jars 9 4oz 3 8oz 1 16oz	HT18-09	

Other:

1655 collect core, no refusal, full 10 ft push

9.7 ft gross recovery

9.6 ft net recovery

0.1 ft loss below catcher

water surface 575.4 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18-10	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 22OCT2018/1540 — **Stop Date/Time** 22OCT2018/1620	
2 Drilling Subcontractor/Equipment Operator: Cetacean	6 Latitude/Northing/Grid: 42° 21.289611 'N	9 Sed Surface Elevation 570.4 ft; 10 Coordinate System H NAD83 V NAVD88	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 57.782160' W	11 Depth of Water, ft (start/end): 5.0; 12 Weather (Temp, circle conditions, wind direction): 55°F Sunny/Cloudy/Rain N 5-10mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ______ -ft barrel ______ -in diameter
- [ ] Core: ______ -ft barrel ______ -in diameter Manual Push/Vibracore
- [x] 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
2.0	1.35 gross 1.05 net	67.5 52.5

16 Location Notes: ≈40ft east of St. Jean Boat Launch

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)	1610 Brown/gray sand with a few pieces of SAV → 5 jars two attemps consolidated into one tray	HT18-10	

Other:

1555 collect core using 5 ft core
refusal at 2.0 ft
gross recovery 1.35 ft
loss 0.3 ft
net recovery 1.05 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18-11	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time**: 22OCT2018/1500 — **Stop Date/Time**: 22OCT2018/1535	
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42° 21.309866' N	9 Sed Surface Elevation: 566 ft; 10 Coordinate System: H NAD83 V NAVD88	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 57.925609' W	11 Depth of Water, ft (start/end): 9.4 ft; 12 Weather (Temp, circle conditions, wind direction): 55 °F Sunny/Cloudy/Rain WSW	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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	9.4	94

16 Location Notes: Moved location NNW of coordinates due to burned Boblo boat. Location taken tied up to seawall north of Boblo boat stern

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 with just a few pieces of SAV → 5 jars no sheen, but silt left slightly greasy markings on gloves	HT18-11	

Other:

water surface elevation 575.4

1521 collect core. no refusal, but it slowed down at the end of penetration

gross recovery 9.6 ft

net recovery 9.4 ft

loss 0.2 ft from below the catcher

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18- 12	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time**: 22OCT2018/1405	**Stop Date/Time**: 22OCT2018/1455
2 Drilling Subcontractor/Equipment Operator: Cetacean	6 Latitude/Northing/Grid: 42° 21.331013' N	9 Sed Surface Elevation 568.7 ft	
		10 Coordinate System H NAD83 V NAVD88	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 58.089107' W	11 Depth of Water, ft (start/end): 6.7 ft	
		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
- [x] 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	9.7	97

16 Location Notes: At western edge of Riverside marina just east of Kean's

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)	1435 dark gray/brown silt with some SAV collected FD → 10 jars live juvenile lamprey in grab - took photos	HT18-12	

Other:

probe penetrated 5 ft and then encountered harder material

1420 collect core. no refusal.

gross recovery 9.7 ~~ft~~

no loss

net recovery 9.7 ft

water surface 573.4

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 13	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 29 OCT 2018/0930 **Stop Date/Time** 29 OCT 2018/1005	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.313181 'N	9 Sed Surface Elevation 561.8 ft; 10 Coordinate System H NAD83 V NAVD88	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 58.382027 'W	11 Depth of Water, ft (start/end) 13.6; 12 Weather (Temp, circle conditions, wind direction) 44°F Sunny/Cloudy/Rain N 5 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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 Shifted offshore 50' South/South E. Due South of Rooster Tail

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)	0940 - Gray silt with light Brown film on top. →5 Jars	HT18-13	

Other:

water surface elevation 575.36 ft

~~0940 - 1st Attempt at ponar~~ DMS

0950 collect core. full 10 ft push, no refusal

gross recovery 9.6 ft

no loss

net recovery 9.6 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- ~~15~~ 14	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	CORE COLLECTION INFO — 8 Start Date/Time: 29OCT2018/0840; Stop Date/Time: 29OCT2018/0920	
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42°21.250149'N	9 Sed Surface Elevation 555.96 ft; 10 Coordinate System H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 19.4	
3 Operator Name *(License # If Required)*: Joe Ponem	7 Longitude/Easting/Grid: 82°58.648377'W	12 Weather (Temp, circle conditions, wind direction): 44°F Sunny/Cloudy/Rain North 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
3	1.9	63.3

16 Location Notes: south and west of water treatment plant

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)	0910 brown sand/silt mix with gravel and mussel shells. ~~Some~~ Trace organic woody depris two ponar attempts consolidated into one tray → 5 jars	HT18-~~15~~ 14 (RWD)	

Other:

water surface elevation 575.35 ft ~~at~~ (RWD)

probing indicates ≈ 5ft of penetration, but rocky

0855 1st core attempt < 1ft penetration, no recovery, probable rock

0900 2nd core attempt refusal at 3 ft, core tipped after refusal

gross recovery 2.1 ft

net recovery 1.9 ft

sheen and odor from core

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 15	Sheet 1 of *1*
1 Geologist Name/Signature Ryan Oarnton	5 Project Number 6256136	CORE COLLECTION INFO 8 **Start Date/Time** 24OCT2018/1615 **Stop Date/Time** 24OCT2018/1715	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42°41.211720'N	9 Sed Surface Elevation ~~556.7~~ 556.1 *ft* 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) ~~18.8~~ 19.4	
3 Operator Name *(License # If Required)* Joe Ponem	7 Longitude/Easting/Grid 82°58.731659'W	12 Weather (Temp, circle conditions, wind direction) 48°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)	13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
[ ] Rotosonic: ____ -ft barrel ____ -in diameter [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore [x] Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/Ponar/Van Veen/Other [ ] Other: [ ] Sample Collection Method:	6.5	6.8	105
	16 Location Notes Location shifted west to avoid submerged water pipeline. South of Kam Marine Jefferson		

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~~ 1635 gray/brown silt with sand, mussel shells, and a few pieces of SAV → 5 jars	HT18-15	

Other:

Surface water elevation 575.5 ft

1650 collect core. refusal at 6.5 ft
gross recovery 6.9 ft
net recovery 6.8

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 16	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 24 OCT 2018/1525 **Stop Date/Time** 24 Oct 2018/1605	
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid see notes below ~~42° 21.192497' N~~	9 Sed Surface Elevation ~~569.8~~ 569.3 ft; 10 Coordinate System H NAD83 V NAVD88; 11 Depth of Water, ft (start/end) ~~5.7~~ 1st attempt 3rd attempt/ponar 6.2	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid see notes below ~~82° 58.813587' W~~	12 Weather (Temp, circle conditions, wind direction) 48 °F Sunny/Cloudy/Rain N 5 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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: south of Stockton memorial park

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)	1545 gray silt/sand mix with brown film, a few mussel shells and SAV → 5 jars	HT18-16	

Other:

surface water elevation 575.5 ft

1540 1st attempt collect core, penetration ~~<0.5 ft~~ <1.0 ft no recovery water depth 5.7 ft

shift ≈ 5 ft north

1543 2nd core attempt. water depth 6.6 ft penetration ≈ 0.5 ft, no recovery

1545 3rd attempt shift ≈ 10 ft west water depth 6.2 ft penetration <1 ft, no recovery

no core collected.

Ponar collected at 3rd core attempt location coordinates 42° 21.190474' N

82° 58.815703' W

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-17	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	CORE COLLECTION INFO 8 Start Date/Time: 24Oct2018/1435	Stop Date/Time: 24Oct2018/~~1445~~ 1515
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42° 21.130291'N	9 Sed Surface Elevation: 548.4 ft	
		10 Coordinate System: H NAD83 V NAVD88	
		11 Depth of Water, ft (start/end): ~~27.0~~ 27.1	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 58.818345'W	12 Weather (Temp, circle conditions, wind direction): 48 °F Sunny/Cloudy/Rain N 5 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: _____ -ft barrel _____ -in diameter
- [ ] Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
- [x] 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
4.5	4.6	102

16 Location Notes: Location shifted offshore per EPA south of Manoogian Mansion (Detroit, Mayor's Residence)

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)	1445 brown/~~tan~~ gray sand/silt mix with mussel shells and invertebrates → 5 jars	HT18-17	

Other:

water surface elevation 575.48 ft

1500 collect core; ~~full 5ft push, no refusal EPA instructed 5 ft core is sufficient because bottom material appears to be native clay~~
refusal at 4.5 ft
gross recovery 4.7 ft
net recovery 4.6 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-18	Sheet 1 of 1

1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 24OCT2018/1130 — **Stop Date/Time** 24OCT2018/1220
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.162420' N	9 Sed Surface Elevation 560.5 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 15
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 58.895003' W	12 Weather (Temp, circle conditions, wind direction) 42°F Sunny/Cloudy/Rain N 5 mph

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ______ -ft barrel ______ -in diameter
- [ ] Core: ______ -ft barrel ______ -in diameter Manual Push/Vibracore
- [x] 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
6.0	5.4	90

16 Location Notes
south of Berry subdivision, ~ 30 ft west of brick boathouse

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)	1200 gray silt with light brown film and a few pieces of SAV → 5 jars	HT18-18	

Other:

1145 collect core

refusal at 6.0 ft

gross recovery 5.7 ft

net recovery 5.4 ft

sheen and odor observed during core retrieval

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 19	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time:** 24 OCT 2018/1050	**Stop Date/Time:** 24 OCT 2018/1125
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42° 21.145827'N	9 Sed Surface Elevation 554.6 ft	
		10 Coordinate System H NAD83 V NAVD88	
		11 Depth of Water, ft (start/end): 20.9	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 58.952226' W	12 Weather (Temp, circle conditions, wind direction): 42 Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
3.25	3.0	92.3

16 Location Notes: one south of white boathouse and dock

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)	1100 two attempts consolidated into on tray gray/brown silt/sand mix with mussel shells and a few pieces of SAV. ~~both~~ native mussel ~~both mussel she~~ shells present in addition to the dreissenids	HT18-19	

Other:

water surface elevation 575.5 ft

1115 collect core

refusal at 3.25 ft

3.3ft gross recovery

3.0ft net recovery

sheen observed during core recovery

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-20	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 24OCT2018/1000 **Stop Date/Time** 24OCT2018/1040	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.111178'N	9 Sed Surface Elevation 549.6 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 25.9	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 59.102033'W	12 Weather (Temp, circle conditions, wind direction) 42°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
3.25	3.0	92.3

16 Location Notes
Shifted to west of the marina mouth per EPA field Instruction

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)	1025 gray/brown silt with sand and mussel shells, and a live invertebrate → 5 jars	HT18-20	

Other:

~~to~~ water surface elevation 575.46 ft

1015 ~~refusal~~ collect core
refusal at 3.25 ft
gross recovery 3.0 ft
net recovery 3.0 ft
large rock in core catcher

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-21	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	CORE COLLECTION INFO 8 Start Date/Time: 24Oct2018/0900 Stop Date/Time: 24Oct2018/0955	
2 Drilling Subcontractor/Equipment Operator Cetacean	6 Latitude/Northing/Grid 42°21.090310'N	9 Sed Surface Elevation ~~565.66~~ 564.5 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 9.8 1st attempt 2nd attempt 11.0 ft used this	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82°59.206108'W	12 Weather (Temp, circle conditions, wind direction) 40°F Sunny/Cloudy/Rain N 5 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: _____ -ft barrel _____ -in diameter
- [ ] Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
- [x] 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
2	1.75	87.5

16 Location Notes
south of Burns Drive

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)	0915 ~~three~~ four attempts consolidated into one tray brown/gray silt, sand, gravel mix with SAV and one juvenile goby → 5 jars	HT18-21	

Other:

water surface elevation 575.46 ft (0900 at NOAA Windmill Point Station)

~~0915~~ ~~0930~~

~~09~~ 0925 1st core attempt penetration < 1 ft, little recovery material dumped

0930 2nd attempt core. sampling is on a slope, so shifting ≈1 ft in the horizontal changed water depth to 11.0 ft for 2nd attempt

gross 1.95 ft

net recovery 1.75

refusal at 2 ft

hydrocarbon odor from core

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 22	Sheet 1 of *1*
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time**	**Stop Date/Time**
2 Drilling Subcontractor/Equipment Operator	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: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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

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)	No samples collected Location abandoned per EPA Field instruction		

Other:

EA LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18-23	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Parnton	5 Project Number: 6256136	CORE COLLECTION INFO — 8 Start Date/Time: 23OCT2018/1640; Stop Date/Time: 23OCT2018/1745	
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42° 21.066846' N	9 Sed Surface Elevation: 568.9 ft; 10 Coordinate System: H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 6.5	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 59.390311' W	12 Weather (Temp, circle conditions, wind direction): 52°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
3rd attempt 10	9.2	92

16 Location Notes: East of 8330 on the river building

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)	1730 collect ponar gray silt with SAV → 5 jars	HT18-23	

Other:

1st core attempt small streamers of sheen during 1st attempt core retrieval

1655 refusal at 3.5
gross recovery 2.0 ft ← do not use
net recovery 1.7 ft

1700 2nd attempt using 5 ft core. full 5 ft push, no refusal ← do not use
recovery ≈ 4 ft

1715 3rd attempt (using 10 ft tube)
full 10 ft push, no refusal ← use this core for processing
gross recovery 9.4
net recovery 9.2

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-24	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 23OCT2018/1535 **Stop Date/Time** 23OCT2018/1630	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42° 21.036536	9 Sed Surface Elevation 560.7 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 14.7	
3 Operator Name *(License # If Required)* Joe Bonem	7 Longitude/Easting/Grid 82° 59.420921' W	12 Weather (Temp, circle conditions, wind direction) 52°F Sunny/Cloudy/Rain N 5mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: _____ -ft barrel _____ -in diameter
- [ ] Core: _____ -ft barrel _____ -in diameter Manual Push/Vibracore
- [x] Grab Sample: 0 -ft x _____ -ft x 0.5 -ft Box/Ponar/Van Veen/Other
- [ ] Other:
- [ ] Sample Collection Method:

13 Boring Depth (ft) 2nd attempt	14 Recovery (ft) 2nd attempt	15 % Recovery
9	7.8	87

16 Location Notes
offshore for 8330 building

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)	1545 gray/brown silt with sand → 5 jars	HT18-24	

Other:

1600 1st core attempt used 5 ft tube
no refusal, core saved, but do not process

1610 2nd attempt - used 10 ft
refusal at 9 ft ← use this for processing

gross and net recovery 7.8 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18-25	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	CORE COLLECTION INFO 8 Start Date/Time: 23OCT2018/1455; Stop Date/Time: 23OCT2018/1530	
2 Drilling Subcontractor/Equipment Operator: Cetacean	6 Latitude/Northing/Grid: 42° 21.023073' N	9 Sed Surface Elevation: 566.9 ft; 10 Coordinate System: H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 8.5	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 59.468149' W	12 Weather (Temp, circle conditions, wind direction): 54°F Sunny/Cloudy/Rain N 5-10 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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	9.5	95

16 Location Notes: tied up along seawall (N/S facing)

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)	1510 collect ponar gray/brown silt with some very fine sand and SAV collect MS/MSD → 13 jars	HT18-25	

Other:

1500 Collect core, full 10 ft push, no refusal

gross recovery 9.5 ft

net recovery 9.8 ft

loss below catcher 0.3

hydrocarbon/organic solvent odor with core retrieval

<table>
<tr><td>LITHOLOGIC LOG
Sediment Collection Log
EA Engineering, Science, & Technology, Inc., PBC</td><td>Client Name and Project Name
GLAES
Harbortown - Upstream</td><td>Location/Boring Name
HT18-26</td><td>Sheet
1 of 1</td></tr>
<tr><td>1 Geologist Name/Signature
Ryan Darnton</td><td>5 Project Number
6256136</td><td colspan="2">CORE COLLECTION INFO
8 Start Date/Time: 23OCT2018/1420
Stop Date/Time: 23OCT2018/1450</td></tr>
<tr><td>2 Drilling Subcontractor/Equipment Operator
Cetacean</td><td>6 Latitude/Northing/Grid
42°20.976594'N</td><td colspan="2">9 Sed Surface Elevation 568.5 ft
10 Coordinate System H NAD83 V NAVD88
11 Depth of Water, ft (start/end)
6.9</td></tr>
<tr><td>3 Operator Name (*License # If Required*)
Joe Ponem</td><td>7 Longitude/Easting/Grid
82°59.557515'W</td><td colspan="2">12 Weather (Temp, circle conditions, wind direction)
52°F Sunny/Cloudy/Rain</td></tr>
<tr><td colspan="2">4 Sampling Equipment and Methodology (Check One)
[ ] Rotosonic: ____ -ft barrel ____ -in diameter
[ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
[x] Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/Ponar/Van Veen/Other
[ ] Other:
[ ] Sample Collection Method:</td><td colspan="2">13 Boring Depth (ft): 10
14 Recovery (ft): 9.5
15 % Recovery: 95
16 Location Notes
south of UAW building</td></tr>
</table>

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)	1425 collect ponar 2 attempts consolidated into one tray gray/brown silt with sand, mussel shell fragments, and a few pieces of SAV. → 5 jars	HT18-26	

Other:

water surface elevation 575.4 ft

1440 collect core - full 10 ft push, no refusal

gross recovery 9.8 ft

net recovery 9.5 ft

hydrocarbon odor and sheen

EA — LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18-27	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Durnton	5 Project Number: 6256136	CORE COLLECTION INFO — 8 Start Date/Time: 23OCT2018/0905	Stop Date/Time: 23OCT2018/1015
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid after shift: 42° 20.879894' N	9 Sed Surface Elevation: 560.34 ft	
		10 Coordinate System: H NAD83 V NAVD88	
3 Operator Name (*License # If Required*): Joe Bonem	7 Longitude/Easting/Grid after shift: 82° 59.707908' W	11 Depth of Water, ft (start/end): 17.1 initial 15.0 ft after shift	
		12 Weather (Temp, circle conditions, wind direction): 48°F Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
3.0	2.0	67%

16 Location Notes: Offshore of River Terrace Apartments

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)	ponar 1st attempt all mussel shells. no material collected 2nd & 3rd attempts also >90% mussel shells no material collected. ~~Apt~~ Abandon surface grab sampling per EPA guidance attempt Ponar at new location after shifting ≈10 ft during coring	HT18-27	

Other:

probing indicates gravel

1st attempt will be with a 5 ft core

1st attempt coordinates 42° 20.878620' N
82° 59.705633' W

~~Ponar 1~~

0935 1st attempt core; little penetration and no recovery

shift location ≈ 10 ft toward the shore for 2nd attempt

0945 2nd attempt core refusal at 3.0 ft

penetration 3.0 ft

gross recovery 2.2 ft

net recovery 2.0 ft

loss 0.2 ft

Ponar after shift.
3 additional attempts, very little recovery. Mussels and sand.
no surface sample collected.

EA — LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18- 2-8	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	CORE COLLECTION INFO — 8 Start Date/Time: 23OCT2018/0845; Stop Date/Time: 23OCT2018/0900	
2 Drilling Subcontractor/Equipment Operator: Cetacean	6 Latitude/Northing/Grid: 42°20.819173'N	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)*: Joe Bonem	7 Longitude/Easting/Grid: 82°59.799457'W	12 Weather (Temp, circle conditions, wind direction): 47°F Sunny/Cloudy/Rain	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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: Trash, toilet paper, and signs of CSO activity along the rocks on the shore

this description was for initial location that was subsequently abandoned after probing indicated hard pack sand.

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)	No ponar collected		

Other:

Initial Location abandoned per EPA instruction
42°20.819173'N, 82°59.799457'W

No core collected

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name: GLAES Harbortown - Upstream	Location/Boring Name: HT18- 29	Sheet 1 of 1

1 Geologist Name/Signature	5 Project Number	CORE COLLECTION INFO	
Ryan Darnton	6256136	8 Start Date/Time: 12OCT2018/1055	Stop Date/Time: 12Oct2018/1145
2 Drilling Subcontractor/Equipment Operator: Cetacean	6 Latitude/Northing/Grid: 42° 20.770424' N	9 Sed Surface Elevation 552.0 ft	
		10 Coordinate System H NAD83 V NAVD88	
3 Operator Name *(License # If Required)*: Joe Bonem	7 Longitude/Easting/Grid: 82° 59.880960' W	11 Depth of Water, ft (start/end): 23.4	
		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
- [x] 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
1.5	1.2	80

16 Location Notes: East end of Gabriel Richard park

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)	1115 three attempts consolidated to get volume sand with lots of mussel shells and some gravel ~~4~~ 5 jars (1 8oz, 1 16oz, 3 4oz)	HT18-29	

Other:

Probing indicates gravel, limited penetration likely
water surface elevation 575.38

1135 collect core. refusal at 1.5 ft
gross recovery 1.5 ft
0.3 loss below core catcher
1.2 net recovery

used the weight (dinner roll) to keep core vertical ~~as it~~ RWD in the current

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-30	Sheet 1 of 1
1 Geologist Name/Signature: Ryan Darnton	5 Project Number: 6256136	**CORE COLLECTION INFO** 8 Start Date/Time: 22OCT2018/0950	Stop Date/Time: 22OCT2018/1045
2 Drilling Subcontractor/Equipment Operator: Cetacean Marine	6 Latitude/Northing/Grid: 42° 20.531980′ N	9 Sed Surface Elevation: 563.98 ft; 10 Coordinate System H NAD83 V NAVD88; 11 Depth of Water, ft (start/end): 11.4 ft	
3 Operator Name *(License # If Required)*: Joe Ponem	7 Longitude/Easting/Grid: 82° 59.984068′ W	12 Weather (Temp, circle conditions, wind direction): 45°F Sunny/Cloudy/Rain W 10 mph	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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 ft	92%

16 Location Notes: Gabriel Richard Park ≈ 50 ft East of MacArthur Bridge

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)	1025 gray silt with brown surface skin layer 5 jars (3 4oz, 1 8oz, 1 16oz)	HT18-30	

Other:

1st attempt 0955

penetration 10 ft → No refusal

gross recovery 9.5 ft

core loss 0.3 ft (from below catcher

net recovery 9.2 ft

Water surface elevation 575.38 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18-31	Sheet 1 of 1

1 Geologist Name/Signature	Ryan Parnton
2 Drilling Subcontractor/Equipment Operator	Cetacean
3 Operator Name *(License # If Required)*	Joe Bonem
5 Project Number	6256136
6 Latitude/Northing/Grid	42° 20.949171' N
7 Longitude/Easting/Grid	82° 59.047716' W

CORE COLLECTION INFO

8 Start Date/Time	23 OCT 2018/1115
Stop Date/Time	23 OCT 2018/1155
9 Sed Surface Elevation	ft
10 Coordinate System	H NAD83 V NAVD88
11 Depth of Water, ft (start/end)	6.3
12 Weather (Temp, circle conditions, wind direction)	50°F Sunny/Cloudy/Rain NW 10-15

13 Boring Depth (ft)	14 Recovery (ft)	15 % Recovery
6.75 ft	6.6 ft	97.8

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] Grab Sample: 0 -ft x ____ -ft x 0.5 -ft Box/Ponar/Van Veen/Other
- [ ] Other:
- [ ] Sample Collection Method:

16 Location Notes
In the center of channel between Belle Isle and US mainland side of Detroit River

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)	1135 dark gray silt, light brown microbial layer on top, a few pieces of SAV. → 5 jars	HT18-31	

Other:

1125 collect core
refusal at 6.75 ft
gross recovery 6.7 ft
net recovery 6.6 ft

LITHOLOGIC LOG *Sediment Collection Log* *EA Engineering, Science, & Technology, Inc., PBC*	Client Name and Project Name GLAES Harbortown - Upstream	Location/Boring Name HT18- 32	Sheet 1 of 1
1 Geologist Name/Signature Ryan Darnton	5 Project Number 6256136	**CORE COLLECTION INFO** 8 **Start Date/Time** 23OCT2018/1020 **Stop Date/Time** 23OCT2018/1100	
2 Drilling Subcontractor/Equipment Operator Cetacean Marine	6 Latitude/Northing/Grid 42°20.712008'N	9 Sed Surface Elevation 565.65 ft 10 Coordinate System H NAD83 V NAVD88 11 Depth of Water, ft (start/end) 9.7	
3 Operator Name (*License # If Required*) Joe Bonem	7 Longitude/Easting/Grid 82°59.~~70~~ 571313'W	12 Weather (Temp, circle conditions, wind direction) 50°F Partly Sunny/Cloudy/Rain NW5-10	

4 Sampling Equipment and Methodology (Check One)

- [ ] Rotosonic: ____ -ft barrel ____ -in diameter
- [ ] Core: ____ -ft barrel ____ -in diameter Manual Push/Vibracore
- [x] 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
7.0	7.1	101

16 Location Notes: In center of channel between Belle Isle and US side of Detroit River

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)	HT18-32 1030 dark gray silt with some clay, a few pieces of detritus collect FD → 10 jars	HT18-32	

Other:

refusal at 7 ft
gross recovery 7.3 ft
Net recovery 7.1 ft

water surface elevation 575.35

Appendix B

Lithologic Core Logs

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SEDIMENT BORING HT18-01

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/29/2018 3:10:00 PM

LATITUDE 42° 21.360451

DATE/TIME LOGGED 10/30/2018 9:40:00 AM

LONGITUDE 82° 56.568433

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 568.2 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 93.7 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-01-0010		ML	SILT WITH SAND: Dark gray (10YR 4/1), silt, some f-m sand, trace roots and shell. PID = 0.4 ppm	1.0
1–3	24	Composite	HT18-01-1030		CL-ML	LEAN CLAY AND SILT: Dark gray (10YR 4/1), clay, some f. sand; silt, some clay, trace granules and shell. PID = 0.5 ppm	3.0
3–5	24	Composite	HT18-01-3050		ML	SILT: Dark gray (10YR 4/1), silt, some clay, trace roots and shell. PID = 0.6 ppm	5.0
5–7	24	Composite	HT18-01-5070		ML-SP	SILT AND SAND: Dark gray (10YR 4/1), alternating layers of: silt, some clay; and vf. sand, some silt, trace pebbles. PID = 0.6 ppm	7.0
7–8	19.2	Composite	HT18-01-7085		ML-CL	SILT AND LEAN CLAY: Dark gray (10YR 3/1), silt, some clay; and clay, some silt, trace shell and organics; thin bed of f. sand, some silt at 7.8-7.9 ft. PID = 0.7 ppm	8.6
						End of Boring at 8.8 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING HT18-02

PROJECT NAME Harbortown Upstream

DATE/TIME COLLECTED 10/29/2018 3:45:00 PM

DATE/TIME LOGGED 10/30/2018 11:00:00 AM

DRILLING CONTRACTOR Cetacean Marine

DRILLING METHOD Vibracore

LOGGED BY E Cline

PROJECT NUMBER 62561.36

LOCATION Detroit, MI

LATITUDE 42° 21.325964

LONGITUDE 82° 56.779133

ELEVATION (Sediment Surface) 565.2 ft (NAVD 88)

RECOVERY 90 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-02-0010		ML	SANDY SILT: Dark gray (10YR 4/1), f. sandy silt, some clay, trace shell and construction debris. PID = 0.5 ppm	1.0
1–3	24	Composite	HT18-02-1030		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f. sand, some clay. PID = 0.3 ppm	3.0
3–6.1	37.2	Composite	HT18-02-3060		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f. sand, some clay, trace m. sand. PID = 0.2 ppm	6.1
6.1–7.8	20.4	Composite	HT18-02-6080		SW-SM	WELL GRADED SAND WITH SILT: Black (10YR 2/1), f-vc sand, some silt and stiff clay nodules. PID = 0.6 ppm	7.8
7.8–9.2	16.8	Composite	HT18-02-8090		SM	SILTY SAND: Very dark gray (10YR 3/1), silty f. sand, trace clay. PID = 0.5 ppm	9.2
10							

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

End of Boring at 10 ft.

EA Engineering, Science, and Technology, Inc., PBC

SEDIMENT BORING HT18-03

PROJECT NAME Harbortown Upstream	**PROJECT NUMBER** 62561.36
DATE/TIME COLLECTED 10/29/2018 5:20:00 PM	**LOCATION** Detroit, MI
DATE/TIME LOGGED 10/30/2018 1:55:00 PM	**LATITUDE** 42° 21.533856
DRILLING CONTRACTOR Cetacean Marine	**LONGITUDE** 82° 57.306525
DRILLING METHOD Vibracore	**ELEVATION (Sediment Surface)** 557.8 ft (NAVD 88)
LOGGED BY E Cline	**RECOVERY** 94.4 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	Composite	HT18-03-0010		ML-OL	SILT WITH SAND: Very dark gray (10YR 3/1), silt, some vf. sand, trace m-c sand and organics. Hydrocarbon odor. PID = 0.2 ppm	1.0
1, 2	24	Composite	HT18-03-1030		OL	ORGANIC SILT WITH SAND: Very dark gray (10YR 3/1), organic silt, some vf. sand, trace m-c sand. Hydrocarbon odor. PID = 8.0 ppm	3.0
3, 4	19.2	Composite	HT18-03-3045		OL	ORGANIC SILT: Black (10YR 2/1), organic silt, trace f-c sand and roots. PID = 8.5 ppm	4.6
5	16.8	Composite	HT18-03-4560		CH	FAT CLAY: Dark gray (10Y 4/1), stiff clay, few f. sand, trace granules and pebbles. PID = 0.9 ppm	6.0
6					OL	ORGANIC SILT WITH SAND: Black (10YR 2/1), organic silt, some f-m sand, trace granules, pebbles, and c. sand. PID = 3.0 ppm	6.4
						End of Boring at 6.3 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-04

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/29/2018 11:55:00 AM

LATITUDE 42° 21.291181

DATE/TIME LOGGED 10/29/2018 3:20:00 PM

LONGITUDE 82° 57.042887

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 566.9 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 70 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	7.2	Composite	HT18-04-0005		SP-SC	POORLY GRADED SAND WITH CLAY: Gray (10YR 5/1), f. sand, some clay, few c. sand, trace granules. Bed of organic silt at top 0.2 ft. PID = 0.2 ppm	0.6
1–3	32.4	Composite	HT18-04-0530		CL	LEAN CLAY WITH SAND: Dark gray (10YR 4/1), clay, some vf. sand, trace c. sand. Thin bed of f. sand, some clay at 1.1-1.2-ft. PID = 0.3 ppm	3.3
4	12	Composite	HT18-04-3040		SW-SC	WELL GRADED SAND WITH CLAY: Black (10YR 2/1), f-vc sand, trace clay and wood, fining upward to f. sand, some clay. PID = 0.2 ppm	4.3
5–6						End of Boring at 6 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-05

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream
DATE/TIME COLLECTED 10/29/2018 4:35:00 PM
DATE/TIME LOGGED 10/30/2018 4:30:00 PM
DRILLING CONTRACTOR Cetacean Marine
DRILLING METHOD Vibracore
LOGGED BY E Cline

LOCATION Detroit, MI
LATITUDE 42° 21.313827
LONGITUDE 82° 57.217096
ELEVATION (Sediment Surface) 559.8 ft (NAVD 88)
RECOVERY 84.6 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	Composite	HT18-05-0010		ML	SILT WITH SAND: Gray (2.5YR 5/1), silt, some vf. sand, trace organics. PID = 0.2 ppm	1.0
1 2	20.4	Composite	HT18-05-1030		ML-OL	SILT: Dark gray (2.5YR 4/1), silt, some clay, trace vf. sand, wood, and roots; bed of organics at 1-1.3 ft. PID = 0.2 ppm	2.7
3 4 5	28.2	Composite	HT18-05-3050		OL	ORGANIC SILT WITH SAND: Black (2.5YR 2.5/1), organic silt, some f-m sand, trace roots and c. sand. PID = 3.1 ppm	5.1
	10.2	Composite	HT18-05-5060		SM	SILTY SAND: Very dark gray (2.5YR 3/1), silty f-m sand, trace shell; thin layer of stiff clay at 5.1 ft. PID = 0.8 ppm	5.9
6						End of Boring at 6.5 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-06

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/29/2018 11:20:00 AM

LATITUDE 42° 21.270563

DATE/TIME LOGGED 10/29/2018 2:10:00 PM

LONGITUDE 82° 57.289438

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 558.3 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 92 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0							
	12	Composite	HT18-06-0010		ML	SILT: Dark gray (10YR 4/1), silt, some clay, trace organics. PID = 0.1 ppm	
1							1.0
2	24	Composite	HT18-06-1030		ML-CL	SILT: Dark gray (10YR 4/1), clayey silt, trace organics. PID = 0.1 ppm	
3							3.0
4							
	36	Composite	HT18-06-3060		MH-OH	ELASTIC SILT: Very dark gray (10YR 3/1), clayey silt, trace m-c sand interbedded with organic layers. Hydrocarbon odor. PID = 1.3 ppm	
5							
6							6.0
	13.2	Composite	HT18-06-6070		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f-m sand, some silt, trace organics, shell, and angular pebbles. PID = 4.2 ppm	
7							7.1
	12	Composite	HT18-06-7080		OH	ORGANIC SILT WITH SAND: Black (1YR 2/1), organic silt, some f-m sand, trace wood and cultural debris (i.e. comb). PID = 4.2 ppm	
8							8.1
9	19.2	Composite	HT18-06-8010		OH	ORGANIC SILT: Very dark gray (10YR 3/1), organic silt and clay, some sand, trace pebbles. Hydrocarbon odor. PID = 10.3 ppm	
							9.7
10							

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

End of Boring at 10 ft.

SEDIMENT BORING HT18-07

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream
DATE/TIME COLLECTED 10/29/2018 10:30:00 AM
DATE/TIME LOGGED 10/29/2018 2:30:00 PM
DRILLING CONTRACTOR Cetacean Marine
DRILLING METHOD Vibracore
LOGGED BY E Cline

LOCATION Detroit, MI
LATITUDE 42° 21.272053
LONGITUDE 82° 57.468904
ELEVATION (Sediment Surface) 565.3 ft (NAVD 88)
RECOVERY 86 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1.8	21.6	Composite	HT18-07-0020		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f-m sand, some silt. PID = 0.4 ppm	1.8
1.8–4.8	36	Composite	HT18-07-2050		MH	ELASTIC SILT WITH SAND: Black (10YR 2/1), clayey silt, some vf. sand and organics. Hydrocarbon odor. PID = 15.2 ppm	4.8
4.8–7.0	26.4	Composite	HT18-07-5070		ML	SILT WITH SAND: Very dark gray (10YR 3/1), silt, some vf. sand; thin layers of f. sand and clay, some silt, trace shell. PID = 4.1 ppm	7.0
7.0–8.9	22.8	Composite	HT18-07-7090		ML	SANDY SILT: Black (10YR 2/1), f. sandy silt, some clay. Hydrocarbon odor with clay at base. PID = 9.4 ppm	8.9
8.9–10							

End of Boring at 10 ft.

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-08

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NAME Harbortown Upstream
DATE/TIME COLLECTED 10/22/2018 5:30:00 PM
DATE/TIME LOGGED 10/23/2018 5:10:00 PM
DRILLING CONTRACTOR Cetacean Marine
DRILLING METHOD Vibracore
LOGGED BY E Cline

PROJECT NUMBER 62561.36
LOCATION Detroit, MI
LATITUDE 42° 21.286307
LONGITUDE 82° 57.54814
ELEVATION (Sediment Surface) 566.6 ft (NAVD 88)
RECOVERY 80 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	Composite	HT18-08-0010		ML	SILT: Dark gray (10YR 4/1), silt, some vf. sand, trace clay and roots. PID = 0.3 ppm	1.0
1 2	15.6	Composite	HT18-08-1020		ML	SILT: Dark gray (10YR 4/1), silt, some vf. sand, trace clay and roots; some granules at base. PID = 0.2 ppm	2.3
3 4	27.6	Composite	HT18-08-2045		SW	WELL GRADED SAND: Bluish black (10B 2.5/1), f-vc sand, few pebbles, trace silt and granules. Whole clamshell. Hydrocarbon odor. PID = 0.5 ppm	4.6
5 6	22.8	Composite	HT18-08-4565		SP-SM	POORLY GRADED SAND WITH SILT: Bluish black (10B 2.5/1) to dark gray (10YR 4/1), f. sand, some silt; bed of silt, some c. sand at top 0.3 ft. PID = 4.4 ppm	6.5
7	18	Composite	HT18-08-6580		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f. sand, some silt. PID = 0.5 ppm	8.0
8 9 10							

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

End of Boring at 10 ft.

SEDIMENT BORING HT18-09

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/22/2018 4:30:00 PM

LATITUDE 42° 21.289201

DATE/TIME LOGGED 10/23/2018 1:45:00 PM

LONGITUDE 82° 57.670667

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 565.7 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 96 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-09-0010		ML	SILT: Dark greenish gray (10YR 4/1), wet, silt, little f. sand, trace clay. PID = 1.7 ppm	1.0
1–3	24	Composite	HT18-09-1030		ML	SILT: Dark greenish gray (10YR 4/1), wet, silt, little f. sand, trace clay and roots. PID = 1.4 ppm	3.0
3–5	24	Composite	HT18-09-3050		ML	SILT: Dark greenish gray (10YR 4/1), wet, silt, little f. sand, trace clay and roots. Hydrocarbon odor. PID = 1.2 ppm	5.0
5–7	24	Composite	HT18-09-5070		ML	SILT: Dark greenish gray (10YR 3/1), silt, some clay, trace organics and roots. Dark black layer with hydrocarbon odor at 5.3 ft. PID = 0.8 ppm	7.0
7–9.7	32.4	Composite	HT18-09-7010		ML	SILT: Dark greenish gray (10YR 3/1), silt, some clay, trace f. sand, organics, and roots. PID = 0.6 ppm	9.7
10							

End of Boring at 10 ft.

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-10

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/22/2018 3:55:00 PM

LATITUDE 42° 21.289611

DATE/TIME LOGGED 10/24/2018 9:40:00 AM

LONGITUDE 82° 57.782160

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 570.4 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 52.5 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12.6	Composite	HT18-10-0010		SW	WELL GRADED SAND: Dark gray (10YR 4/1), vf-m clean sand, few angular pebbles, trace shell. PID = 0.2 ppm	
1							1.1
2						End of Boring at 2 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-11

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36
PROJECT NAME Harbortown Upstream
LOCATION Detroit, MI
DATE/TIME COLLECTED 10/22/2018 3:21:00 PM
LATITUDE 42° 21.309866
DATE/TIME LOGGED 10/24/2018 8:30:00 AM
LONGITUDE 82° 57.925609
DRILLING CONTRACTOR Cetacean Marine
ELEVATION (Sediment Surface) 566 ft (NAVD 88)
DRILLING METHOD Vibracore
LOGGED BY E Cline
RECOVERY 94 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-11-0010		ML	SILT: Dark gray (10YR 4/1), soft, wet, silt, trace plant debris. PID = 0.2 ppm	1.0
1–3	24	Composite	HT18-11-1030		ML	SILT: Dark gray (10YR 4/1), soft, wet, silt, trace f. sand and plant debris. PID = 0.2 ppm	3.0
3–5	24	Composite	HT18-11-3050		SM	SANDY SILT: Very dark gray (10YR 3/1), f. sandy silt, some clay, trace organics, fining upward from f. sand with silt. PID = 0.2 ppm	5.0
5–7	24	Composite	HT18-11-5070		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f. sand, some silt, trace organics. PID = 0.2 ppm	7.0
7–9.4	28.8	Composite	HT18-11-7010		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f. sand, some silt. PID = 0.2 ppm	9.4
10						End of Boring at 10 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-12

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/22/2018 2:20:00 PM

LATITUDE 42° 21.331013

DATE/TIME LOGGED 10/23/2018 3:40:00 PM

LONGITUDE 82° 58.089107

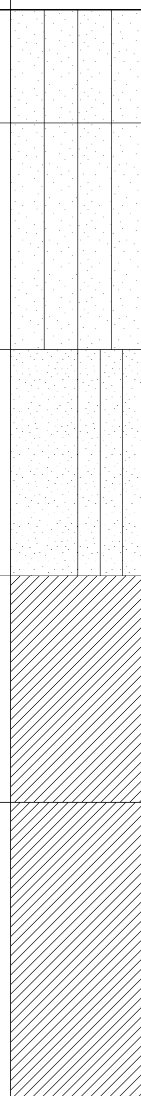
DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 568.7 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 97 %



DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-12-0010		ML	SANDY SILT: Dark gray (7.5YR 4/1), soft, wet, vf. sandy silt, trace organics. PID = 31.8 ppm	1.0
1–3	24	Composite	HT18-12-1030		ML	SANDY SILT: Black (5YR 2.5/1), soft, wet, vf. sandy silt, trace clay and organics; interbedded with f. sand some silt. Hydrocarbon odor. PID = 17.2 ppm	3.0
3–5	24	Composite	HT18-12-3050		SP-SM	POORLY GRADED SAND WITH SILT: Black (5YR 2.5/1), vf-f sand, some silt, few granules and interbedded clay. PID = 2.2 ppm	5.0
5–7	24	Composite	HT18-12-5070		CL	LEAN CLAY WITH SAND: Dark gray (7.5YR 4/1), clay, some f. sand, trace granules, pebbles, and wood; fining upward from clayey sand. PID = 1.1 ppm	7.0
7–9.7	32.4	Composite	HT18-12-7010		CL	LEAN CLAY WITH SAND: Dark gray (7.5YR 4/1), low to medium plastic clay, some f. sand. PID = 22.8 ppm	9.7
10							

End of Boring at 10 ft.

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-13

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/29/2018 9:50:00 AM

LATITUDE 42° 21.313187

DATE/TIME LOGGED 10/29/2018 5:55:00 PM

LONGITUDE 82° 58.382027

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 561.8 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 96 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-13-0010		ML	SILT WITH SAND: Dark gray (10YR 4/1), silt, some vf-m sand, trace shells and pebbles. PID = 0.5 ppm	1.0
1–3	24	Composite	HT18-13-1030		ML	SILT: Dark gray (10YR 4/1), silt, trace clay and f. sand. Hydrocarbon odor. PID = 1.5 ppm	3.0
3–5	24	Composite	HT18-13-3050		ML	SILT: Dark gray (10YR 4/1), silt, some clay, trace f. sand and shell. PID = 0.5 ppm	5.0
5–6.3	15.6	Composite	HT18-13-5060		CL	LEAN CLAY: Dark gray (10YR 4/1), clay, some silt, trace f. sand and shell. PID = 0.9 ppm	6.3
6.3–8.8	30	Composite	HT18-13-6090		ML	SILT: Very dark gray, (10YR 3/1), silt, some clay, trace f. sand and shell; thin layers of clay with trace f. sand and shell. PID = 0.5 ppm	8.8
8.8–10	15.6	Composite	HT18-13-9010		SP-SM	POORLY GRADED SAND WITH SILT: Very dark gray (10YR 3/1), f. sand, some silt, trace c. sand, shell, and pebbles. PID = 0.5 ppm	10.0

End of Boring at 10 ft.

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-14

PROJECT NUMBER 62561.36
PROJECT NAME Harbortown Upstream
LOCATION Detroit, MI
DATE/TIME COLLECTED 10/29/2018 9:00:00 AM
LATITUDE 42° 21.250149
DATE/TIME LOGGED 10/30/2018 8:50:00 AM
LONGITUDE 82° 58.648377
DRILLING CONTRACTOR Cetacean Marine
ELEVATION (Sediment Surface) 555.96 ft (NAVD 88)
DRILLING METHOD Vibracore
LOGGED BY E Cline
RECOVERY 63.3 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	15.6	Composite	HT18-14-0010		SW-SM	WELL GRADED SAND WITH SILT: Black (10YR 2/1), f-vc sand, some silt, trace granules, construction debris, and shell. PID = 2.4 ppm	1.3
2	7.2	Composite	HT18-14-1020		CL	SANDY LEAN CLAY: Very dark gray (10YR 3/1), f-vc sandy clay, some silt, trace shell. PID = 0.5 ppm	1.9
3						End of Boring at 3 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-15

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/24/2018 4:50:00 PM

LATITUDE 42° 21.211720

DATE/TIME LOGGED 10/25/2018 10:10:00 AM

LONGITUDE 82° 58.731659

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 556.1 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 101.5 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	6	Composite	HT18-15-0005		SW-SC	WELL GRADED SAND WITH CLAY: Very dark gray (2.5YR 3/1), f-c sand, some clay and oyster shell. PID = 0.9 ppm	0.5
1, 2	30	Composite	HT18-15-0530		CH	FAT CLAY: Dark gray (2.5YR 4/1), fat clay, trace granules and c. sand. PID = 0.5 ppm	3.0
3, 4	24	Composite	HT18-15-3050		CH	FAT CLAY: Dark gray (2.5YR 4/1), fat clay, trace granules and c. sand. PID = 0.4 ppm	5.0
5, 6					CH	FAT CLAY: Dark gray (2.5YR 4/1), fat clay, trace granules and c. sand. PID = 0.4 ppm	6.6
						End of Boring at 6.5 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-17

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36
PROJECT NAME Harbortown Upstream
LOCATION Detroit, MI
DATE/TIME COLLECTED 10/24/2018 3:00:00 PM
LATITUDE 42° 21.130291
DATE/TIME LOGGED 10/25/2018 11:20:00 AM
LONGITUDE 82° 58.818345
DRILLING CONTRACTOR Cetacean Marine
ELEVATION (Sediment Surface) 548.4 ft (NAVD 88)
DRILLING METHOD Vibracore
LOGGED BY E Cline
RECOVERY 102.2 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	Composite	HT18-17-0010		CH	FAT CLAY WITH GRAVEL: Gray (2.5YR 5/1), fat clay, trace c. sand and granules. Bed of clayey gravel, some f-c sand at top 0.2 ft. PID = 0.7 ppm	1.0
1 2	24	Composite	HT18-17-1030		CH	FAT CLAY: Gray (2.5YR 5/1), fat clay, trace c. sand and granules. PID = 0.5 ppm	3.0
3 4	20.4	Composite	HT18-17-3050		CH	FAT CLAY: Gray (2.5YR 5/1), fat clay, trace c. sand and granules. PID = 0.5 ppm	4.7
						End of Boring at 4.5 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-18

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/24/2018 11:45:00 AM

LATITUDE 42° 21.162420

DATE/TIME LOGGED 10/25/2018 12:05:00 PM

LONGITUDE 82° 58.895003

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 560.5 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 90 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1.9	22.8	Composite	HT18-18-0020		ML-OL	SILT WITH SAND AND ORGANICS: Black (2.5Y 2.5/1), silt, some f-m sand, trace shell at top; bed of organics in bottom 0.5 ft. Sheen and hydrocarbon odor. PID = 8.2 ppm	1.9
1.9–2.8	10.8	Composite	HT18-18-2030		CL	LEAN CLAY: Gray (5YR 5/1), soft clay, trace c. sand and granules. PID = 0.6 ppm	2.8
2.8–3.6	9.6	Composite	HT18-18-3035		SC	CLAYEY SAND: Dark gray (10YR 4/1), clayey f-vc sand, trace shell, fining upward from granules and pebbles. PID = 0.6 ppm	3.6
3.6–5.4	21.6	Composite	HT18-18-3550		CH	FAT CLAY: Gray (10YR 5/1), fat clay, trace m. sand, granules, and angular pebbles. PID = 0.6 ppm	5.4
5.4–6						End of Boring at 6 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-19

PROJECT NUMBER 62561.36
PROJECT NAME Harbortown Upstream
LOCATION Detroit, MI
DATE/TIME COLLECTED 10/24/2018 11:15:00 AM
LATITUDE 42° 21.145827
DATE/TIME LOGGED 10/25/2018 2:35:00 PM
LONGITUDE 82° 58.952226
DRILLING CONTRACTOR Cetacean Marine
ELEVATION (Sediment Surface) 554.6 ft (NAVD 88)
DRILLING METHOD Vibracore
LOGGED BY E Cline
RECOVERY 92.3 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	10.8	Composite	HT18-19-0010		OL	ORGANIC SILT WITH SAND: Black (10YR 2/1), organic silt, some m. sand, trace angular pebbles. Sheen and strong hydrocarbon odor. PID = 9.4 ppm	1.0
1–2	15.6	Composite	HT18-19-1020		ML	SILT: Very dark gray (10YR 3/1), silt, some f. sand, numerous large shells. Sheen and strong hydrocarbon odor. PID = 0.8 ppm	2.3
	6	Composite	HT18-19-2030		SW	WELL GRADED SAND: Dark gray (10YR 4/1), f-c sand, some shell, trace silt and pebbles. PID = 0.7 ppm	2.8
3						End of Boring at 3.3 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-20

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36
PROJECT NAME Harbortown Upstream
LOCATION Detroit, MI
DATE/TIME COLLECTED 10/24/2018 10:15:00 AM
LATITUDE 42° 21.111178
DATE/TIME LOGGED 10/25/2018 3:05:00 PM
LONGITUDE 82° 59.102033
DRILLING CONTRACTOR Cetacean Marine
ELEVATION (Sediment Surface) 549.6 ft (NAVD 88)
DRILLING METHOD Vibracore
LOGGED BY E Cline
RECOVERY 92.3 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	9.6	Composite	HT18-20-0010		SP-SM	POORLY GRADED SAND WITH SILT: Black (10YR 2/1), f-m sand, some silt, trace pebbles. PID = 0.5 ppm	0.8
1	12	Composite	HT18-20-1020		CH	FAT CLAY: Greenish gray (10G 5/1), stiff, highly plastic clay. PID = 0.4 ppm	1.8
2	12	Composite	HT18-20-2030		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (2.5Y 4/1), f. sand, some silt, trace clay, shell, wood; cobbles at base. PID = 0.5 ppm	2.8
3						End of Boring at 3.3 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-21

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/24/2018 9:30:00 AM

LATITUDE 42° 21.090310

DATE/TIME LOGGED 10/25/2018 3:45:00 PM

LONGITUDE 82° 59.206108

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 564.5 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 87.5 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0							
1	20.4	Composite	HT18-21-0015		SW-SM	WELL GRADED SAND WITH SILT AND GRAVEL: Very dark grayish brown (2.5Y 3/2), f-vc sand and gravel, some silt, trace shell, pebbles, and construction debris (i.e. brick). PID = 0.4 ppm	1.7
2						End of Boring at 2 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-23

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/23/2018 5:15:00 PM

LATITUDE 42° 21.066846

DATE/TIME LOGGED 10/24/2018 10:15:00 AM

LONGITUDE 82° 59.390311

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 568.9 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 92 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-23-0010		ML	SILT WITH SAND: Dark gray (10YR 4/1), silt, some f. sand; bed of plant debris at top 0.3 ft. PID = 0.6 ppm	1.0
1–3	24	Composite	HT18-23-1030		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f. sand, some silt, trace granules, pebbles, and shell. PID = 0.2 ppm	3.0
3–5	24	Composite	HT18-23-3050		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f. sand, some clay, trace silt; interbeded with lean clay, some silt. PID = 2.9 ppm	5.0
5–7	24	Composite	HT18-23-5070		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f. sand, some clay, trace silt; interbeded with lean clay, some silt. PID = 0.3 ppm	7.0
7–9.2	26.4	Composite	HT18-23-7010		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f. sand, some clay, trace silt; increasingly interbeded with lean clay, some silt with depth. PID = 0.3 ppm	9.2
10							

End of Boring at 10 ft.

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-24

PROJECT NUMBER 62561.36
PROJECT NAME Harbortown Upstream
LOCATION Detroit, MI
DATE/TIME COLLECTED 10/23/2018 4:10:00 PM
LATITUDE 42° 21.036536
DATE/TIME LOGGED 10/24/2018 11:40:00 AM
LONGITUDE 82° 59.420921
DRILLING CONTRACTOR Cetacean Marine
ELEVATION (Sediment Surface) 560.7 ft (NAVD 88)
DRILLING METHOD Vibracore
LOGGED BY E Cline
RECOVERY 86.7 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-24-0010		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), vf-f sand, some silt, large cobble. PID = 0.3 ppm	1.0
1–2.7	20.4	Composite	HT18-24-1025		SM	SILTY SAND: Dark gray (10YR 4/1), silty, f-m sand; interbedded with silt, some clay. PID = 0.3 ppm	2.7
2.7–5	27.6	Composite	HT18-24-2550		CL	LEAN CLAY: Dark gray (10YR 4/1), low plasticity clay, some silt, trace f. sand. PID = 0.3 ppm	5.0
5–6.6	19.2	Composite	HT18-24-5065		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f. sand, some clay; trace shell, granules, and pebbles. PID = 0.3 ppm	6.6
6.6–7.8	14.4	Composite	HT18-24-6575		CH	FAT CLAY: Dark gray (10YR 4/1), medium to highly plastic clay, trace m. sand. PID = 0.3 ppm	7.8
7.8–9						End of Boring at 9 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-25

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/23/2018 3:00:00 PM

LATITUDE 42° 21.023073

DATE/TIME LOGGED 10/24/2018 3:10:00 PM

LONGITUDE 82° 59.468149

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 566.9 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 95 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-25-0010		ML	SILT WITH SAND: Dark gray (10YR 4/1), silt, some m. sand; thin bed of c. sand and pebbles, some silt at 0.7-0.8 ft. PID = 3.6 ppm	1.0
1–3	24	Composite	HT18-25-1030		ML	SILT WITH SAND: Black (10YR 2/1), silt, some f. sand, trace shell. Sheen and strong hydrocarbon odor. PID = 7.2 ppm	3.0
3–4.2	14.4	Composite	HT18-25-3040		ML	SILT WITH SAND: Black (10YR 2/1), silt, some f. sand, trace shell. Sheen and strong hydrocarbon odor. PID = 2.3 ppm	4.2
4.2–7	33.6	Composite	HT18-25-4070		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f-m sand, trace organics; interbededded with lean clay, some silt. PID = 4.6 ppm	7.0
7–9.5	30	Composite	HT18-25-7010		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f-m sand, trace organics; interbededded with lean clay, some silt. PID = 3.7 ppm	9.5
10							

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

End of Boring at 10 ft.

SEDIMENT BORING HT18-26

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/23/2018 2:40:00 PM

LATITUDE 42° 20.976594

DATE/TIME LOGGED 10/24/2018 4:10:00 PM

LONGITUDE 82° 59.557515

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 568.5 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 95 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	12	Composite	HT18-26-0010		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f-m sand, some silt. PID = 2.4 ppm	1.0
1–3	24	Composite	HT18-26-1030		SP-SM	POORLY GRADED SAND WITH SILT: Dark gray (10YR 4/1), f-m sand, some silt, trace shell and pebbles, coarsening upward from f-m sand, some clay. PID = 1.4 ppm	3.0
3–5	24	Composite	HT18-26-3050		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f-m sand, some silt; interbedded with lean clay, some sand, trace shell. PID = 0.9 ppm	5.0
5–7	24	Composite	HT18-26-5070		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f-m sand, some silt; interbedded with lean clay, some sand, trace shell and organics. PID = 4.0 ppm	7.0
7–9.5	30	Composite	HT18-26-7010		SP-SC	POORLY GRADED SAND WITH CLAY: Dark gray (10YR 4/1), f-m sand, some silt; interbedded with lean clay, some sand, trace shell and organics; increasing clay content with depth. PID = 2.2 ppm	9.5
10							

End of Boring at 10 ft.

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-27

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/23/2018 9:45:00 AM

LATITUDE 42° 20.879894

DATE/TIME LOGGED 10/24/2018 5:10:00 PM

LONGITUDE 82° 59.707928

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 560.34 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 66.7 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0	9.6	Composite	HT18-27-0010		SP-SM	POORLY GRADED SAND WITH GRAVEL AND SILT: Black (10YR 2/1), m. sand and gravel, some silt, trace shell. Hydrocarbon odor. PID = 3.8 ppm	0.8
1	13.2	Composite	HT18-27-1020		CH	FAT CLAY: Grayish brown (2.5YR 5/2), stiff, fat clay, few angular pebbles (possibly slag). PID = 1.2 ppm	2.4
2							
3						End of Boring at 3 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-29

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/22/2018 11:35:00 AM

LATITUDE 42° 20.770424

DATE/TIME LOGGED 10/23/2018 12:00:00 PM

LONGITUDE 82° 59.880960

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 552 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 80 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0 1	14.4	Composite	HT18-29-0010		SM	SILTY SAND: Dark gray (7.5YR 4/1), silty f-vc sand, little angular granules gravel, and construction debris (brick and concrete), trace clay and shell. PID = 0.8 ppm	1.2
						End of Boring at 1.5 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-30

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/22/2018 9:55:00 AM

LATITUDE 42° 20.531980

DATE/TIME LOGGED 10/23/2018 10:35:00 AM

LONGITUDE 82° 59.984068

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) 563.98 ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 92 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-30-0010		CL-ML	LEAN CLAY AND SILT: Dark greenish gray (5GY 3/1), silt, some soft clay, little fine sand; clay, some silt, trace pebbles. Hydrocarbon odor. PID = 6.3 ppm	
1–3	24	Composite	HT18-30-1030				
3–5	24	Composite	HT18-30-3050				
5–7	24	Composite	HT18-30-5070				
7–9.2	26.4	Composite	Archive				9.2
9.2–10							

End of Boring at 10 ft.

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-31

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36

PROJECT NAME Harbortown Upstream

LOCATION Detroit, MI

DATE/TIME COLLECTED 10/23/2018 11:25:00 AM

LATITUDE 42° 20.949171

DATE/TIME LOGGED 10/25/2018 8:30:00 AM

LONGITUDE 82° 59.047716

DRILLING CONTRACTOR Cetacean Marine

ELEVATION (Sediment Surface) ft (NAVD 88)

DRILLING METHOD Vibracore

LOGGED BY E Cline

RECOVERY 97.8 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0							
1	15.6	Composite	HT18-31-0010		ML	SILT WITH SAND: Very dark gray (5Y 3/1), silt, some f-c sand, trace roots, granules, and angular pebbles; cobble at 1-1.3 ft. PID = 0.9 ppm	1.3
2	15.6	Composite	HT18-31-1025		OL	ORGANIC SILT: Black (5Y 2.5/2), Organic silt and peat, trace m. sand. PID = 0.9 ppm	2.6
3, 4, 5	37.2	Composite	HT18-31-2555		SC-CL	SAND WITH CLAY: Greenish gray (10BG 5/1), m. sand, some clay, fining upward to clay, some m. sand at 3.2 ft. PID = 0.8 ppm	5.7
6	10.8	Composite	HT18-31-5565		GW-GC	WELL GRADED GRAVEL WITH CLAY AND SAND: Greenish gray (10BG 5/1), f-vc sandy gravel, some clay, few angular pebbles. PID = 0.8 ppm	6.6
						End of Boring at 6.8 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

SEDIMENT BORING HT18-32

EA Engineering, Science, and Technology, Inc., PBC

PROJECT NUMBER 62561.36
PROJECT NAME Harbortown Upstream
LOCATION Detroit, MI
DATE/TIME COLLECTED 10/23/2018 10:50:00 AM
LATITUDE 42° 20.712008
DATE/TIME LOGGED 10/24/2018 6:00:00 PM
LONGITUDE 82° 59.1313
DRILLING CONTRACTOR Cetacean Marine
ELEVATION (Sediment Surface) 565.65 ft (NAVD 88)
DRILLING METHOD Vibracore
LOGGED BY E Cline
RECOVERY 100 %

DEPTH BELOW MUDLINE (ft)	SAMPLE INTERVAL (inches)	SAMPLE TYPE	SAMPLE SUBMITTED FOR GRAIN SIZE & CHEMICAL ANALYSIS (Sample ID at sample depth)	GRAPHIC LOG	USCS CLASS	MATERIAL DESCRIPTION	Depth (ft)
0–1	12	Composite	HT18-32-0010		SW-SM	WELL GRADED SAND WITH SILT: Dark gray (2.5YR 4/1), f-c sand, some silt, trace clay and angular pebbles. PID = 1.9 ppm	1.0
1–3	24	Composite	HT18-32-1030		ML	SANDY SILT: Gray (2.5YR 5/1), f. sandy silt, some clay, trace roots. PID = 1.6 ppm	3.0
3–5	36	Composite	HT18-32-3050		CL	LEAN CLAY: Gray (2.5YR 5/1), lean clay, some silt, trace f. sand and roots. PID = 1.4 ppm	5.0
5–7	24	Composite	HT18-32-5070		CL	LEAN CLAY: Gray (2.5YR 5/1), lean clay, some silt, trace f. sand and roots. PID = 1.4 ppm	7.0
						End of Boring at 7 ft.	

NOTES:

"End of Boring" indicates depth of maximum penetration used to calculate % recovery for each core.

APPENDIX C:

PHOTOGRAPHIC RECORD

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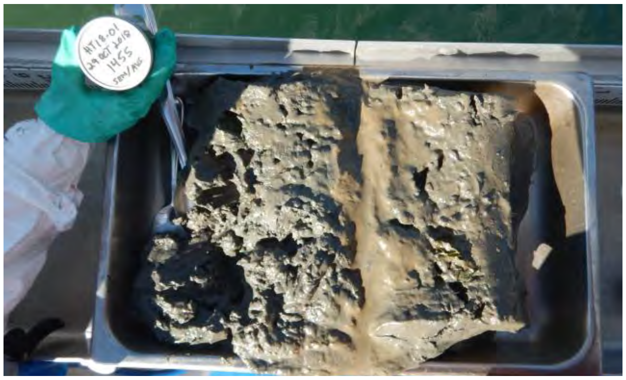
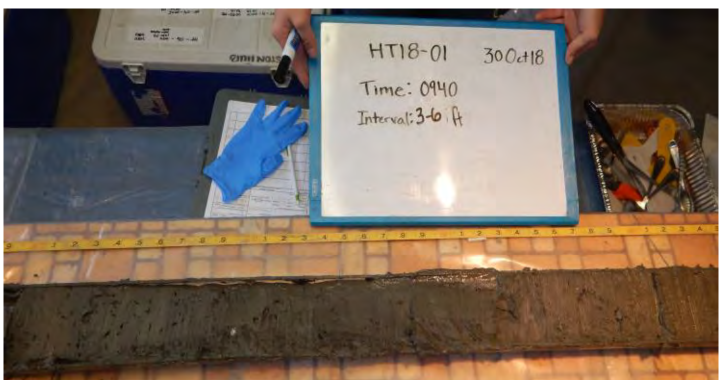
Photographic Record

Sample location: HT18-01



HT18-01-SURF

HT18-01-0030



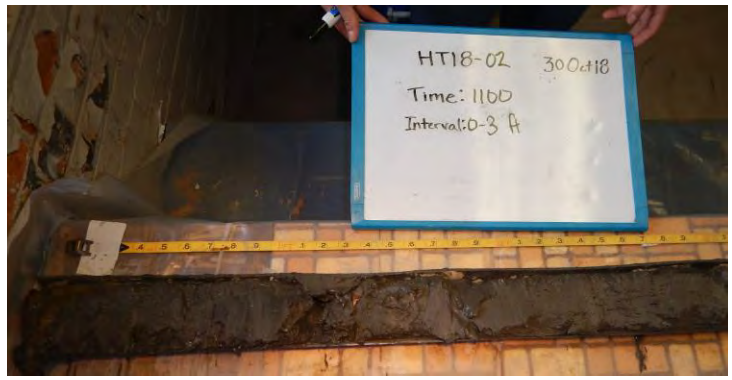
HT18-01-3060

HT18-01-6086

Photographic Record

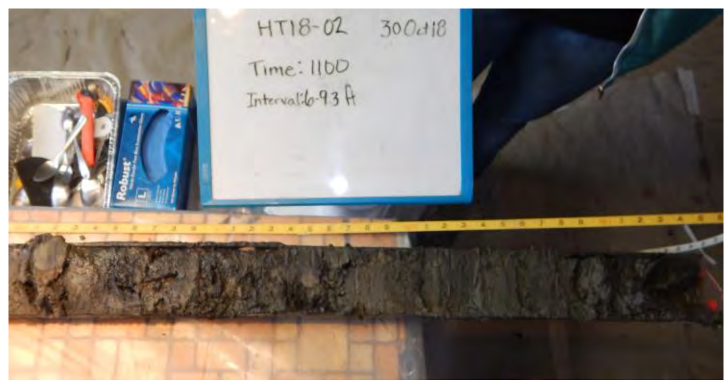
Sample location: HT18-02

HT18-02-SURF



HT18-02-0030

HT18-02-3060



HT18-02-6093

Photographic Record

Sample location: HT18-03

HT18-03-SURF

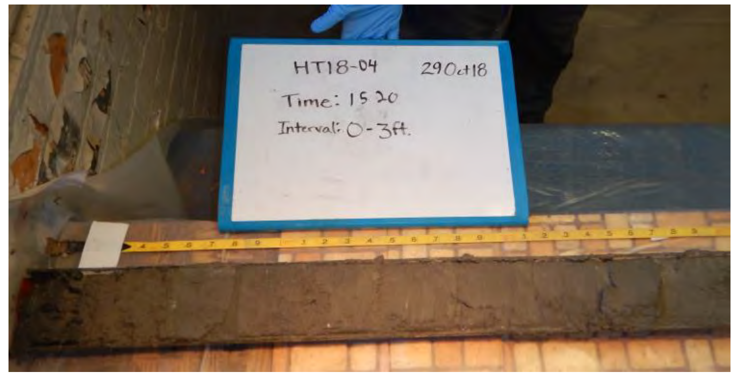
HT18-03-0030

HT18-03-3060

Photographic Record

Sample location: HT18-04

HT18-04-SURF



HT18-04-0030

HT18-04-3044

Photographic Record

Sample location: HT18-05

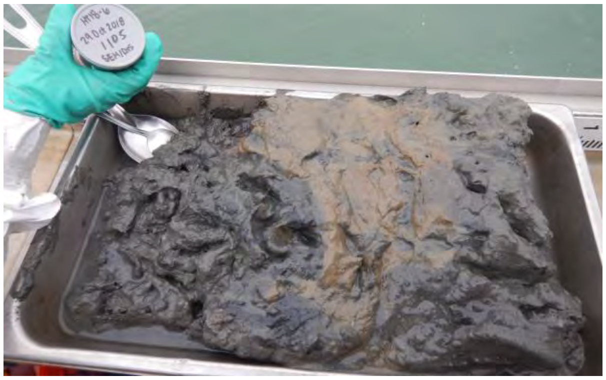
HT18-05-SURF

HT18-05-0030

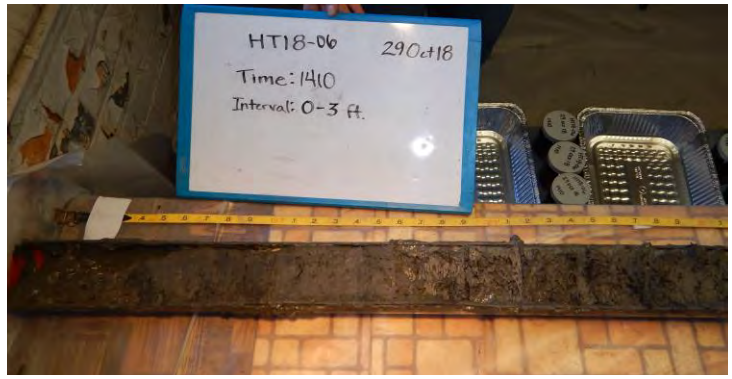
HT18-05-3060

Photographic Record

Sample location: HT18-06

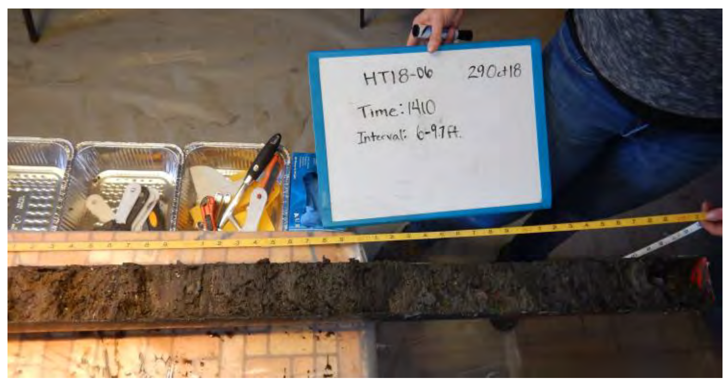


HT18-06-SURF



HT18-06-0030

HT18-06-3060

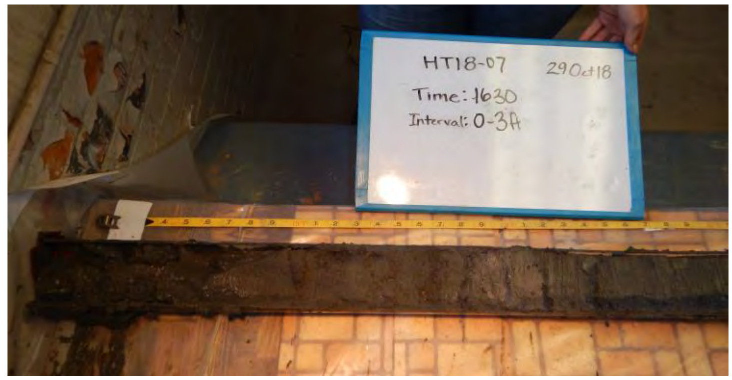


HT18-06-6097

Photographic Record

Sample location: HT18-07

HT18-06-SURF



HT18-06-0030

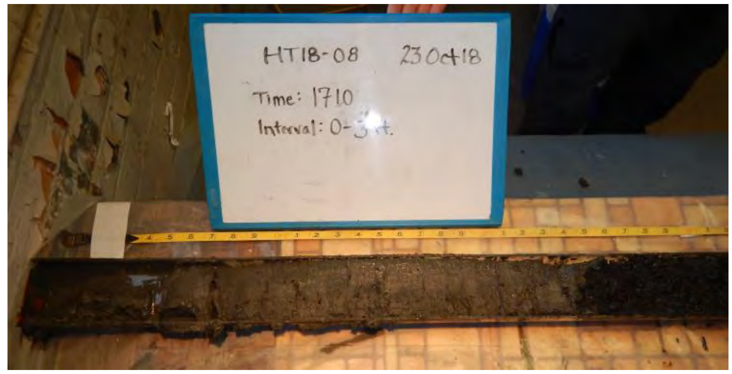
HT18-06-3060

HT18-06-6090

Photographic Record

Sample location: HT18-08

HT18-08-SURF



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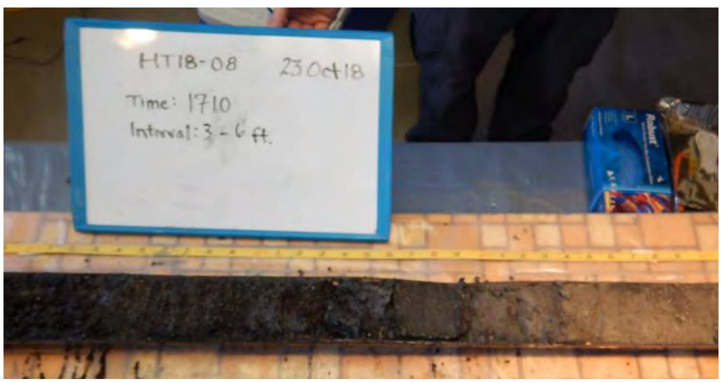

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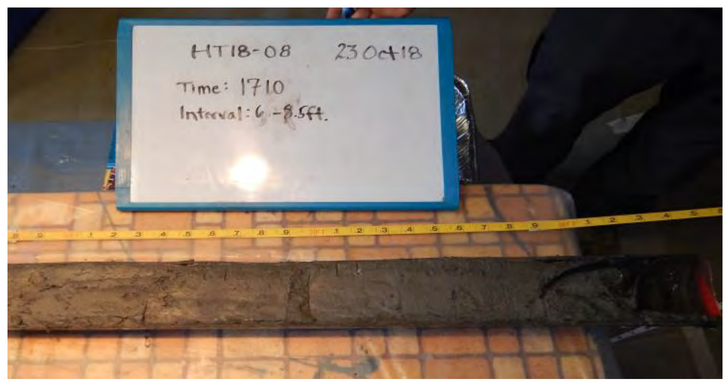
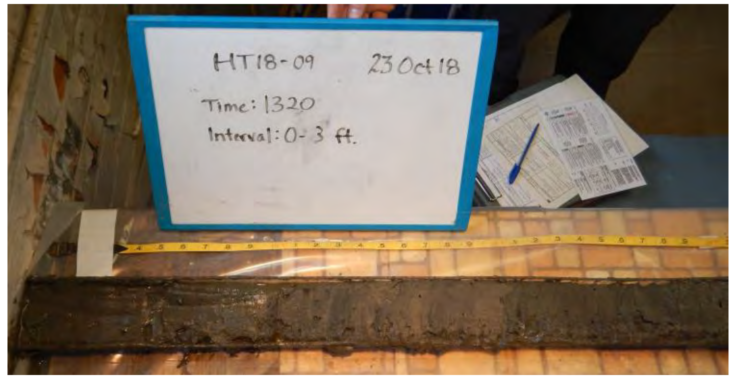


HT18-08-6085

Photographic Record

Sample location: HT18-09


HT18-09-SURF



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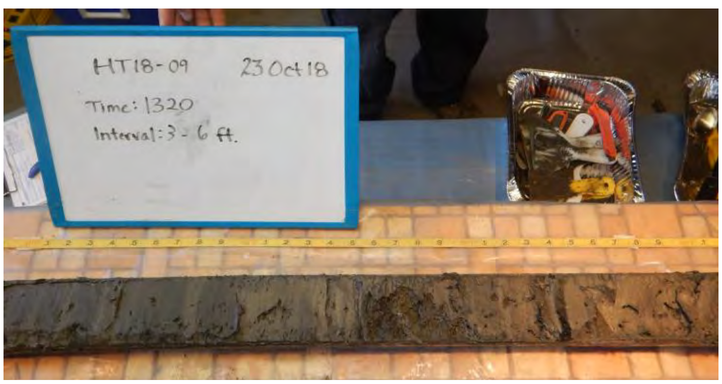

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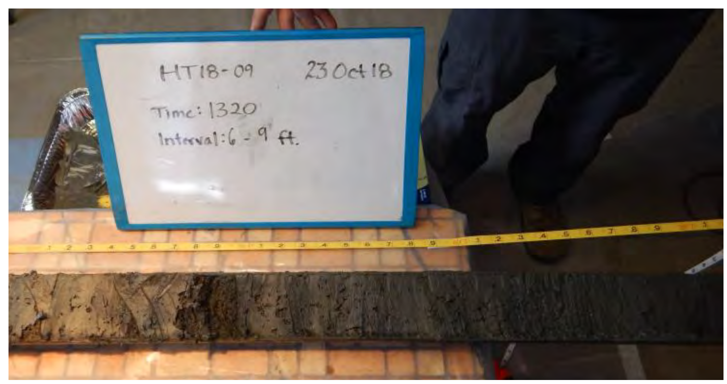

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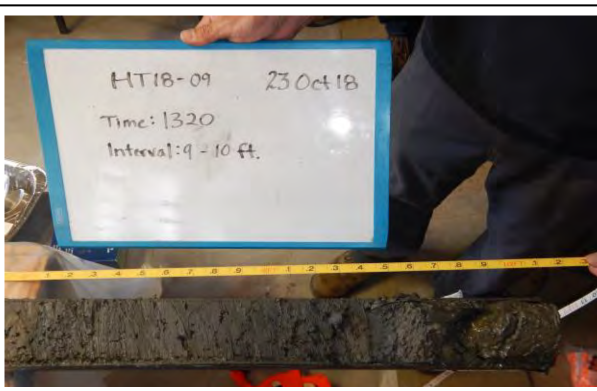


HT18-09-9010

Photographic Record

Sample location: HT18-10

HT18-10-SURF

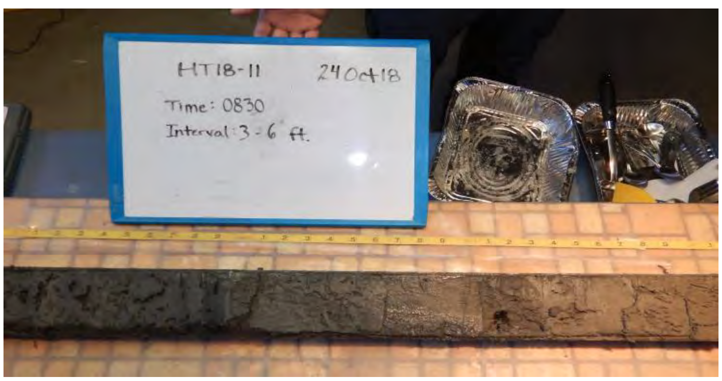
HT18-10-0011

Photographic Record

Sample location: HT18-11

HT18-11-SURF

HT18-11-0030



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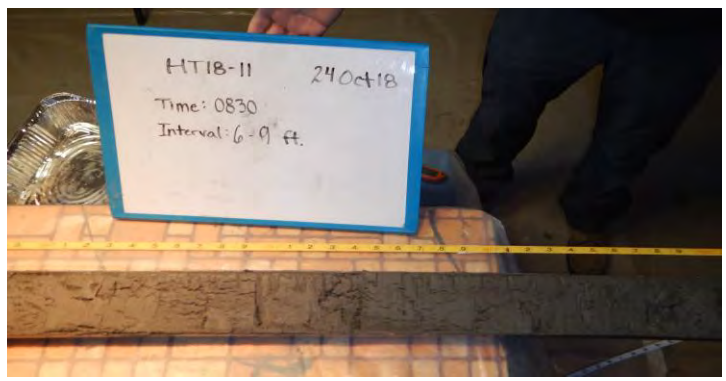
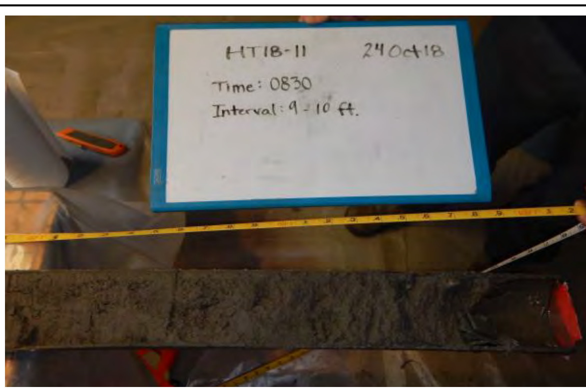


HT18-11-6090

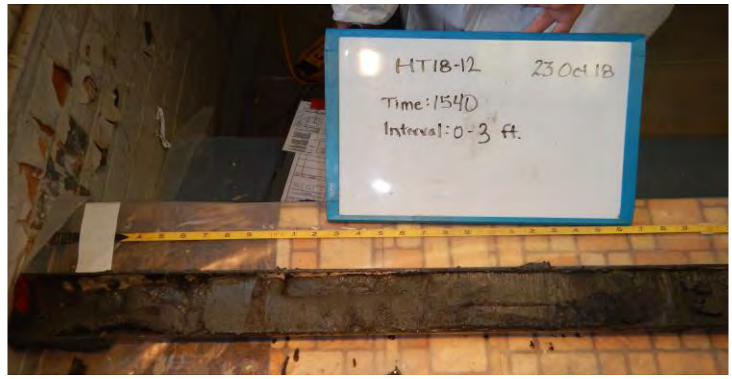


HT18-11-9010

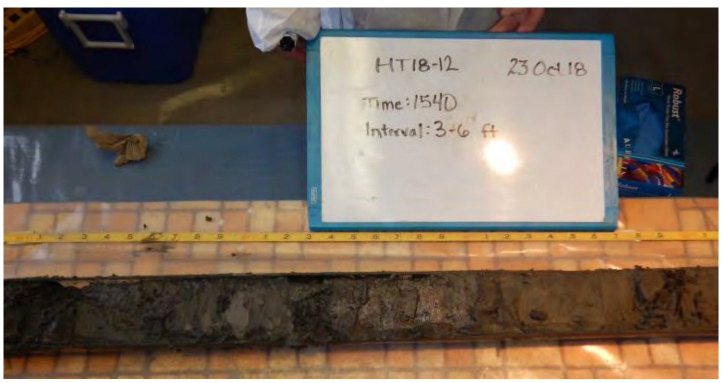
Photographic Record

Sample location: HT18-12

HT18-12-SURF



HT18-12-0030



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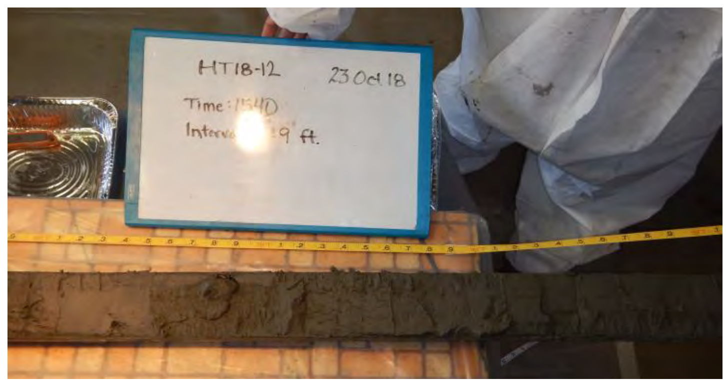

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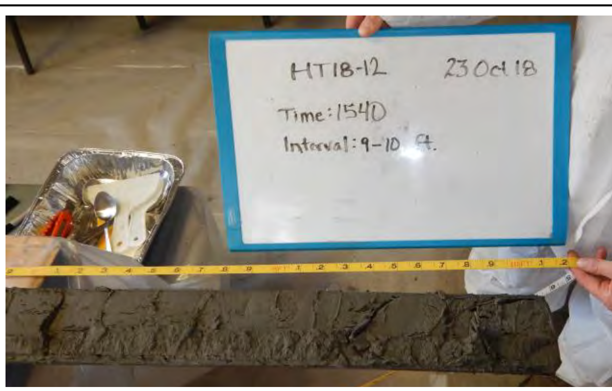


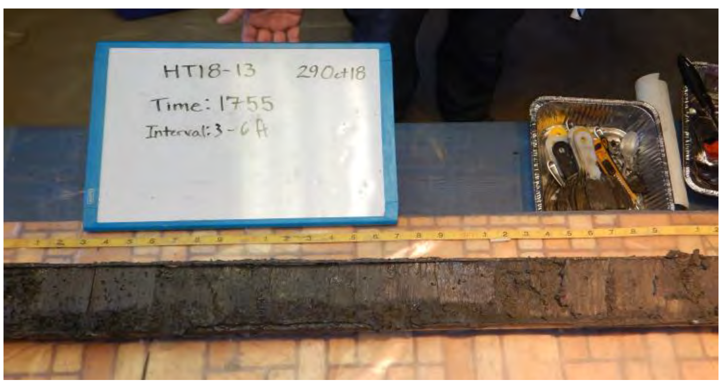
HT18-12-9010

Photographic Record

Sample location: HT18-13

HT18-13-SURF

HT18-13-0030



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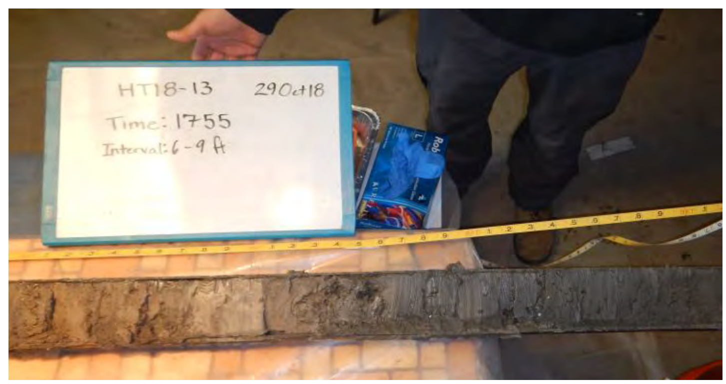


HT18-13-6090

HT18-13-9010

Photographic Record

Sample location: HT18-14

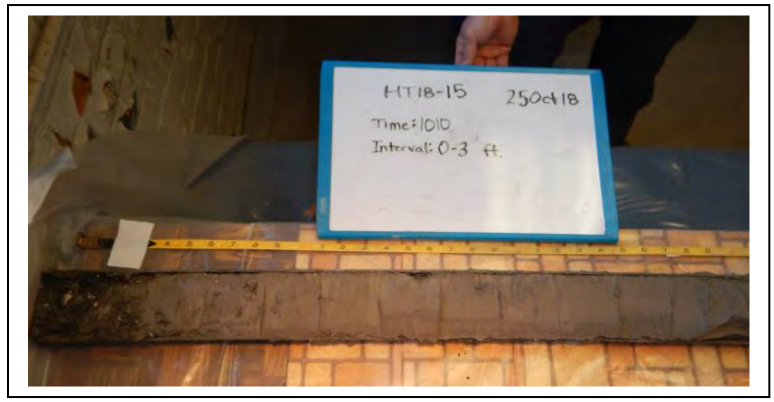
HT18-14-SURF

HT18-14-0019

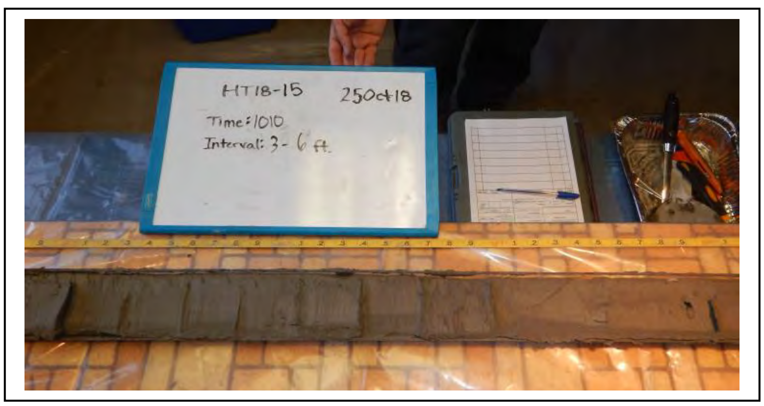
Photographic Record

Sample location: HT18-15

HT18-15-SURF



HT18-15-0030



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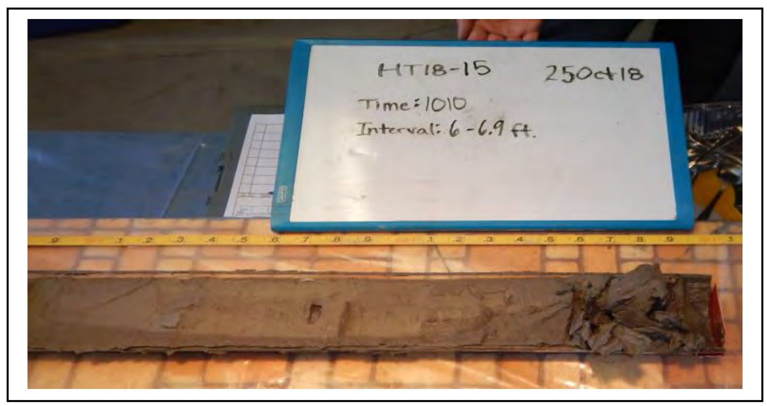


HT18-15-6069

Photographic Record

Sample location: HT18-16

HT18-16-SURF

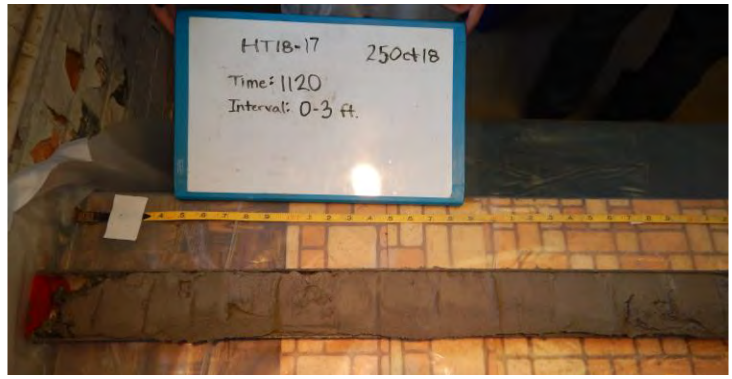
No Core Taken from This Location

HT18-16-0010

Photographic Record

Sample location: HT18-17

HT18-17-SURF



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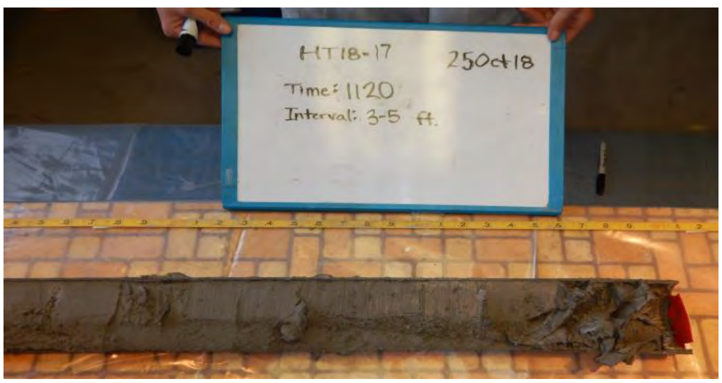


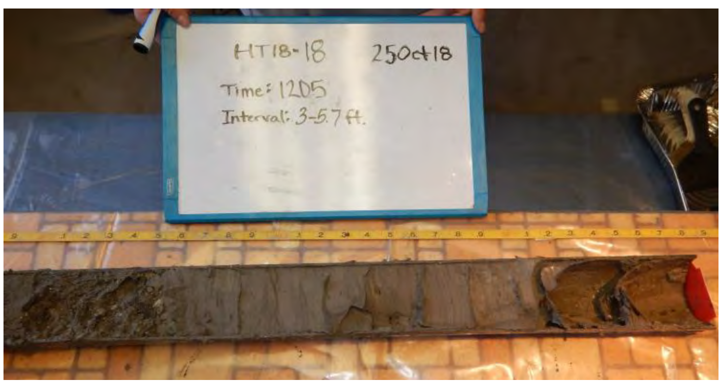
HT18-17-3050

Photographic Record

Sample location: HT18-18

HT18-18-SURF

HT18-18-0030

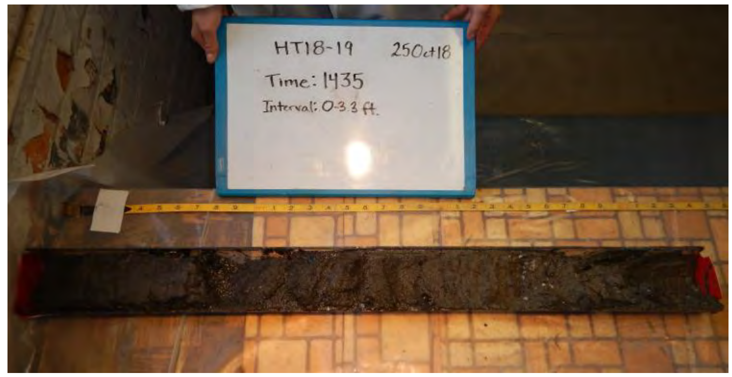


HT18-18-3057

Photographic Record

Sample location: HT18-19

HT18-19-SURF

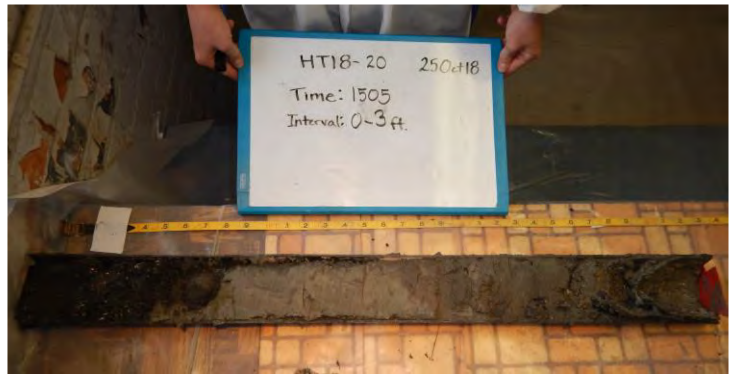


HT18-19-0033

Photographic Record

Sample location: HT18-20

HT18-20-SURF

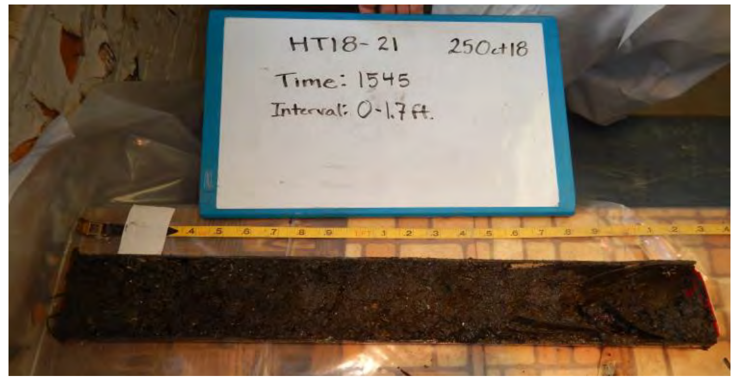


HT18-20-0030

Photographic Record

Sample location: HT18-21

HT18-21-SURF

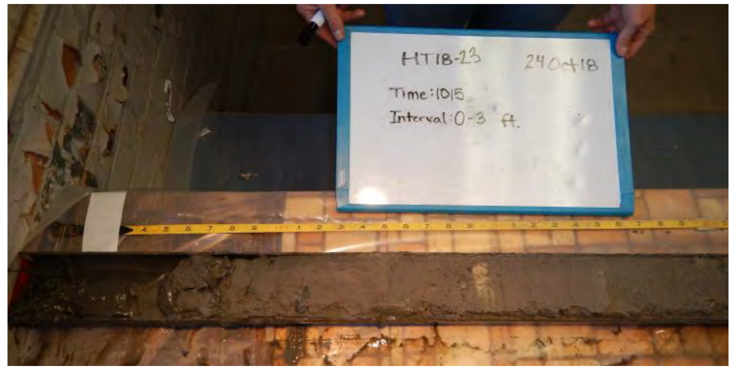


HT18-21-0017

Photographic Record

Sample location: HT23-18

HT18-23-SURF



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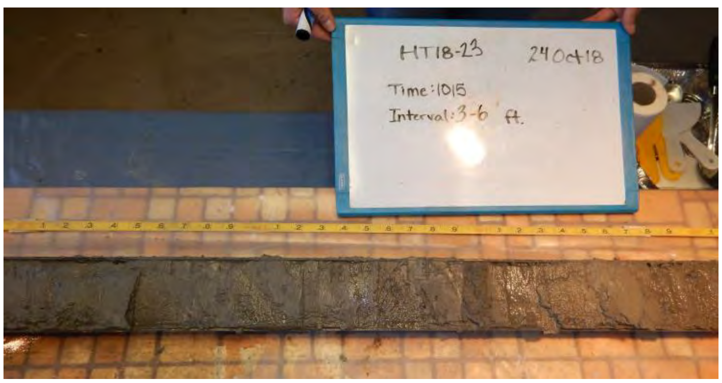

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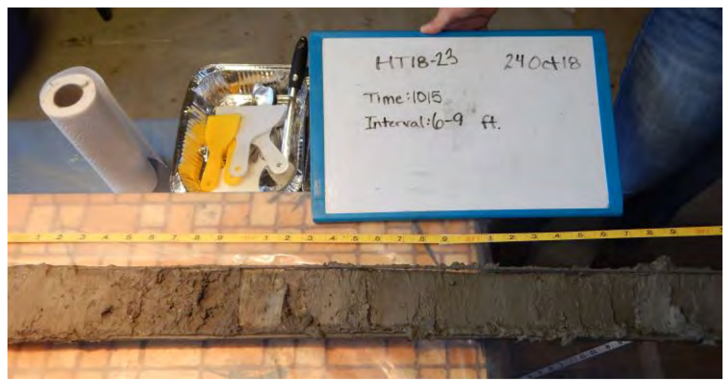


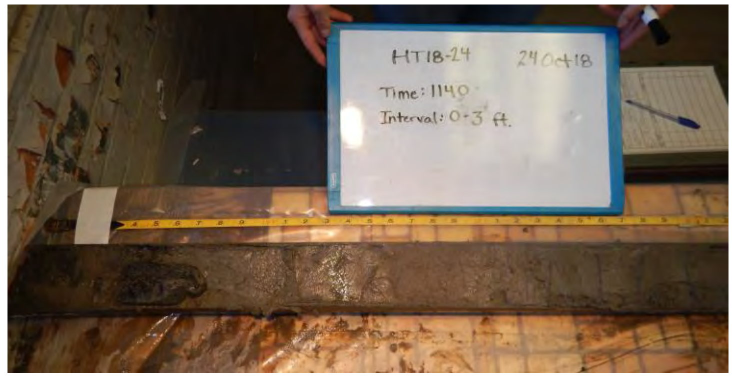
HT18-23-6090

HT18-23-9010

Photographic Record

Sample location: HT18-24

HT18-24-SURF



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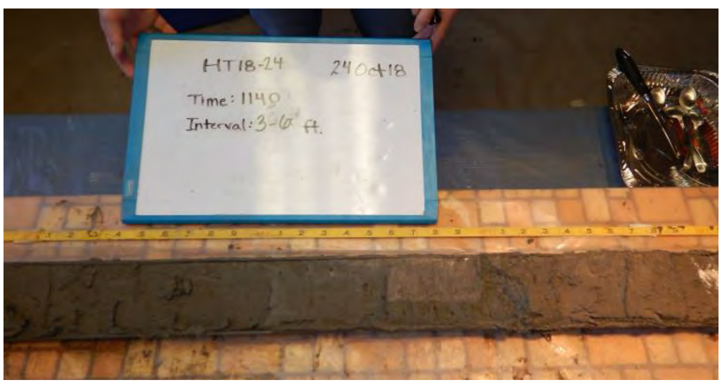
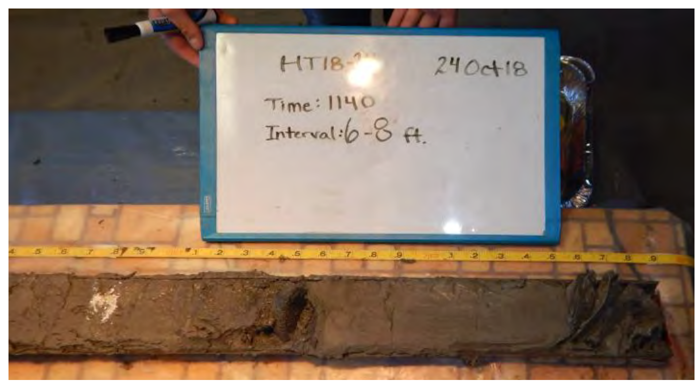


HT18-24-3060

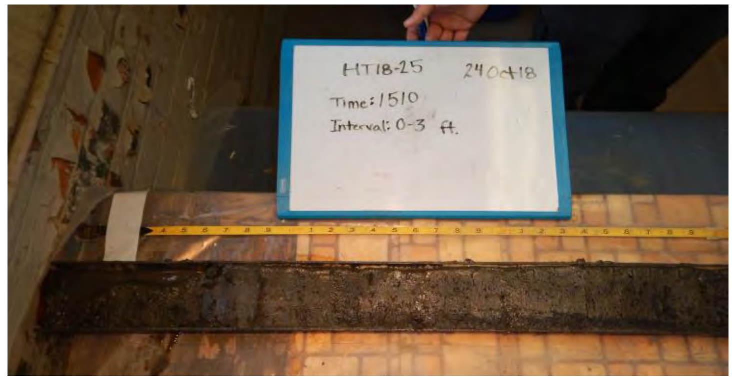


HT18-24-6080

Photographic Record

Sample location: HT18-25

HT18-25-SURF



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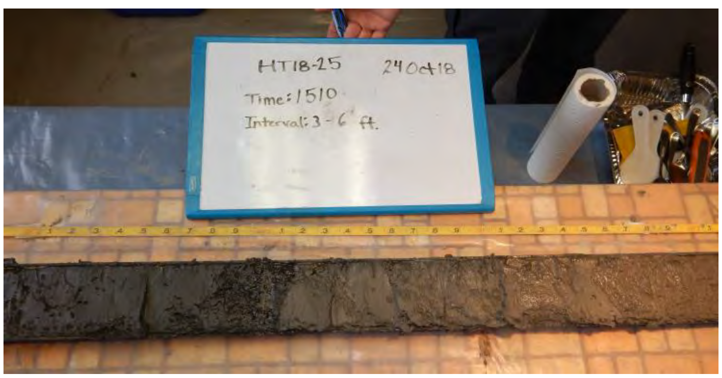
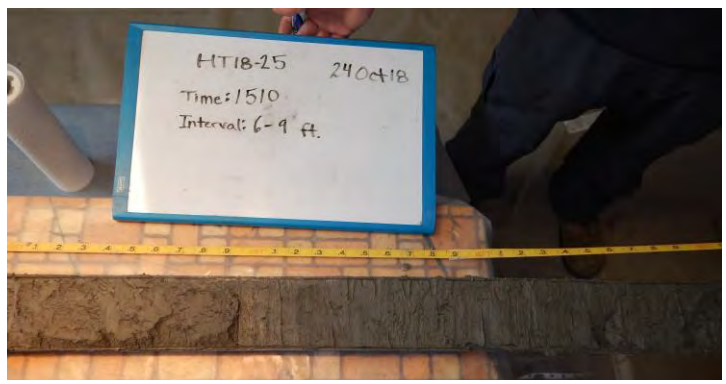


HT18-25-3060



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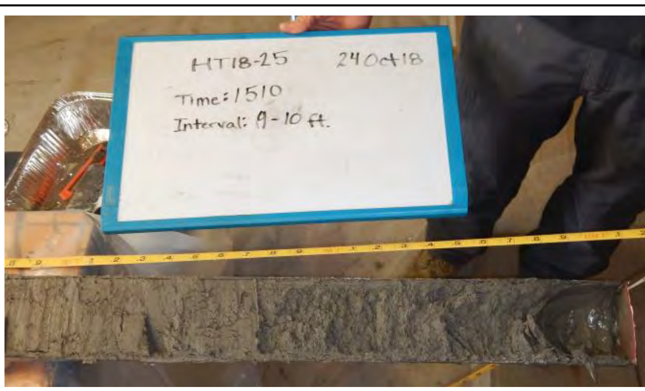
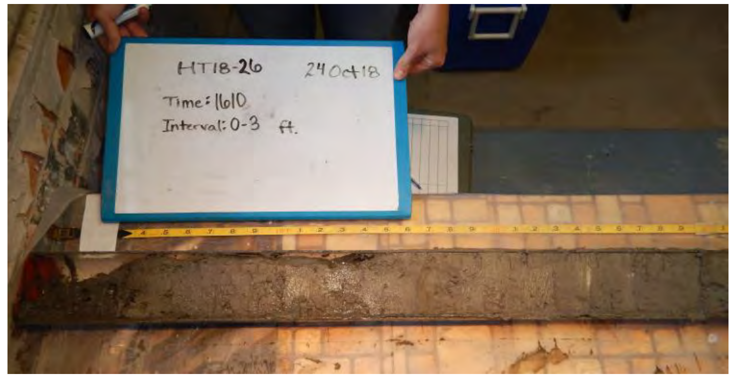


HT18-25-9010

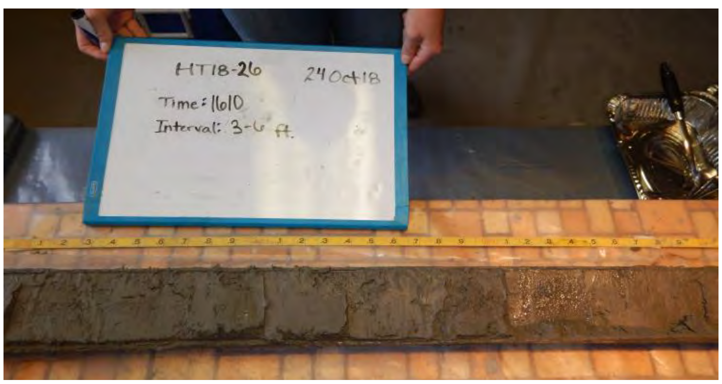
Photographic Record

Sample location: HT18-26

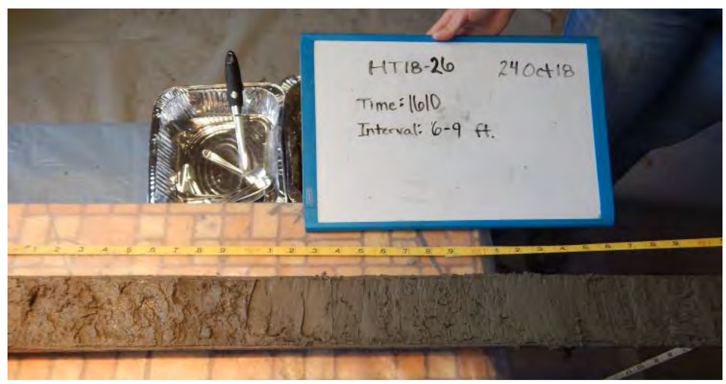
HT18-26-SURF



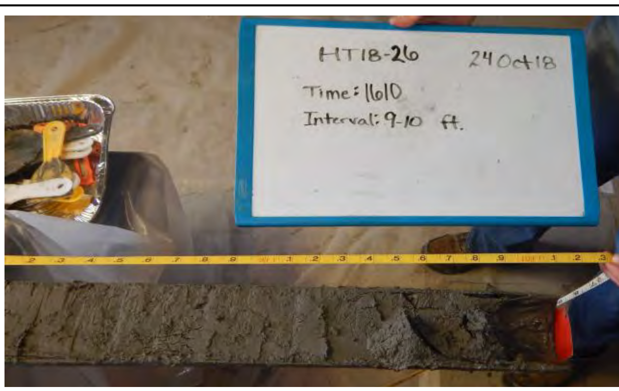
HT18-26-0030



HT18-26-3060



HT18-26-6069



HT18-26-9010

Photographic Record

Sample location: HT18-27

No Ponar Taken from This Location

HT18-27-SURF

HT18-27-0020

Photographic Record

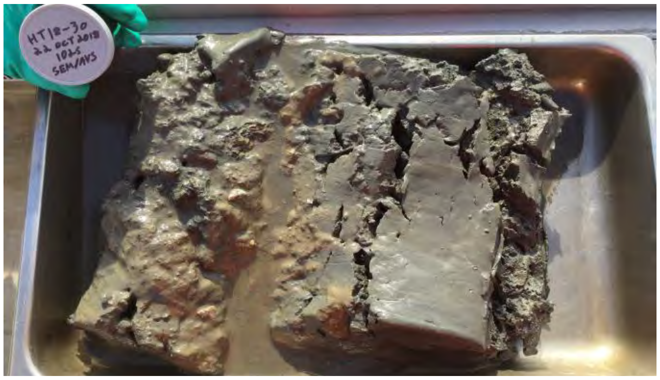
Sample location: HT18-29

HT18-29-SURF

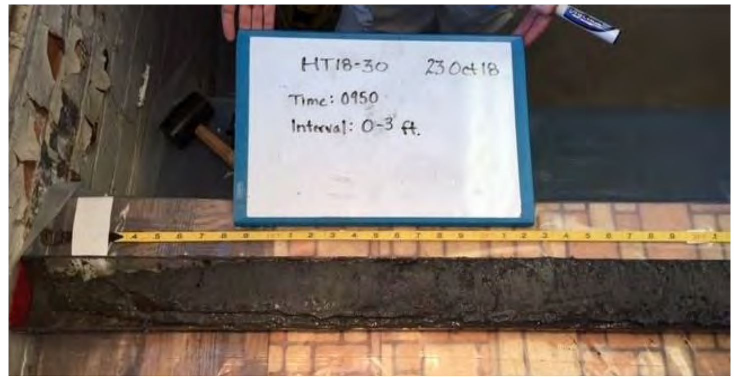
HT18-29-0012

Photographic Record

Sample location: HT18-30

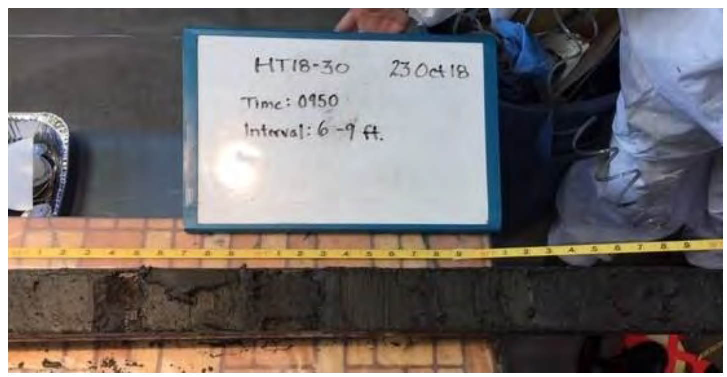


HT18-30-SURF

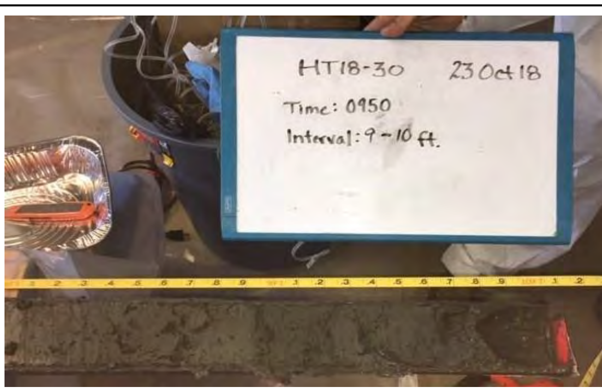


HT18-30-0030

HT18-30-3060



HT18-30-6090

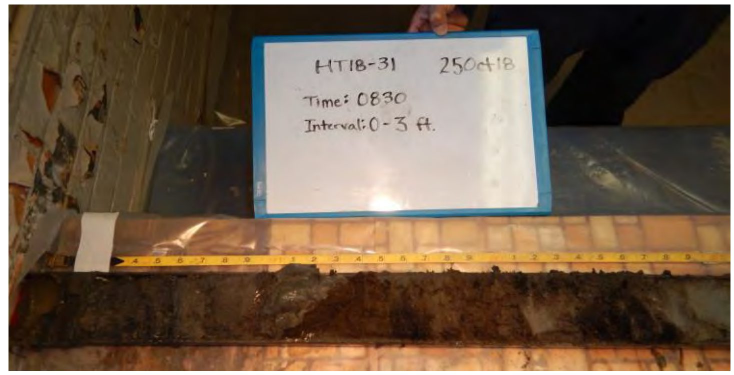


HT18-30-9010

Photographic Record

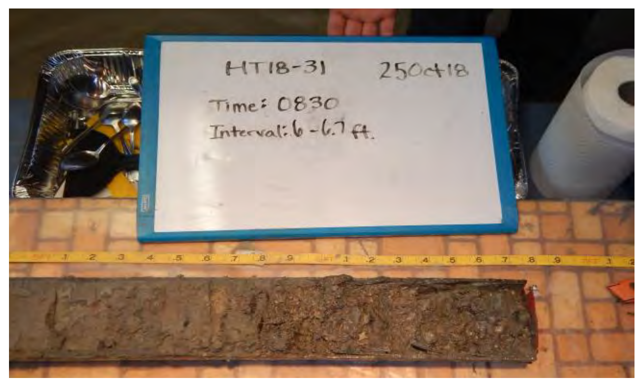
Sample location: HT18-31

HT18-31-SURF



HT18-31-0030

HT18-31-3060



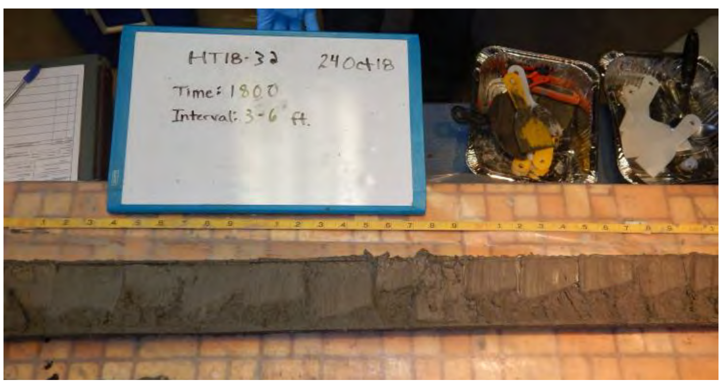
HT18-31-6067

Photographic Record

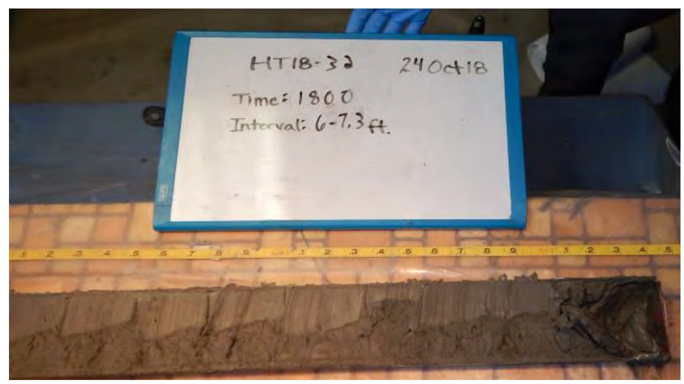
Sample location: HT18-32

HT18-32-SURF

HT18-32-0030



HT18-32-3050



HT18-32-6073

Appendix D

Particle Size Graphs

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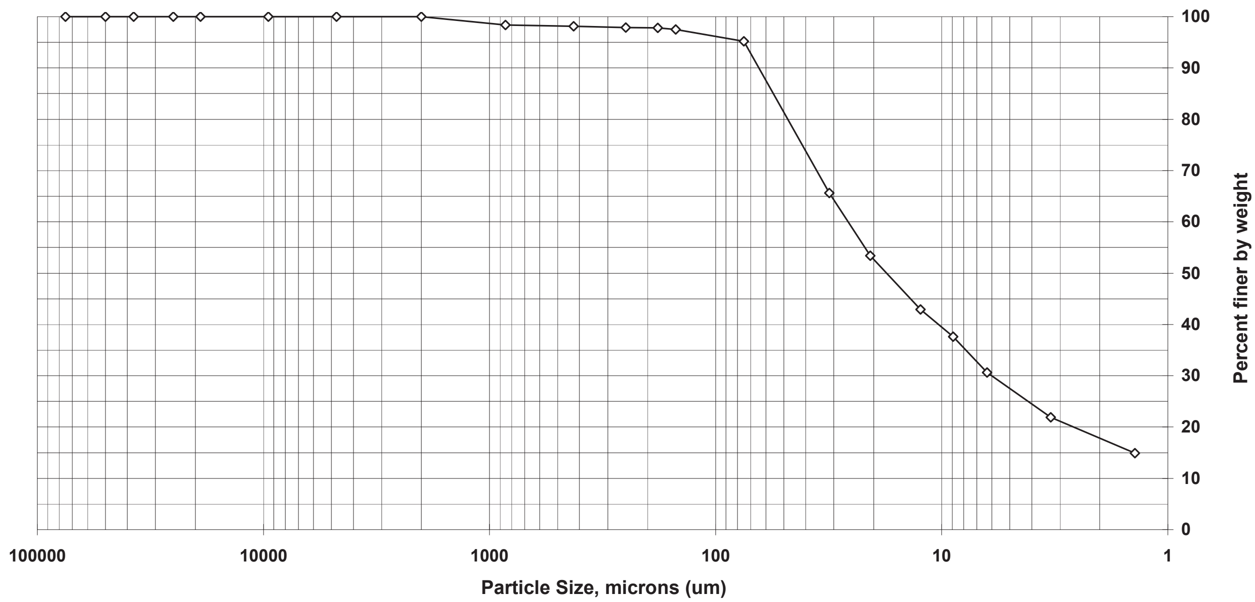
Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-09-SURF	**Percent Solids:**	31.4%	**Start Date:**	10/29/2018
Lab ID:	200-45876-E-1	**Specific Gravity:**	2.650	**End Date:**	11/5/2018

Shape (> #10): na

Non-soil material: plant
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	98.4	1.6
#40	425	98.1	0.3
#60	250	97.9	0.2
#80	180	97.8	0.1
#100	150	97.5	0.3
#200	75	95.2	2.3
Hyd1	31.4	65.6	29.6
Hyd2	20.7	53.4	12.2
Hyd3	12.4	42.9	10.5
Hyd4	8.9	37.6	5.3
Hyd5	6.3	30.6	7.0
Hyd6	3.3	21.9	8.7
Hyd7	1.4	14.9	7.0

Soil Classification	Percent of sample
Gravel	0.0
Sand	4.8
Coarse Sand	0.0
Medium Sand	1.9
Fine Sand	2.9
Silt	64.6
Clay	30.6

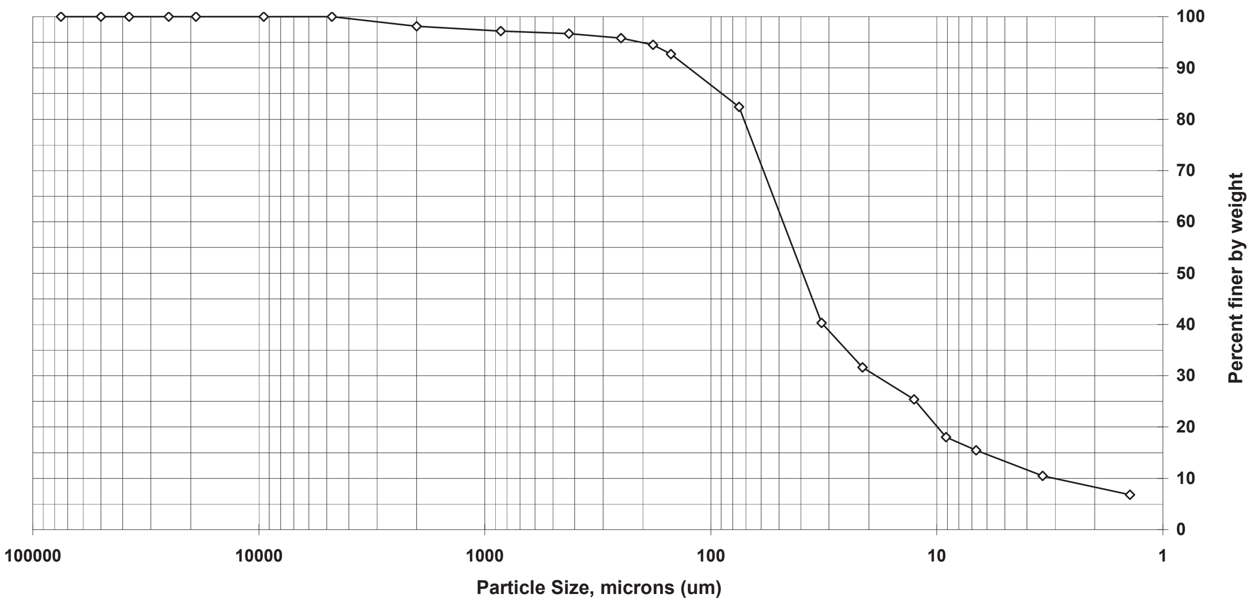
Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-12-SURF-FD	**Percent Solids:**	39.8%	**Start Date:**	10/29/2018
Lab ID:	200-45876-E-2	**Specific Gravity:**	2.650	**End Date:**	11/5/2018

Shape (> #10): angular

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	98.1	1.9
#20	850	97.2	0.9
#40	425	96.7	0.5
#60	250	95.8	0.9
#80	180	94.5	1.3
#100	150	92.7	1.8
#200	75	82.4	10.3
Hyd1	32.4	40.3	42.1
Hyd2	21.3	31.6	8.7
Hyd3	12.6	25.4	6.2
Hyd4	9.1	18.0	7.4
Hyd5	6.7	15.5	2.5
Hyd6	3.4	10.5	5.0
Hyd7	1.4	6.8	3.7

Soil Classification	Percent of sample
Gravel	0.0
Sand	17.6
Coarse Sand	1.9
Medium Sand	1.4
Fine Sand	14.3
Silt	66.9
Clay	15.5

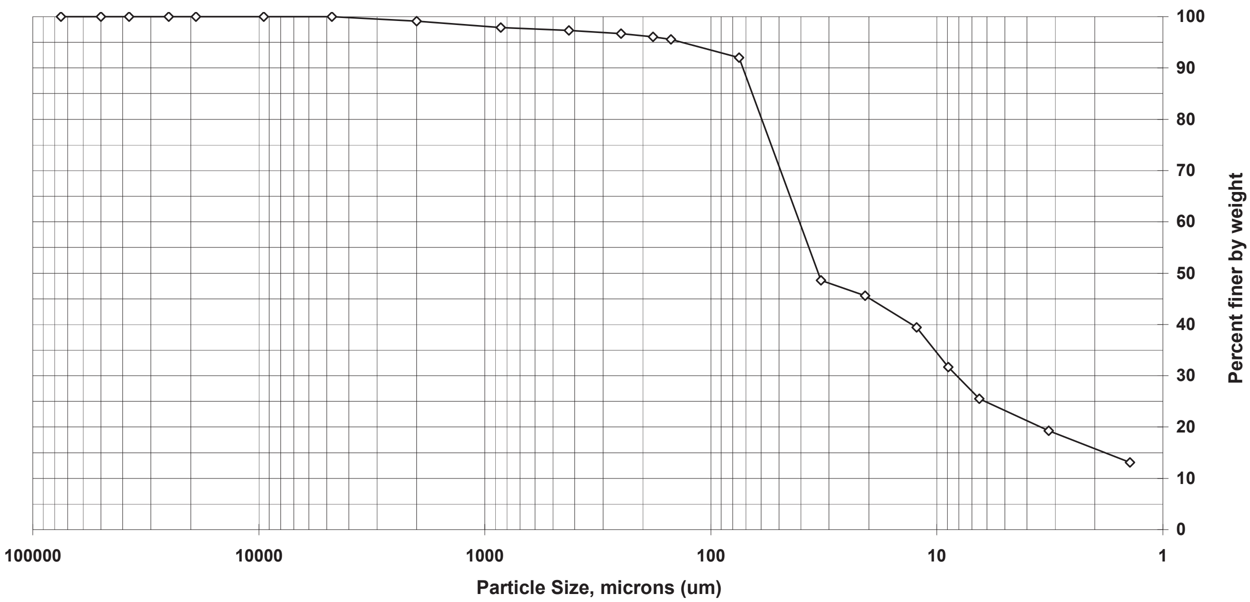
Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-08-SURF	**Percent Solids:**	30.3%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-3	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

Shape (> #10): na

Non-soil material: plantg, shell

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	99.1	0.9
#20	850	97.9	1.2
#40	425	97.3	0.6
#60	250	96.7	0.6
#80	180	96.1	0.6
#100	150	95.6	0.5
#200	75	92.0	3.6
Hyd1	32.6	48.6	43.4
Hyd2	20.8	45.6	3.0
Hyd3	12.3	39.4	6.2
Hyd4	8.9	31.7	7.7
Hyd5	6.5	25.5	6.2
Hyd6	3.2	19.3	6.2
Hyd7	1.4	13.1	6.2

Soil Classification	Percent of sample
Gravel	0.0
Sand	8.0
Coarse Sand	0.9
Medium Sand	1.8
Fine Sand	5.3
Silt	66.5
Clay	25.5

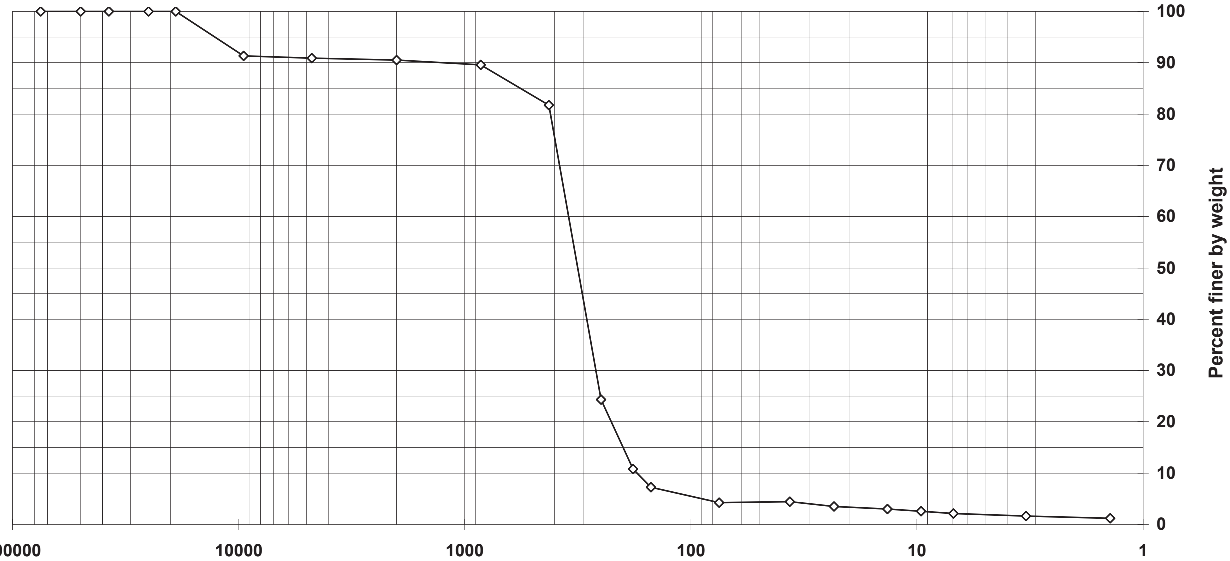
Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-10-SURF	**Percent Solids:**	73.8%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-4	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

Shape (> #10): angular

Non-soil material: plant, shell

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	91.3	8.7
#4	4750	90.9	0.4
#10	2000	90.5	0.4
#20	850	89.6	0.9
#40	425	81.7	7.9
#60	250	24.3	57.4
#80	180	10.8	13.5
#100	150	7.3	3.6
#200	75	4.2	3.0
Hyd1	36.5	4.4	-0.2
Hyd2	23.3	3.5	0.9
Hyd3	13.5	3.0	0.5
Hyd4	9.6	2.6	0.5
Hyd5	6.9	2.1	0.5
Hyd6	3.3	1.6	0.5
Hyd7	1.4	1.2	0.5

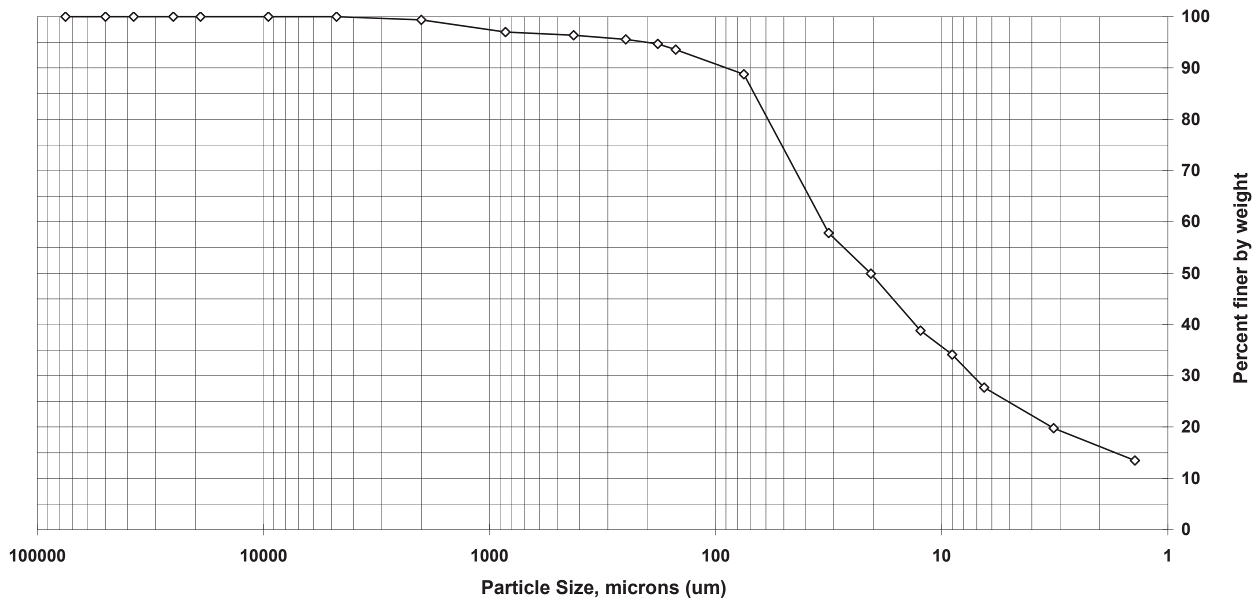
Soil Classification	Percent of sample
Gravel	9.1
Sand	86.7
Coarse Sand	0.4
Medium Sand	8.8
Fine Sand	77.5
Silt	2.1
Clay	2.1

Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-11-SURF	**Percent Solids:**	29.8%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-5	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

Shape (> #10): na

Non-soil material: plant, shell
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	99.4	0.6
#20	850	97.0	2.4
#40	425	96.4	0.6
#60	250	95.6	0.8
#80	180	94.7	0.9
#100	150	93.6	1.1
#200	75	88.8	4.8
Hyd1	31.6	57.8	31.0
Hyd2	20.6	49.9	7.9
Hyd3	12.4	38.8	11.1
Hyd4	9	34.1	4.7
Hyd5	6.5	27.7	6.4
Hyd6	3.2	19.8	7.9
Hyd7	1.4	13.5	6.3

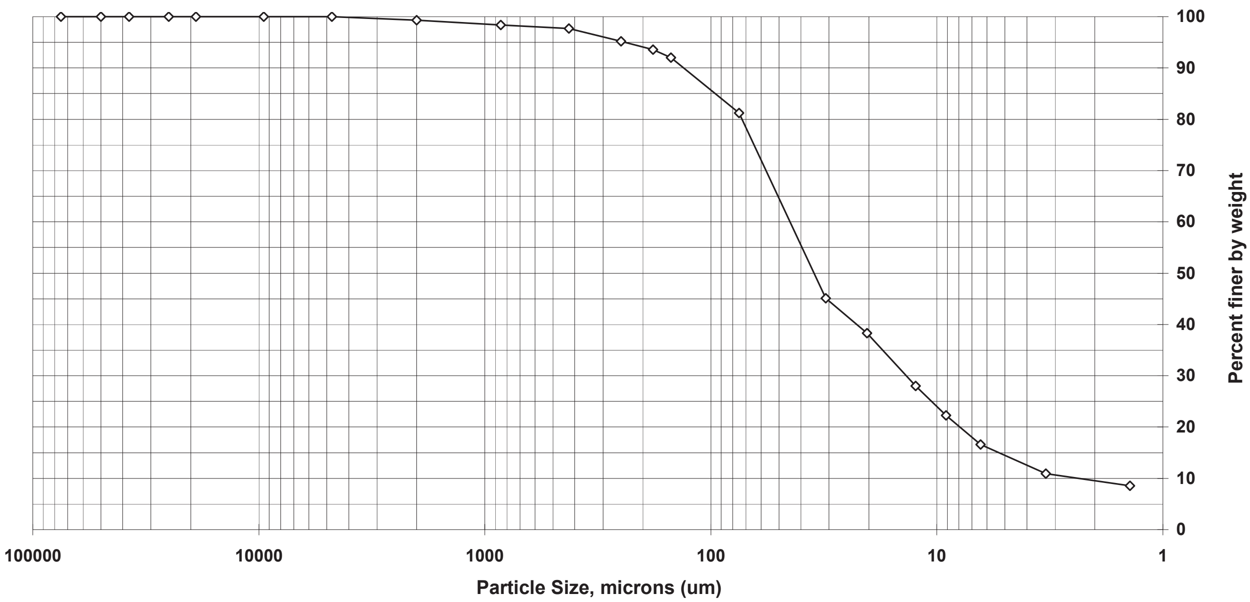
Soil Classification	Percent of sample
Gravel	0.0
Sand	11.2
Coarse Sand	0.6
Medium Sand	3.0
Fine Sand	7.6
Silt	61.1
Clay	27.7

Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-12-SURF	**Percent Solids:**	37.1%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-6	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

Shape (> #10): angular

Non-soil material: plant
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.3	0.7
#20	850	98.4	0.9
#40	425	97.7	0.7
#60	250	95.2	2.5
#80	180	93.6	1.6
#100	150	92.0	1.6
#200	75	81.2	10.8
Hyd1	31	45.1	36.1
Hyd2	20.4	38.3	6.8
Hyd3	12.4	28.0	10.3
Hyd4	9.1	22.3	5.7
Hyd5	6.4	16.6	5.7
Hyd6	3.3	10.9	5.7
Hyd7	1.4	8.6	2.3

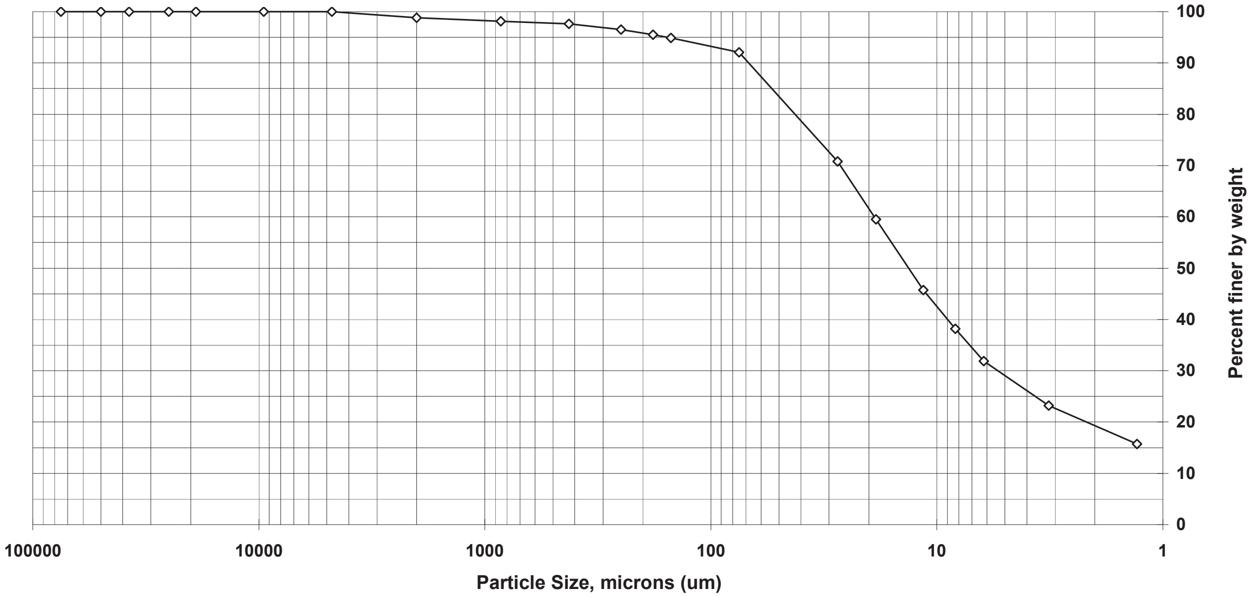
Soil Classification	Percent of sample
Gravel	0.0
Sand	18.8
Coarse Sand	0.7
Medium Sand	1.6
Fine Sand	16.5
Silt	64.6
Clay	16.6

Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-31-SURF	**Percent Solids:**	37.1%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-7	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

Shape (> #10): na

Non-soil material: plant, shell
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	98.8	1.2
#20	850	98.1	0.7
#40	425	97.6	0.5
#60	250	96.5	1.1
#80	180	95.5	1.0
#100	150	94.9	0.6
#200	75	92.1	2.8
Hyd1	27.5	70.8	21.3
Hyd2	18.6	59.5	11.3
Hyd3	11.5	45.7	13.8
Hyd4	8.3	38.2	7.5
Hyd5	6.2	31.9	6.3
Hyd6	3.2	23.2	8.7
Hyd7	1.3	15.7	7.5

Soil Classification	Percent of sample
Gravel	0.0
Sand	7.9
Coarse Sand	1.2
Medium Sand	1.2
Fine Sand	5.5
Silt	60.2
Clay	31.9

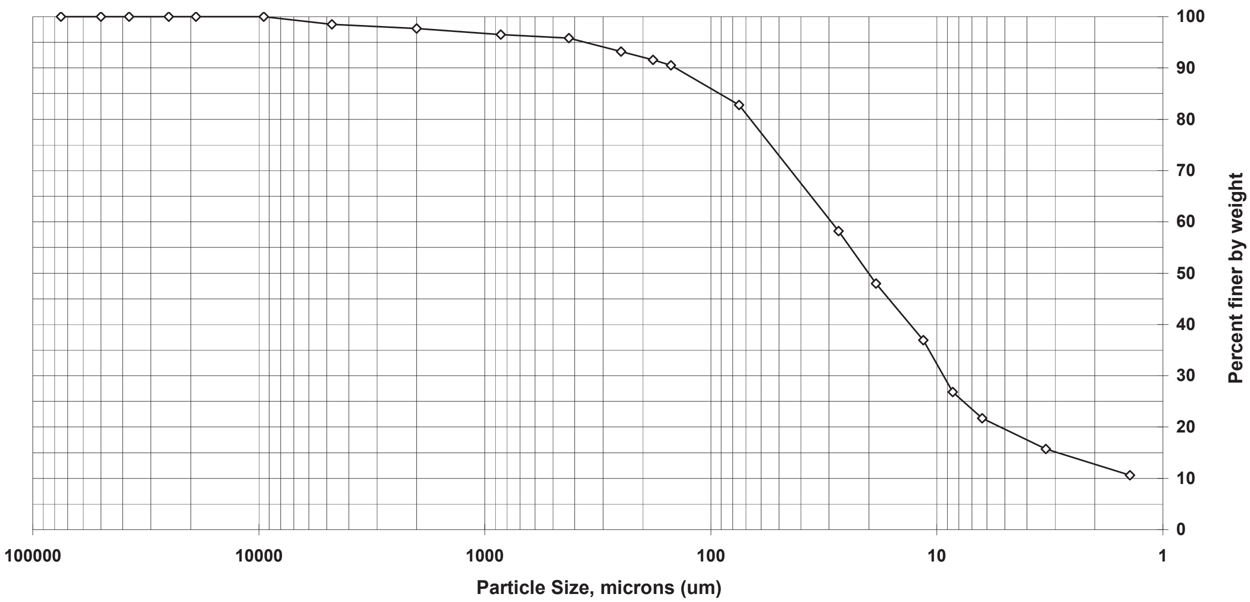
Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-32-SURF	**Percent Solids:**	49.0%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-8	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

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	100.0	0.0
#4	4750	98.5	1.5
#10	2000	97.7	0.8
#20	850	96.5	1.2
#40	425	95.8	0.7
#60	250	93.2	2.6
#80	180	91.6	1.6
#100	150	90.5	1.1
#200	75	82.8	7.7
Hyd1	27.2	58.2	24.6
Hyd2	18.6	48.0	10.2
Hyd3	11.5	36.9	11.1
Hyd4	8.5	26.8	10.1
Hyd5	6.3	21.7	5.1
Hyd6	3.3	15.7	6.0
Hyd7	1.4	10.6	5.1

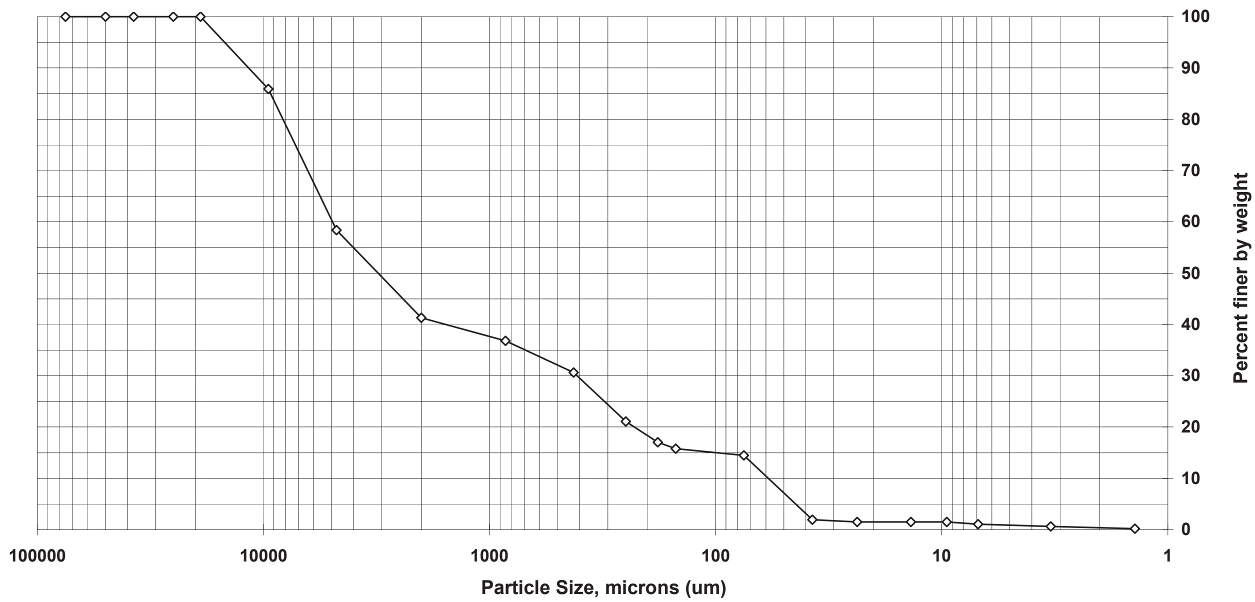
Soil Classification	Percent of sample
Gravel	1.5
Sand	15.7
Coarse Sand	0.8
Medium Sand	1.9
Fine Sand	13.0
Silt	61.1
Clay	21.7

Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-29-SURF	**Percent Solids:**	81.2%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-9	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

Shape (> #10): angular

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	85.9	14.1
#4	4750	58.4	27.5
#10	2000	41.3	17.1
#20	850	36.8	4.5
#40	425	30.6	6.2
#60	250	21.1	9.5
#80	180	17.0	4.1
#100	150	15.8	1.2
#200	75	14.5	1.3
Hyd1	37.3	1.9	12.6
Hyd2	23.7	1.5	0.4
Hyd3	13.7	1.5	0.0
Hyd4	9.5	1.5	0.0
Hyd5	6.9	1.1	0.4
Hyd6	3.3	0.6	0.4
Hyd7	1.4	0.2	0.4

Soil Classification	Percent of sample
Gravel	41.6
Sand	43.9
Coarse Sand	17.1
Medium Sand	10.7
Fine Sand	16.1
Silt	13.4
Clay	1.1

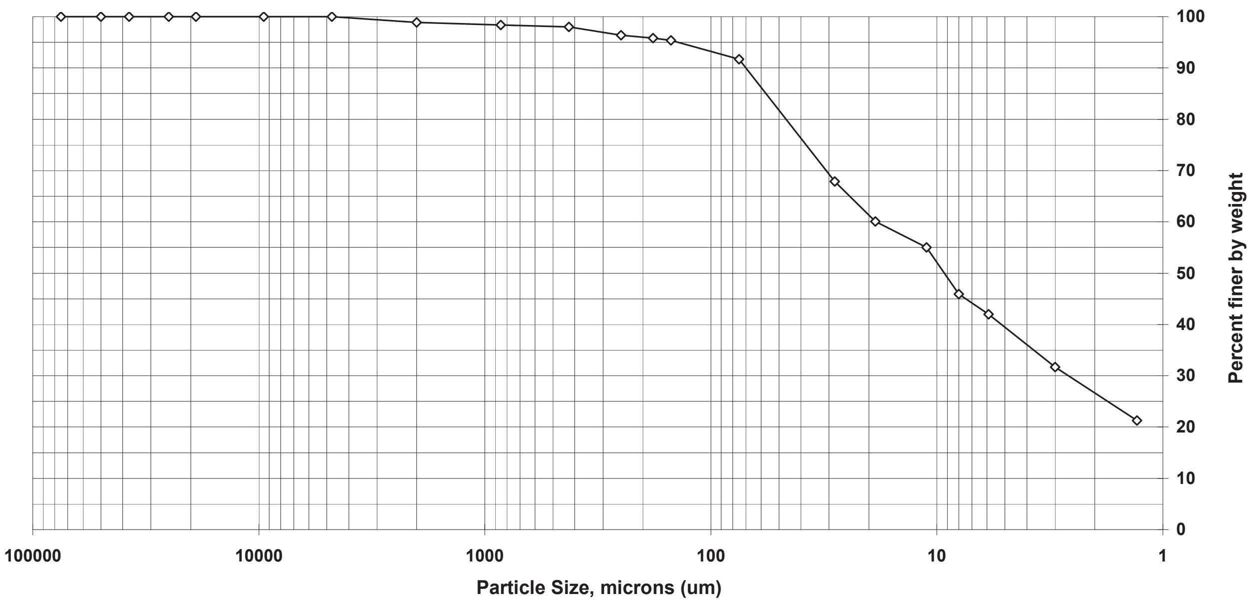
Particle Size of Soils by ASTM D422

				Date Received:	10/25/2018
Sample ID:	HT18-30-SURF	**Percent Solids:**	38.2%	**Start Date:**	10/30/2018
Lab ID:	200-45876-E-10	**Specific Gravity:**	2.650	**End Date:**	11/2/2018

Shape (> #10): angular

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	100.0	0.0
#10	2000	98.9	1.1
#20	850	98.4	0.5
#40	425	98.0	0.4
#60	250	96.4	1.6
#80	180	95.8	0.6
#100	150	95.4	0.4
#200	75	91.7	3.7
Hyd1	28.3	67.9	23.8
Hyd2	18.7	60.1	7.8
Hyd3	11.1	55.0	5.1
Hyd4	8	45.9	9.1
Hyd5	5.9	42.0	3.9
Hyd6	3	31.7	10.3
Hyd7	1.3	21.3	10.4

Soil Classification	Percent of sample
Gravel	0.0
Sand	8.3
Coarse Sand	1.1
Medium Sand	0.9
Fine Sand	6.3
Silt	49.7
Clay	42.0

Particle Size of Soils by ASTM D422

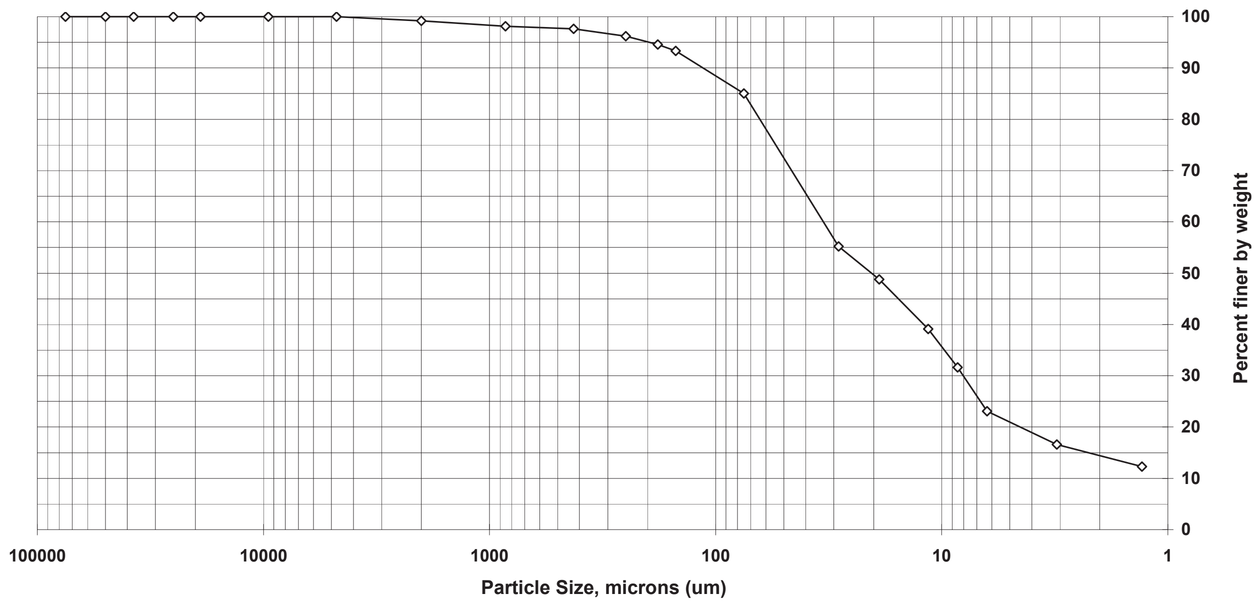
Date Received: 10/25/2018
Start Date: 10/30/2018
End Date: 11/5/2018

Sample ID: HT18-32-SURF-FD
Lab ID: 200-45876-E-11

Percent Solids: 47.9%
Specific Gravity: 2.650

Shape (> #10): na

Non-soil material: plant, shell
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	99.2	0.8
#20	850	98.1	1.1
#40	425	97.6	0.5
#60	250	96.2	1.4
#80	180	94.6	1.6
#100	150	93.3	1.3
#200	75	85.0	8.3
Hyd1	28.6	55.2	29.8
Hyd2	18.9	48.8	6.4
Hyd3	11.5	39.1	9.7
Hyd4	8.5	31.6	7.5
Hyd5	6.3	23.1	8.5
Hyd6	3.1	16.6	6.5
Hyd7	1.3	12.3	4.3

Soil Classification	Percent of sample
Gravel	0.0
Sand	15.0
Coarse Sand	0.8
Medium Sand	1.6
Fine Sand	12.6
Silt	61.9
Clay	23.1

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/25/2018
Client Sample ID	HT18-09-SURF	Start Date	10/29/2018 19:40
Lab Sample ID	200-45876-E-1	End Date	11/05/2018 14:28

Dry Weight Determination

Tin Weight	1.07	g
Wet Sample + Tin	18.13	g
Dry Sample + Tin	6.42	g
% Moisture	68.64	%

Non-soil material:	plant
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	10/29/2018 19:44
Date/Time out of oven	10/30/2018 16:57

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.09	190.52	146.43
Sample Weight (Oven Dried)			45.9

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.02
Sample <#10			45.9
% Passing #10			31.3

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.69	462.71	0.02 g	100.0	Sand	Coarse
#20	850	378.86	379.61	0.75 g	98.4	Sand	Medium
#40	425	353.20	353.36	0.16 g	98.1	Sand	Medium
#60	250	348.61	348.69	0.08 g	97.9	Sand	Fine
#80	180	338.06	338.12	0.06 g	97.8	Sand	Fine
#100	150	328.67	328.80	0.13 g	97.5	Sand	Fine
#200	75	325.49	326.53	1.04 g	95.2	Sand	Fine
				0.00 g	95.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	45.9

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0215	20.0	31.4	65.6	Silt	
5	5	1.0180	20.0	20.7	53.4	Silt	
15	15	1.0150	20.0	12.4	42.9	Silt	
30	30	1.0135	20.0	8.9	37.6	Silt	
60	63	1.0115	20.0	6.3	30.6	Silt	
250	241	1.0090	20.0	3.3	21.9	Clay	
1440	1388	1.0070	20.0	1.4	14.9	Clay	

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Sediment Grain Size - D422

Client		Date Received	10/25/2018
Client Sample ID	HT18-12-SURF-FD	Start Date	10/29/2018 19:46
Lab Sample ID	200-45876-E-2	End Date	11/05/2018 14:31

Dry Weight Determination

Tin Weight	1.09	g
Wet Sample + Tin	20.70	g
Dry Sample + Tin	8.89	g
% Moisture	60.22	%

Non-soil material:	plant
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/29/2018 19:48
Date/Time out of oven	10/30/2018 16:58

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.08	206.76	162.68
Sample Weight (Oven Dried)			64.7

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			1.21
Sample <#10			63.5
% Passing #10			39

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.69	463.90	1.21	g	98.1	Sand	Coarse
#20	850	374.56	375.15	0.59	g	97.2	Sand	Medium
#40	425	363.31	363.61	0.30	g	96.7	Sand	Medium
#60	250	353.69	354.25	0.56	g	95.8	Sand	Fine
#80	180	319.37	320.21	0.84	g	94.5	Sand	Fine
#100	150	328.79	329.93	1.14	g	92.7	Sand	Fine
#200	75	314.60	321.25	6.65	g	82.4	Sand	Fine
				0.00	g	82.4		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	64.7

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0190	20.0	32.4	40.3	Silt	
5	5	1.0155	20.0	21.3	31.6	Silt	
15	15	1.0130	20.0	12.6	25.4	Silt	
30	31	1.0100	20.0	9.1	18	Silt	
60	57	1.0090	20.0	6.7	15.5	Silt	
250	235	1.0070	20.0	3.4	10.5	Clay	
1440	1382	1.0055	20.0	1.4	6.83	Clay	

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Sediment Grain Size - D422

Client		Date Received	10/25/2018
Client Sample ID	HT18-08-SURF	Start Date	10/30/2018 18:18
Lab Sample ID	200-45876-E-3	End Date	11/02/2018 11:13

Dry Weight Determination

Tin Weight	1.04	g
Wet Sample + Tin	17.23	g
Dry Sample + Tin	5.94	g
% Moisture	69.73	%

Non-soil material:	plantg, shell
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	10/30/2018 18:20
Date/Time out of oven	10/31/2018 19:27

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.77	216.53	171.76
Sample Weight (Oven Dried)			52

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.49
Sample <#10			51.5
% Passing #10			30

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.68	463.17	0.49	g	99.1	Sand	Coarse
#20	850	378.85	379.47	0.62	g	97.9	Sand	Medium
#40	425	353.22	353.54	0.32	g	97.3	Sand	Medium
#60	250	348.46	348.75	0.29	g	96.7	Sand	Fine
#80	180	337.94	338.26	0.32	g	96.1	Sand	Fine
#100	150	328.66	328.94	0.28	g	95.6	Sand	Fine
#200	75	325.49	327.36	1.87	g	92.0	Sand	Fine
				0.00	g	92.0		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	52

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0185	20.0	32.6	48.6	Silt	
5	5	1.0175	20.0	20.8	45.6	Silt	
15	15	1.0155	20.0	12.3	39.4	Silt	
30	30	1.0130	20.0	8.9	31.7	Silt	
60	59	1.0110	20.0	6.5	25.5	Silt	
250	256	1.0090	20.0	3.2	19.3	Clay	
1440	1440	1.0070	20.0	1.4	13.1	Clay	

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Sediment Grain Size - D422

Client	
Client Sample ID	HT18-10-SURF
Lab Sample ID	200-45876-E-4

Date Received	10/25/2018
Start Date	10/30/2018 18:22
End Date	11/02/2018 11:18

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	40.33	g
Dry Sample + Tin	30.02	g
% Moisture	26.25	%

Non-soil material:	plant, shell
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/30/2018 18:24
Date/Time out of oven	10/31/2018 19:27

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.09	278.98	234.89
Sample Weight (Oven Dried)			173

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			16.5
Sample <#10			157
% Passing #10			66.8

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500	447.24	462.35	15.11 g	91.3	Gravel	
#4	4750	488.03	488.73	0.70 g	90.9	Gravel	
#10	2000	462.68	463.40	0.72 g	90.5	Sand	Coarse
#20	850	374.58	376.10	1.52 g	89.6	Sand	Medium
#40	425	363.37	377.07	13.70 g	81.7	Sand	Medium
#60	250	353.50	452.79	99.29 g	24.3	Sand	Fine
#80	180	319.40	342.83	23.43 g	10.8	Sand	Fine
#100	150	328.63	334.78	6.15 g	7.3	Sand	Fine
#200	75	314.60	319.81	5.21 g	4.2	Sand	Fine
				0.00 g	4.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	173

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0075	20.0	36.5	4.41	Silt	
5	5	1.0065	20.0	23.3	3.48	Silt	
15	15	1.0060	20.0	13.5	3.02	Silt	
30	30	1.0055	20.0	9.6	2.55	Silt	
60	58	1.0050	20.0	6.9	2.09	Silt	
250	256	1.0045	20.0	3.3	1.62	Clay	
1440	1440	1.0040	20.0	1.4	1.16	Clay	

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Sediment Grain Size - D422

Client			Date Received	10/25/2018
Client Sample ID	HT18-11-SURF		Start Date	10/30/2018 18:27
Lab Sample ID	200-45876-E-5		End Date	11/02/2018 11:26

Dry Weight Determination

Tin Weight	1.04	g
Wet Sample + Tin	19.89	g
Dry Sample + Tin	6.66	g
% Moisture	70.19	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na
Date/Time in oven	10/30/2018 18:28
Date/Time out of oven	10/31/2018 19:28

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.09	214.03	169.94
Sample Weight (Oven Dried)			50.7

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.29
Sample <#10			50.4
% Passing #10			29.7

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.68	462.97	0.29 g	99.4	Sand	Coarse
#20	850	378.85	380.07	1.22 g	97.0	Sand	Medium
#40	425	353.22	353.52	0.30 g	96.4	Sand	Medium
#60	250	348.46	348.86	0.40 g	95.6	Sand	Fine
#80	180	337.94	338.39	0.45 g	94.7	Sand	Fine
#100	150	328.66	329.20	0.54 g	93.6	Sand	Fine
#200	75	325.49	327.93	2.44 g	88.8	Sand	Fine
				0.00 g	88.8		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	50.7

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0210	20.0	31.6	57.8	Silt	
5	5	1.0185	20.0	20.6	49.9	Silt	
15	15	1.0150	20.0	12.4	38.8	Silt	
30	29	1.0135	20.0	9	34.1	Silt	
60	58	1.0115	20.0	6.5	27.7	Silt	
250	250	1.0090	20.0	3.2	19.8	Clay	
1440	1434	1.0070	20.0	1.4	13.5	Clay	

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Sediment Grain Size - D422

Client		Date Received	10/25/2018
Client Sample ID	HT18-12-SURF	Start Date	10/30/2018 18:31
Lab Sample ID	200-45876-E-6	End Date	11/02/2018 12:11

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	16.33	g
Dry Sample + Tin	6.72	g
% Moisture	62.89	%

Non-soil material:	plant
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/30/2018 18:33
Date/Time out of oven	10/31/2018 19:28

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.18	233.57	189.39
Sample Weight (Oven Dried)			70.3

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.51
Sample <#10			69.8
% Passing #10			36.9

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.68	463.19	0.51	g	99.3	Sand	Coarse
#20	850	374.58	375.20	0.62	g	98.4	Sand	Medium
#40	425	363.37	363.88	0.51	g	97.7	Sand	Medium
#60	250	353.50	355.28	1.78	g	95.2	Sand	Fine
#80	180	319.40	320.55	1.15	g	93.6	Sand	Fine
#100	150	328.63	329.75	1.12	g	92.0	Sand	Fine
#200	75	314.60	322.20	7.60	g	81.2	Sand	Fine
				0.00	g	81.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	70.3

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0225	20.0	31	45.1	Silt	
5	5	1.0195	20.0	20.4	38.3	Silt	
15	15	1.0150	20.0	12.4	28	Silt	
30	29	1.0125	20.0	9.1	22.3	Silt	
60	63	1.0100	20.0	6.4	16.6	Silt	
250	250	1.0075	20.0	3.3	10.9	Clay	
1440	1434	1.0065	20.0	1.4	8.57	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	HT18-31-SURF
Lab Sample ID	200-45876-E-7

Date Received	10/25/2018
Start Date	10/30/2018 18:36
End Date	11/02/2018 12:17

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	22.36	g
Dry Sample + Tin	8.96	g
% Moisture	62.88	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	10/30/2018 18:38
Date/Time out of oven	10/31/2018 19:28

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.12	216.85	172.73
Sample Weight (Oven Dried)			64.1

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.74
Sample <#10			63.4
% Passing #10			36.7

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.68	463.42	0.74 g	98.8	Sand	Coarse
#20	850	378.85	379.31	0.46 g	98.1	Sand	Medium
#40	425	353.22	353.56	0.34 g	97.6	Sand	Medium
#60	250	348.46	349.17	0.71 g	96.5	Sand	Fine
#80	180	337.94	338.60	0.66 g	95.5	Sand	Fine
#100	150	328.66	329.07	0.41 g	94.9	Sand	Fine
#200	75	325.49	327.30	1.81 g	92.1	Sand	Fine
				0.00 g	92.1		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	64.1

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0310	20.0	27.5	70.8	Silt	
5	5	1.0265	20.0	18.6	59.5	Silt	
15	15	1.0210	20.0	11.5	45.7	Silt	
30	31	1.0180	20.0	8.3	38.2	Silt	
60	60	1.0155	20.0	6.2	31.9	Silt	
250	240	1.0120	20.0	3.2	23.2	Clay	
1440	1424	1.0090	20.0	1.3	15.7	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/25/2018
Client Sample ID	HT18-32-SURF	Start Date	10/30/2018 18:42
Lab Sample ID	200-45876-E-8	End Date	11/02/2018 12:22

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	18.67	g
Dry Sample + Tin	9.68	g
% Moisture	51.02	%

Non-soil material:	shell
Shape (> #10):	subangular
Hardness (> #10):	hard

Date/Time in oven	10/30/2018 18:43
Date/Time out of oven	10/31/2018 19:29

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.75	206.81	162.06
Sample Weight (Oven Dried)			79.4

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			1.79
Sample <#10			77.6
% Passing #10			47.9

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750	488.03	489.19	1.16	g	98.5	Gravel	
#10	2000	462.68	463.31	0.63	g	97.7	Sand	Coarse
#20	850	374.58	375.55	0.97	g	96.5	Sand	Medium
#40	425	363.37	363.95	0.58	g	95.8	Sand	Medium
#60	250	353.50	355.58	2.08	g	93.2	Sand	Fine
#80	180	319.40	320.66	1.26	g	91.6	Sand	Fine
#100	150	328.63	329.50	0.87	g	90.5	Sand	Fine
#200	75	314.60	320.72	6.12	g	82.8	Sand	Fine
				0.00	g	82.8		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	79.4

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0315	20.0	27.2	58.2	Silt	
5	5	1.0265	20.0	18.6	48	Silt	
15	15	1.0210	20.0	11.5	36.9	Silt	
30	31	1.0160	20.0	8.5	26.8	Silt	
60	59	1.0135	20.0	6.3	21.7	Silt	
250	234	1.0105	20.0	3.3	15.7	Clay	
1440	1418	1.0080	20.0	1.4	10.6	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client			Date Received	10/25/2018
Client Sample ID	HT18-29-SURF		Start Date	10/30/2018 18:46
Lab Sample ID	200-45876-E-9		End Date	11/02/2018 12:29

Non-soil material:	shell
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/30/2018 18:47
Date/Time out of oven	10/31/2018 19:29

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	31.61	g
Dry Sample + Tin	25.86	g
% Moisture	18.82	%

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.77	277.82	233.05
Sample Weight (Oven Dried)			189

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			111
Sample <#10			78
% Passing #10			33.5

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500	447.24	473.91	26.67 g	85.9	Gravel	
#4	4750	488.03	540.02	51.99 g	58.4	Gravel	
#10	2000	462.68	494.91	32.23 g	41.3	Sand	Coarse
#20	850	378.85	387.39	8.54 g	36.8	Sand	Medium
#40	425	353.22	364.93	11.71 g	30.6	Sand	Medium
#60	250	348.46	366.34	17.88 g	21.1	Sand	Fine
#80	180	337.94	345.66	7.72 g	17.0	Sand	Fine
#100	150	328.66	331.00	2.34 g	15.8	Sand	Fine
#200	75	325.49	327.93	2.44 g	14.5	Sand	Fine
				0.00 g	14.5		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	189

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0050	20.0	37.3	1.91	Silt	
5	5	1.0045	20.0	23.7	1.49	Silt	
15	15	1.0045	20.0	13.7	1.49	Silt	
30	31	1.0045	20.0	9.5	1.49	Silt	
60	59	1.0040	20.0	6.9	1.06	Silt	
250	265	1.0035	20.0	3.3	0.637	Clay	
1440	1412	1.0030	20.0	1.4	0.212	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/25/2018
Client Sample ID	HT18-30-SURF	Start Date	10/30/2018 18:50
Lab Sample ID	200-45876-E-10	End Date	11/02/2018 12:33

Dry Weight Determination

Tin Weight	1.03	g
Wet Sample + Tin	21.82	g
Dry Sample + Tin	8.97	g
% Moisture	61.81	%

Non-soil material:	shell
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/30/2018 18:52
Date/Time out of oven	10/31/2018 19:29

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.76	207.49	162.73
Sample Weight (Oven Dried)			62.1

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.67
Sample <#10			61.4
% Passing #10			37.7

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.68	463.35	0.67	g	98.9	Sand	Coarse
#20	850	374.58	374.87	0.29	g	98.4	Sand	Medium
#40	425	363.37	363.62	0.25	g	98.0	Sand	Medium
#60	250	353.50	354.47	0.97	g	96.4	Sand	Fine
#80	180	319.40	319.75	0.35	g	95.8	Sand	Fine
#100	150	328.63	328.89	0.26	g	95.4	Sand	Fine
#200	75	314.60	316.87	2.27	g	91.7	Sand	Fine
				0.00	g	91.7		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	62.1

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0290	20.0	28.3	67.9	Silt	
5	5	1.0260	20.0	18.7	60.1	Silt	
15	15	1.0240	20.0	11.1	55	Silt	
30	32	1.0205	20.0	8	45.9	Silt	
60	60	1.0190	20.0	5.9	42	Silt	
250	259	1.0150	20.0	3	31.7	Clay	
1440	1406	1.0110	20.0	1.3	21.3	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/25/2018
Client Sample ID	HT18-32-SURF-FD	Start Date	10/30/2018 19:45
Lab Sample ID	200-45876-E-11	End Date	11/05/2018 11:52

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na

Dry Weight Determination

Tin Weight	1.03	g
Wet Sample + Tin	19.40	g
Dry Sample + Tin	9.82	g
% Moisture	52.15	%

Date/Time in oven	10/30/2018 19:47
Date/Time out of oven	10/31/2018 19:39

Sample Weights

	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.06	200.67	156.61
Sample Weight (Oven Dried)			74.9

Sample Split (oven dried)

	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.62
Sample <#10			74.3
% Passing #10			47.4

Hydrometer Data

Serial Number	542318
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.69	463.31	0.62 g	99.2	Sand	Coarse
#20	850	378.86	379.67	0.81 g	98.1	Sand	Medium
#40	425	353.20	353.61	0.41 g	97.6	Sand	Medium
#60	250	348.61	349.66	1.05 g	96.2	Sand	Fine
#80	180	338.06	339.28	1.22 g	94.6	Sand	Fine
#100	150	328.67	329.63	0.96 g	93.3	Sand	Fine
#200	75	325.49	331.72	6.23 g	85.0	Sand	Fine
				0.00 g	85.0		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	74.9

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0285	20.0	28.6	55.2	Silt	
5	5	1.0255	20.0	18.9	48.8	Silt	
15	15	1.0210	20.0	11.5	39.1	Silt	
30	30	1.0175	20.0	8.5	31.6	Silt	
60	59	1.0135	20.0	6.3	23.1	Silt	
250	256	1.0105	20.0	3.1	16.6	Clay	
1440	1440	1.0085	20.0	1.3	12.3	Clay	

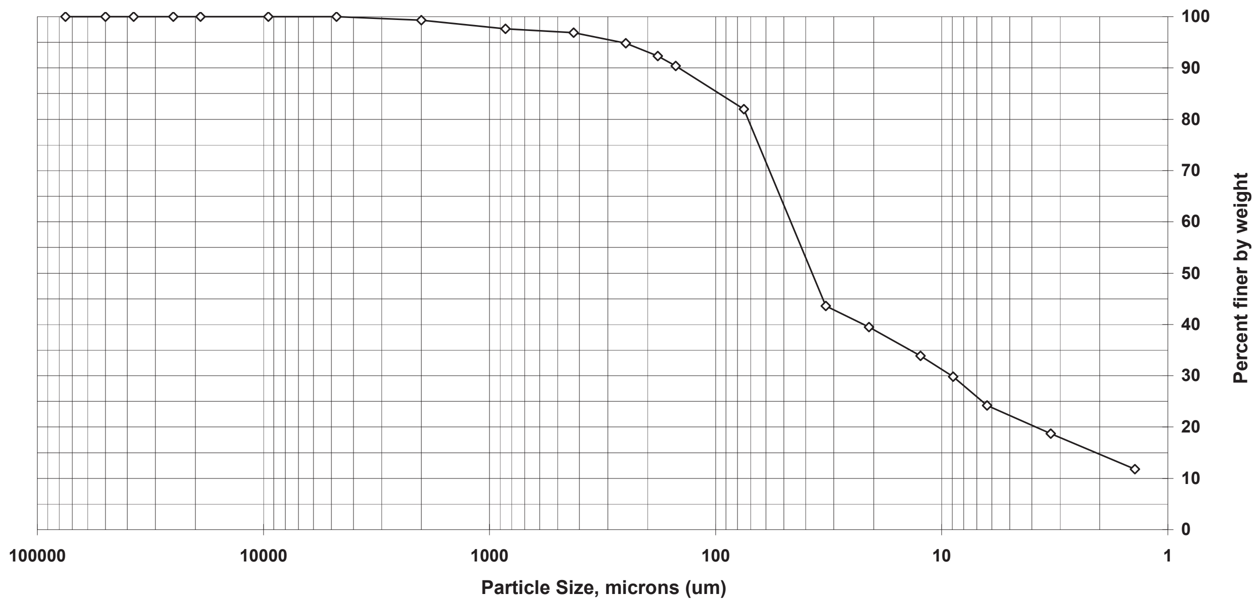
Particle Size of Soils by ASTM D422

				Date Received:	10/26/2018
Sample ID:	HT18-25-SURF	**Percent Solids:**	34.4%	**Start Date:**	11/2/2018
Lab ID:	200-45893-E-1	**Specific Gravity:**	2.650	**End Date:**	11/8/2018

Shape (> #10): na

Non-soil material: plant

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	99.3	0.7
#20	850	97.6	1.7
#40	425	96.9	0.7
#60	250	94.8	2.1
#80	180	92.3	2.5
#100	150	90.4	1.9
#200	75	82.0	8.4
Hyd1	32.6	43.6	38.4
Hyd2	21	39.5	4.1
Hyd3	12.4	33.9	5.6
Hyd4	8.9	29.8	4.1
Hyd5	6.3	24.2	5.6
Hyd6	3.3	18.7	5.5
Hyd7	1.4	11.8	6.9

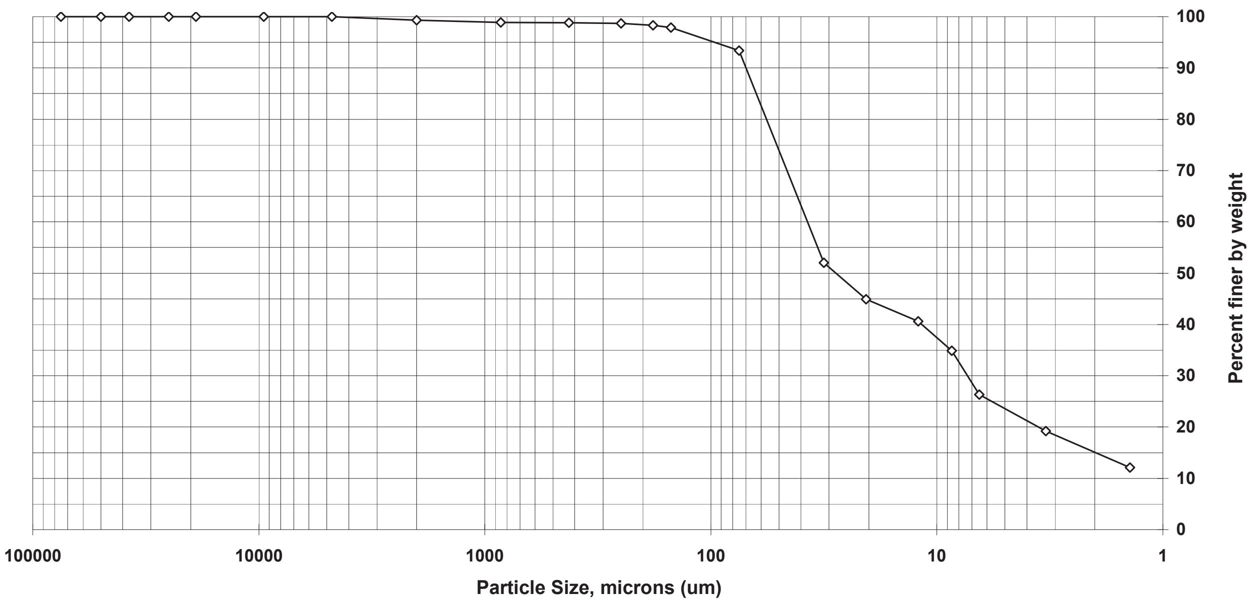
Soil Classification	Percent of sample
Gravel	0.0
Sand	18.0
Coarse Sand	0.7
Medium Sand	2.4
Fine Sand	14.9
Silt	57.8
Clay	24.2

Particle Size of Soils by ASTM D422

				Date Received:	10/26/2018
Sample ID:	HT18-23-SURF	**Percent Solids:**	34.2%	**Start Date:**	11/2/2018
Lab ID:	200-45893-E-2	**Specific Gravity:**	2.650	**End Date:**	11/8/2018

Shape (> #10): na

Non-soil material: plant
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	99.3	0.7
#20	850	98.9	0.4
#40	425	98.8	0.1
#60	250	98.7	0.1
#80	180	98.3	0.4
#100	150	97.9	0.4
#200	75	93.4	4.5
Hyd1	31.6	52.0	41.4
Hyd2	20.6	44.9	7.1
Hyd3	12.1	40.6	4.3
Hyd4	8.6	34.9	5.7
Hyd5	6.5	26.3	8.6
Hyd6	3.3	19.2	7.1
Hyd7	1.4	12.1	7.1

Soil Classification	Percent of sample
Gravel	0.0
Sand	6.6
Coarse Sand	0.7
Medium Sand	0.5
Fine Sand	5.4
Silt	67.1
Clay	26.3

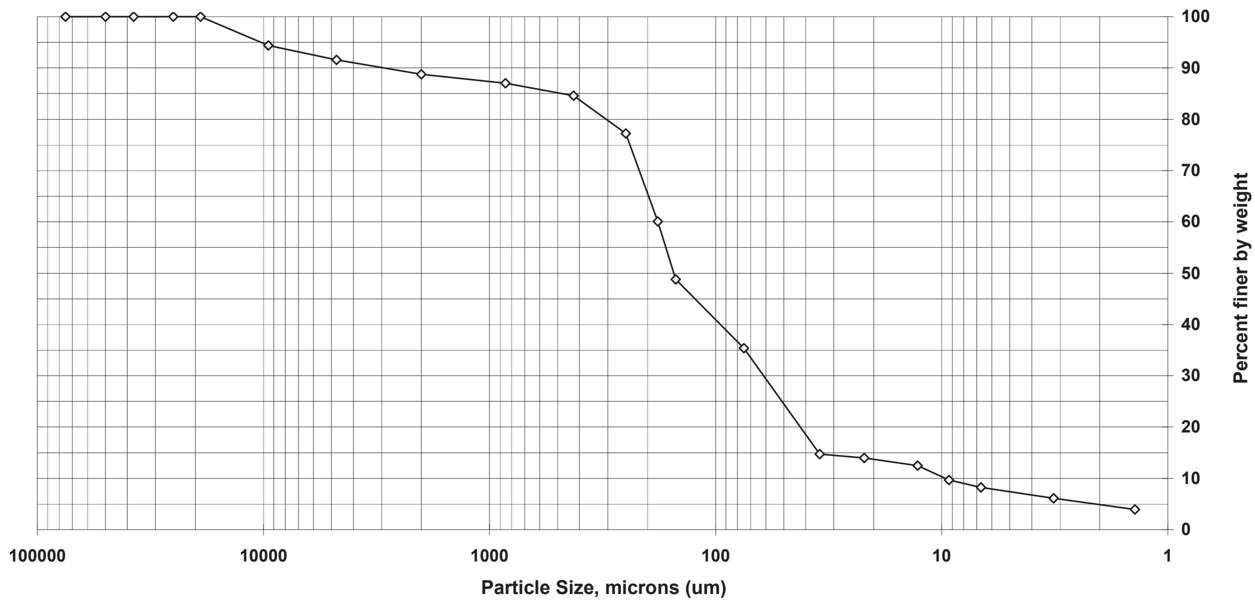
Particle Size of Soils by ASTM D422

				Date Received:	10/26/2018
Sample ID:	HT18-24-SURF	**Percent Solids:**	49.5%	**Start Date:**	11/4/2018
Lab ID:	200-45893-E-3	**Specific Gravity:**	2.650	**End Date:**	11/9/2018

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	94.4	5.6
#4	4750	91.6	2.8
#10	2000	88.8	2.8
#20	850	87.0	1.8
#40	425	84.6	2.4
#60	250	77.2	7.4
#80	180	60.1	17.1
#100	150	48.8	11.3
#200	75	35.4	13.4
Hyd1	34.6	14.7	20.7
Hyd2	22	14.0	0.7
Hyd3	12.8	12.5	1.5
Hyd4	9.3	9.7	2.8
Hyd5	6.7	8.3	1.4
Hyd6	3.2	6.1	2.2
Hyd7	1.4	3.9	2.2

Soil Classification	Percent of sample
Gravel	8.4
Sand	56.2
Coarse Sand	2.8
Medium Sand	4.2
Fine Sand	49.2
Silt	27.2
Clay	8.3

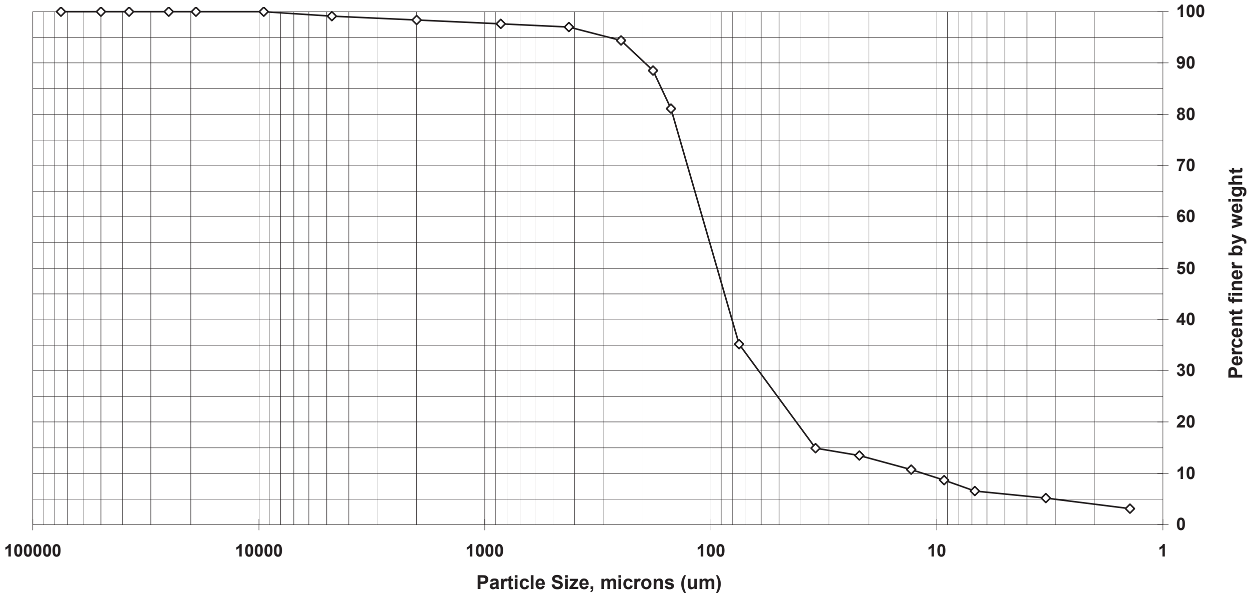
Particle Size of Soils by ASTM D422

				Date Received:	10/26/2018
Sample ID:	HT18-26-SURF	**Percent Solids:**	54.6%	**Start Date:**	11/4/2018
Lab ID:	200-45893-E-4	**Specific Gravity:**	2.650	**End Date:**	11/9/2018

Shape (> #10): na

Non-soil material: plant, shell

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	99.1	0.9
#10	2000	98.4	0.7
#20	850	97.6	0.8
#40	425	97.0	0.6
#60	250	94.4	2.6
#80	180	88.5	5.9
#100	150	81.1	7.4
#200	75	35.2	45.9
Hyd1	34.4	14.9	20.3
Hyd2	22	13.5	1.4
Hyd3	13	10.7	2.8
Hyd4	9.3	8.7	2.1
Hyd5	6.8	6.6	2.1
Hyd6	3.3	5.2	1.4
Hyd7	1.4	3.1	2.1

Soil Classification	Percent of sample
Gravel	0.9
Sand	63.9
Coarse Sand	0.7
Medium Sand	1.4
Fine Sand	61.8
Silt	28.6
Clay	6.6

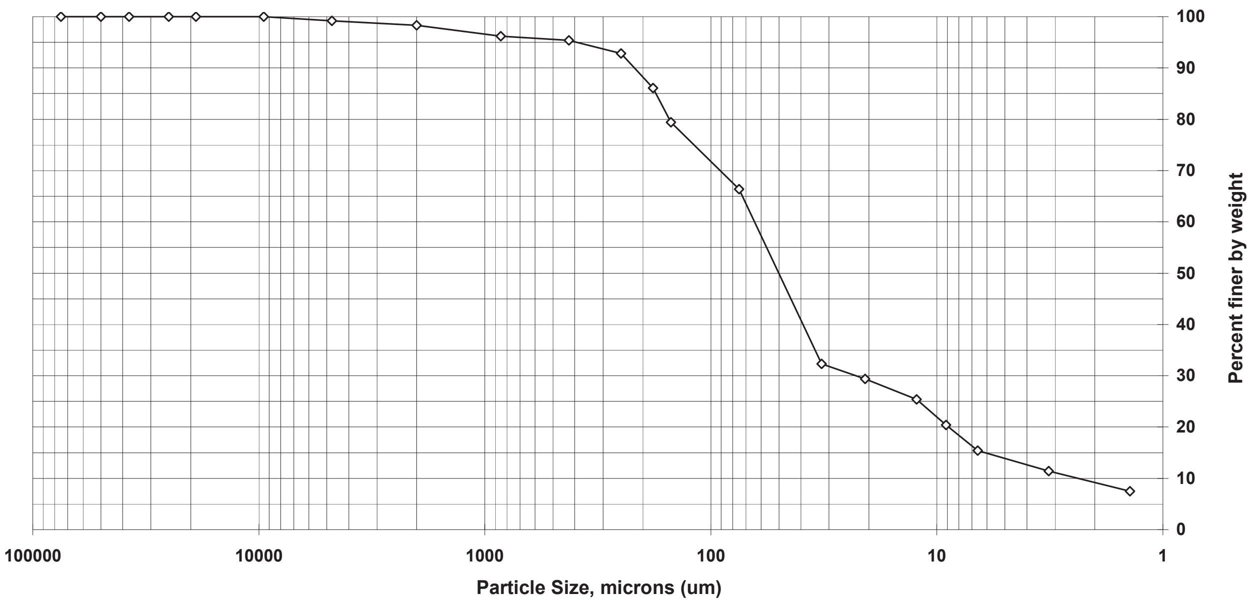
Particle Size of Soils by ASTM D422

				Date Received:	10/26/2018
Sample ID:	HT18-18-SURF	**Percent Solids:**	40.8%	**Start Date:**	11/4/2018
Lab ID:	200-45893-E-5	**Specific Gravity:**	2.650	**End Date:**	11/9/2018

Shape (> #10): subangular

Non-soil material: plant, shell

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.2	0.8
#10	2000	98.3	0.9
#20	850	96.2	2.1
#40	425	95.4	0.8
#60	250	92.8	2.6
#80	180	86.1	6.7
#100	150	79.4	6.7
#200	75	66.4	13.0
Hyd1	32.4	32.3	34.1
Hyd2	20.8	29.4	2.9
Hyd3	12.3	25.4	4.0
Hyd4	9.1	20.4	5.0
Hyd5	6.6	15.4	5.0
Hyd6	3.2	11.4	4.0
Hyd7	1.4	7.5	3.9

Soil Classification	Percent of sample
Gravel	0.8
Sand	32.8
Coarse Sand	0.9
Medium Sand	2.9
Fine Sand	29.0
Silt	51.0
Clay	15.4

Particle Size of Soils by ASTM D422

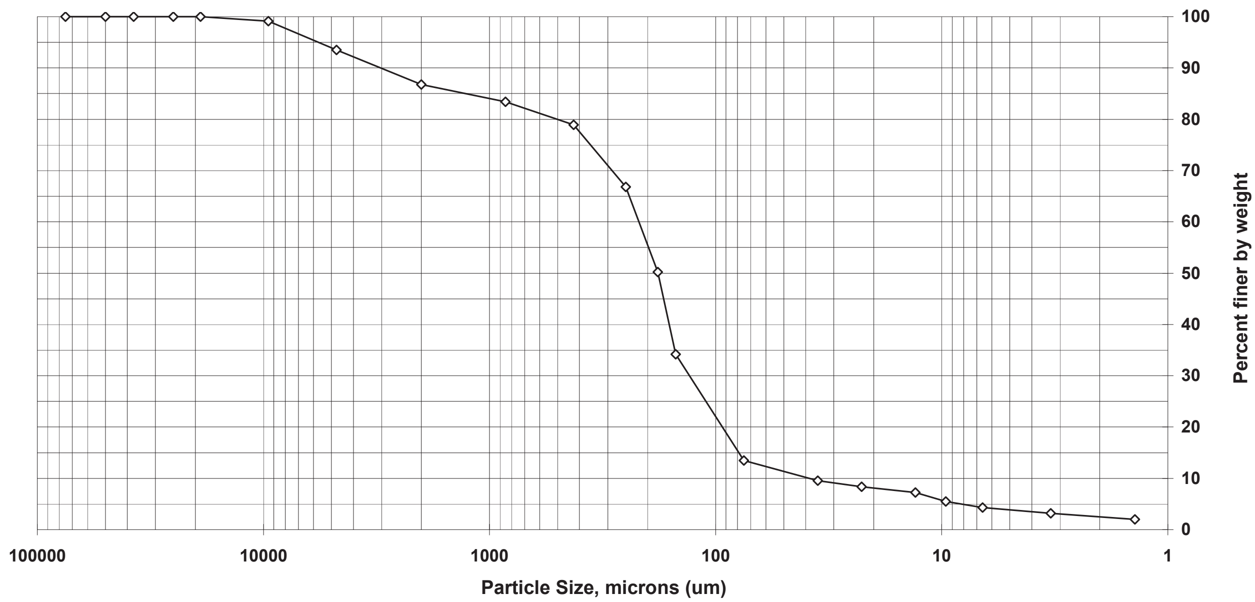
Date Received: 10/26/2018

Sample ID: HT18-19-SURF **Percent Solids:** 69.3% **Start Date:** 11/4/2018

Lab ID: 200-45893-E-6 **Specific Gravity:** 2.650 **End Date:** 11/9/2018

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	99.1	0.9
#4	4750	93.5	5.6
#10	2000	86.8	6.7
#20	850	83.4	3.4
#40	425	78.9	4.5
#60	250	66.8	12.1
#80	180	50.2	16.6
#100	150	34.2	16.0
#200	75	13.5	20.7
Hyd1	35.3	9.5	4.0
Hyd2	22.6	8.4	1.2
Hyd3	13.1	7.2	1.2
Hyd4	9.6	5.5	1.7
Hyd5	6.6	4.3	1.2
Hyd6	3.3	3.2	1.1
Hyd7	1.4	2.0	1.2

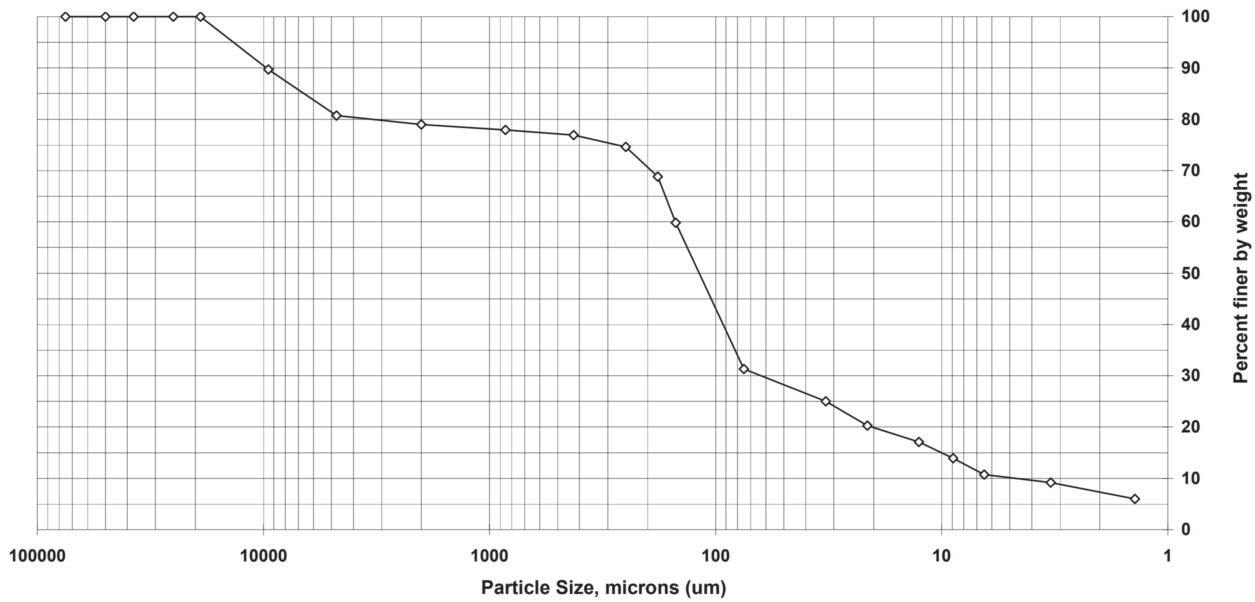
Soil Classification	Percent of sample
Gravel	6.5
Sand	80.0
Coarse Sand	6.7
Medium Sand	7.9
Fine Sand	65.4
Silt	9.2
Clay	4.3

Particle Size of Soils by ASTM D422

				Date Received:	10/26/2018
Sample ID:	HT18-20-SURF	**Percent Solids:**	49.2%	**Start Date:**	11/4/2018
Lab ID:	200-45893-E-7	**Specific Gravity:**	2.650	**End Date:**	11/9/2018

Shape (> #10): na

Non-soil material: shell, plant
Hardness (> #10): na



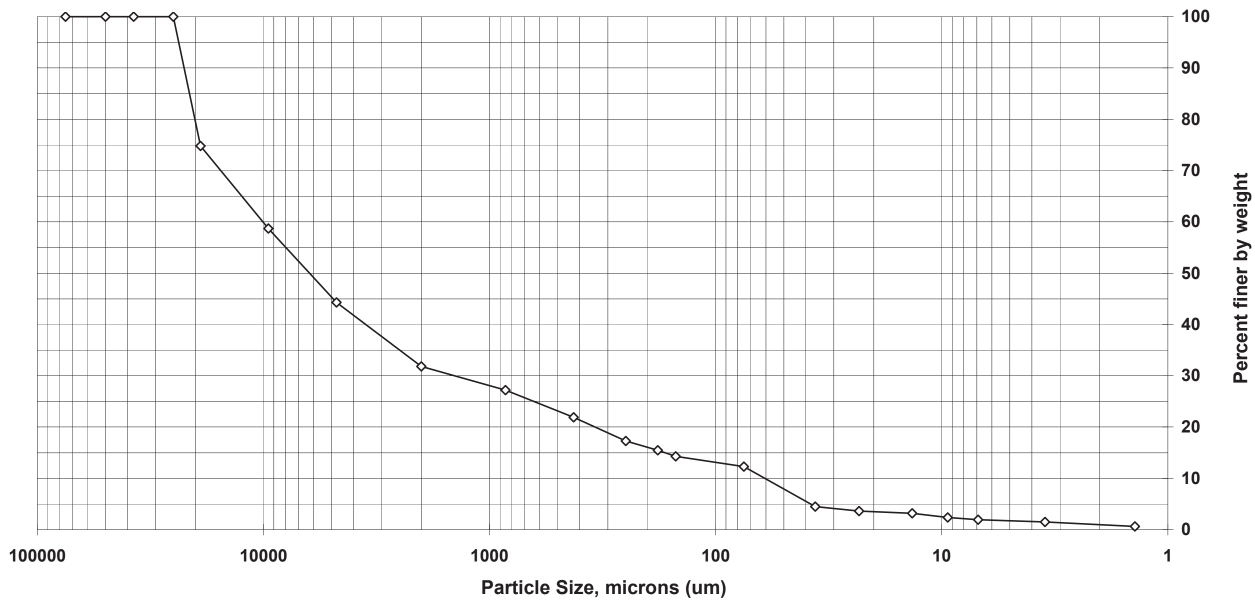
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	89.7	10.3
#4	4750	80.7	9.0
#10	2000	79.0	1.7
#20	850	77.9	1.1
#40	425	76.9	1.0
#60	250	74.6	2.3
#80	180	68.8	5.8
#100	150	59.8	9.0
#200	75	31.3	28.5
Hyd1	32.6	25.0	6.3
Hyd2	21.3	20.3	4.7
Hyd3	12.6	17.1	3.2
Hyd4	8.9	13.9	3.2
Hyd5	6.5	10.7	3.2
Hyd6	3.3	9.1	1.6
Hyd7	1.4	6.0	3.2

Soil Classification	Percent of sample
Gravel	19.3
Sand	49.4
Coarse Sand	1.7
Medium Sand	2.1
Fine Sand	45.6
Silt	20.6
Clay	10.7

Particle Size of Soils by ASTM D422

Date Received: 10/26/2018
Sample ID: HT18-21-SURF **Percent Solids:** 76.4% **Start Date:** 11/4/2018
Lab ID: 200-45893-E-8 **Specific Gravity:** 2.650 **End Date:** 11/9/2018

Shape (> #10): subangular **Non-soil material:** shell, plant, glass
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	74.8	25.2
3/8 inch	9500	58.7	16.1
#4	4750	44.3	14.4
#10	2000	31.8	12.5
#20	850	27.2	4.6
#40	425	21.9	5.3
#60	250	17.3	4.6
#80	180	15.5	1.8
#100	150	14.3	1.2
#200	75	12.3	2.0
Hyd1	36.3	4.5	7.8
Hyd2	23.2	3.6	0.9
Hyd3	13.5	3.2	0.4
Hyd4	9.4	2.4	0.9
Hyd5	6.9	1.9	0.4
Hyd6	3.5	1.5	0.4
Hyd7	1.4	0.6	0.9

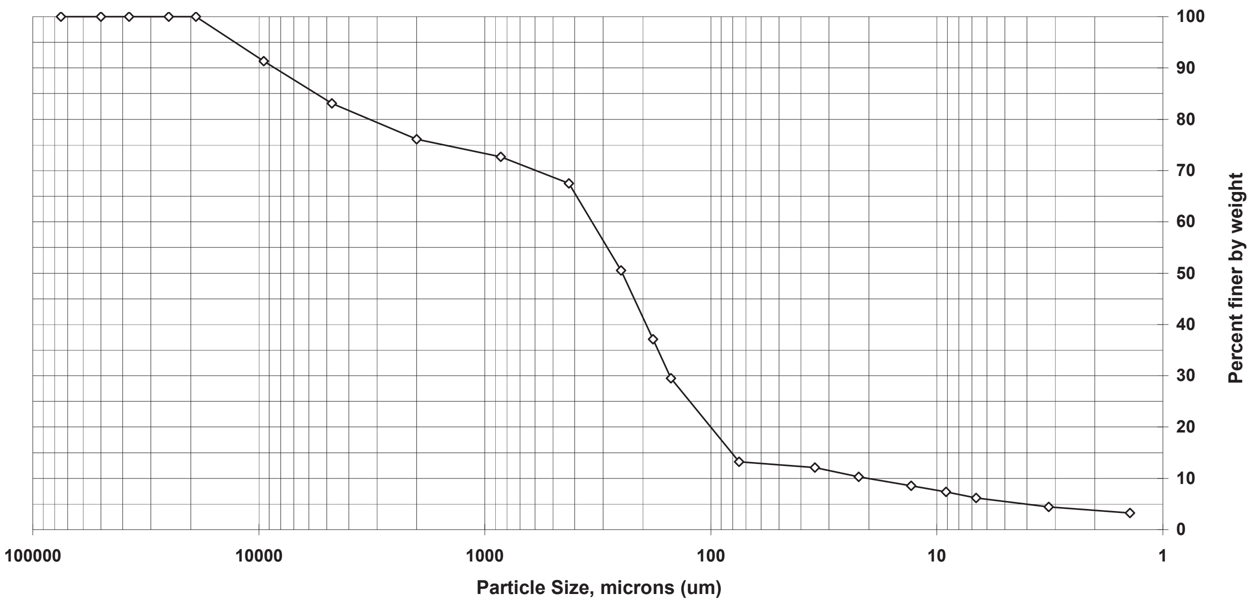
Soil Classification	Percent of sample
Gravel	55.7
Sand	32.0
Coarse Sand	12.5
Medium Sand	9.9
Fine Sand	9.6
Silt	10.4
Clay	1.9

Particle Size of Soils by ASTM D422

				Date Received:	10/26/2018
Sample ID:	HT18-15-SURF	**Percent Solids:**	53.4%	**Start Date:**	11/4/2018
Lab ID:	200-45893-E-9	**Specific Gravity:**	2.650	**End Date:**	11/9/2018

Shape (> #10): na

Non-soil material: shell, plant
Hardness (> #10): na



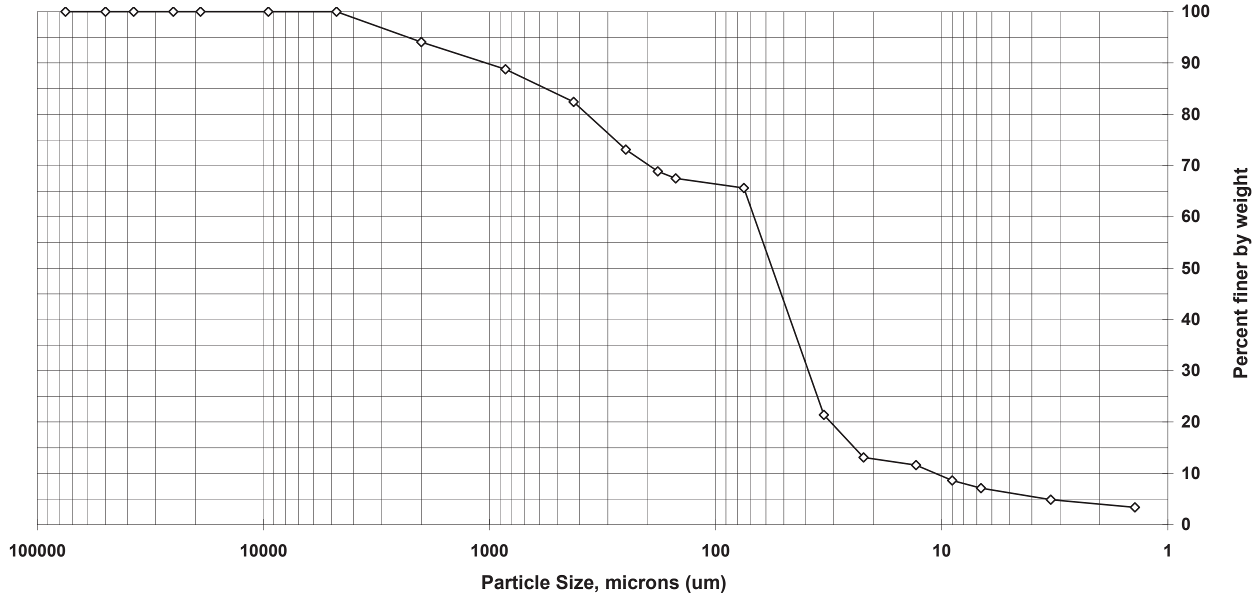
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	91.3	8.7
#4	4750	83.1	8.2
#10	2000	76.1	7.0
#20	850	72.7	3.4
#40	425	67.5	5.2
#60	250	50.5	17.0
#80	180	37.1	13.4
#100	150	29.5	7.6
#200	75	13.2	16.3
Hyd1	34.6	12.1	1.1
Hyd2	22.2	10.3	1.8
Hyd3	13	8.6	1.7
Hyd4	9.1	7.4	1.2
Hyd5	6.7	6.2	1.2
Hyd6	3.2	4.4	1.8
Hyd7	1.4	3.3	1.2

Soil Classification	Percent of sample
Gravel	16.9
Sand	69.9
Coarse Sand	7.0
Medium Sand	8.6
Fine Sand	54.3
Silt	7.0
Clay	6.2

Particle Size of Soils by ASTM D422

Date Received: 10/26/2018
Sample ID: HT18-16-SURF **Percent Solids:** 42.0% **Start Date:** 11/4/2018
Lab ID: 200-45893-E-10 **Specific Gravity:** 2.650 **End Date:** 11/9/2018

Shape (> #10): subangular **Non-soil material:** plant, shell
Hardness (> #10): hard



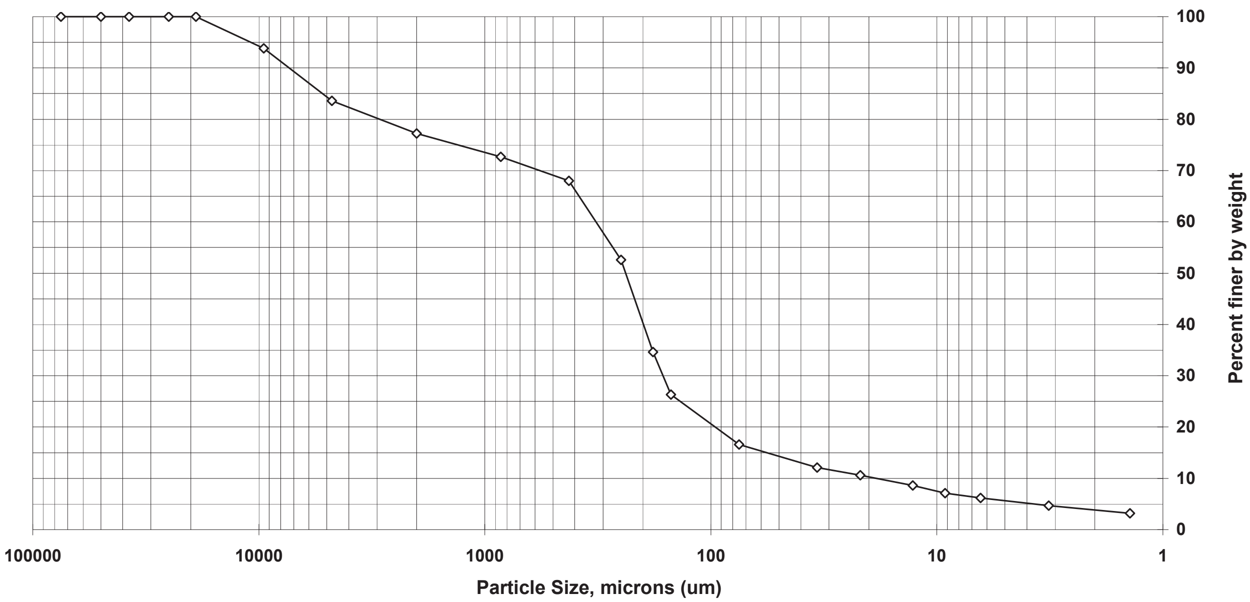
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	94.1	5.9
#20	850	88.8	5.3
#40	425	82.4	6.4
#60	250	73.1	9.3
#80	180	68.9	4.2
#100	150	67.5	1.4
#200	75	65.6	1.9
Hyd1	33.2	21.4	44.2
Hyd2	22.2	13.1	8.3
Hyd3	13	11.6	1.5
Hyd4	9	8.6	3.0
Hyd5	6.7	7.1	1.5
Hyd6	3.3	4.9	2.3
Hyd7	1.4	3.4	1.5

Soil Classification	Percent of sample
Gravel	0.0
Sand	34.4
Coarse Sand	5.9
Medium Sand	11.7
Fine Sand	16.8
Silt	58.5
Clay	7.1

Particle Size of Soils by ASTM D422

Date Received: 10/26/2018
Sample ID: HT18-17-SURF **Percent Solids:** 68.3% **Start Date:** 11/4/2018
Lab ID: 200-45893-E-11 **Specific Gravity:** 2.650 **End Date:** 11/9/2018

Shape (> #10): angular **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	93.8	6.2
#4	4750	83.6	10.2
#10	2000	77.2	6.4
#20	850	72.7	4.5
#40	425	68.0	4.7
#60	250	52.6	15.4
#80	180	34.6	18.0
#100	150	26.3	8.3
#200	75	16.6	9.7
Hyd1	33.9	12.1	4.5
Hyd2	21.8	10.6	1.5
Hyd3	12.8	8.6	2.0
Hyd4	9.2	7.1	1.5
Hyd5	6.4	6.2	1.0
Hyd6	3.2	4.7	1.5
Hyd7	1.4	3.2	1.5

Soil Classification	Percent of sample
Gravel	16.4
Sand	67.0
Coarse Sand	6.4
Medium Sand	9.2
Fine Sand	51.4
Silt	10.4
Clay	6.2

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	HT18-25-SURF
Lab Sample ID	200-45893-E-1

Date Received	10/26/2018
Start Date	11/02/2018 22:20
End Date	11/08/2018 16:22

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	19.94	g
Dry Sample + Tin	7.54	g
% Moisture	65.64	%

Non-soil material:	plant
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/02/2018 22:22
Date/Time out of oven	11/05/2018 14:29

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.11	212.94	168.83
Sample Weight (Oven Dried)			58

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.42
Sample <#10			57.6
% Passing #10			34.1

Hydrometer Data

Serial Number	542318
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.67	463.09	0.42 g	99.3	Sand	Coarse
#20	850	378.83	379.80	0.97 g	97.6	Sand	Medium
#40	425	353.16	353.55	0.39 g	96.9	Sand	Medium
#60	250	348.44	349.65	1.21 g	94.8	Sand	Fine
#80	180	338.00	339.43	1.43 g	92.3	Sand	Fine
#100	150	328.69	329.77	1.08 g	90.4	Sand	Fine
#200	75	325.49	330.37	4.88 g	82.0	Sand	Fine
				0.00 g	82.0		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	58

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0185	20.0	32.6	43.6	Silt	
5	5	1.0170	20.0	21	39.5	Silt	
15	15	1.0150	20.0	12.4	33.9	Silt	
30	30	1.0135	20.0	8.9	29.8	Silt	
60	63	1.0115	20.0	6.3	24.2	Silt	
250	241	1.0095	20.0	3.3	18.7	Clay	
1440	1388	1.0070	20.0	1.4	11.8	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	HT18-23-SURF
Lab Sample ID	200-45893-E-2

Date Received	10/26/2018
Start Date	11/02/2018 22:25
End Date	11/08/2018 16:29

Dry Weight Determination

Tin Weight	1.06	g
Wet Sample + Tin	18.48	g
Dry Sample + Tin	7.02	g
% Moisture	65.79	%

Non-soil material:	plant
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/02/2018 22:26
Date/Time out of oven	11/05/2018 14:29

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.13	209.07	164.94
Sample Weight (Oven Dried)			56.4

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.41
Sample <#10			56
% Passing #10			34

Hydrometer Data

Serial Number	542318
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.67	463.08	0.41	g	99.3	Sand	Coarse
#20	850	374.53	374.78	0.25	g	98.9	Sand	Medium
#40	425	363.27	363.31	0.04	g	98.8	Sand	Medium
#60	250	353.59	353.67	0.08	g	98.7	Sand	Fine
#80	180	319.35	319.55	0.20	g	98.3	Sand	Fine
#100	150	328.68	328.90	0.22	g	97.9	Sand	Fine
#200	75	314.63	317.14	2.51	g	93.4	Sand	Fine
				0.00	g	93.4		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	56.4

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0210	20.0	31.6	52	Silt	
5	5	1.0185	20.0	20.6	44.9	Silt	
15	15	1.0170	20.0	12.1	40.6	Silt	
30	31	1.0150	20.0	8.6	34.9	Silt	
60	57	1.0120	20.0	6.5	26.3	Silt	
250	235	1.0095	20.0	3.3	19.2	Clay	
1440	1382	1.0070	20.0	1.4	12.1	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/26/2018
Client Sample ID	HT18-24-SURF	Start Date	11/04/2018 14:26
Lab Sample ID	200-45893-E-3	End Date	11/09/2018 10:17

Dry Weight Determination

Tin Weight	1.02	g
Wet Sample + Tin	23.17	g
Dry Sample + Tin	11.98	g
% Moisture	50.52	%

Non-soil material:	plant, shell
Shape (> #10):	subangular
Hardness (> #10):	hard
Date/Time in oven	11/04/2018 14:28
Date/Time out of oven	11/05/2018 14:38

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.08	270.58	226.5
Sample Weight (Oven Dried)			112

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			12.6
Sample <#10			99.4
% Passing #10			43.9

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500	447.25	453.51	6.26	g	94.4	Gravel	
#4	4750	488.00	491.17	3.17	g	91.6	Gravel	
#10	2000	462.60	465.79	3.19	g	88.8	Sand	Coarse
#20	850	378.83	380.83	2.00	g	87.0	Sand	Medium
#40	425	353.16	355.86	2.70	g	84.6	Sand	Medium
#60	250	348.44	356.70	8.26	g	77.2	Sand	Fine
#80	180	338.00	357.16	19.16	g	60.1	Sand	Fine
#100	150	328.69	341.30	12.61	g	48.8	Sand	Fine
#200	75	325.49	340.54	15.05	g	35.4	Sand	Fine
				0.00	g	35.4		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	112

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0130	20.0	34.6	14.7	Silt	
5	5	1.0125	20.0	22	14	Silt	
15	15	1.0115	20.0	12.8	12.5	Silt	
30	30	1.0095	20.0	9.3	9.68	Silt	
60	59	1.0085	20.0	6.7	8.25	Silt	
250	256	1.0070	20.0	3.2	6.09	Clay	
1440	1440	1.0055	20.0	1.4	3.94	Clay	

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Sediment Grain Size - D422

Client		Date Received	10/26/2018
Client Sample ID	HT18-26-SURF	Start Date	11/04/2018 14:30
Lab Sample ID	200-45893-E-4	End Date	11/09/2018 10:21

Dry Weight Determination

Tin Weight	1.03	g
Wet Sample + Tin	31.03	g
Dry Sample + Tin	17.40	g
% Moisture	45.43	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/04/2018 14:32
Date/Time out of oven	11/05/2018 14:38

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.06	257.34	213.28
Sample Weight (Oven Dried)			116

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			1.77
Sample <#10			114
% Passing #10			53.5

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750	488.00	488.99	0.99	g	99.1	Gravel	
#10	2000	462.60	463.38	0.78	g	98.4	Sand	Coarse
#20	850	374.53	375.43	0.90	g	97.6	Sand	Medium
#40	425	363.27	363.96	0.69	g	97.0	Sand	Medium
#60	250	353.59	356.61	3.02	g	94.4	Sand	Fine
#80	180	319.35	326.14	6.79	g	88.5	Sand	Fine
#100	150	328.68	337.25	8.57	g	81.1	Sand	Fine
#200	75	314.63	367.88	53.25	g	35.2	Sand	Fine
				0.00	g	35.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	116

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0135	20.0	34.4	14.9	Silt	
5	5	1.0125	20.0	22	13.5	Silt	
15	15	1.0105	20.0	13	10.7	Silt	
30	30	1.0090	20.0	9.3	8.65	Silt	
60	58	1.0075	20.0	6.8	6.58	Silt	
250	256	1.0065	20.0	3.3	5.19	Clay	
1440	1440	1.0050	20.0	1.4	3.12	Clay	

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Sediment Grain Size - D422

Client	
Client Sample ID	HT18-18-SURF
Lab Sample ID	200-45893-E-5

Date Received	10/26/2018
Start Date	11/04/2018 14:34
End Date	11/09/2018 10:40

Dry Weight Determination

Tin Weight	1.04	g
Wet Sample + Tin	27.14	g
Dry Sample + Tin	11.69	g
% Moisture	59.20	%

Non-soil material:	plant, shell
Shape (> #10):	subangular
Hardness (> #10):	hard

Date/Time in oven	11/04/2018 14:35
Date/Time out of oven	11/05/2018 14:38

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.78	242.52	197.74
Sample Weight (Oven Dried)			80.7

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			1.4
Sample <#10			79.3
% Passing #10			40.1

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750	488.00	488.66	0.66	g	99.2	Gravel	
#10	2000	462.60	463.34	0.74	g	98.3	Sand	Coarse
#20	850	378.83	380.52	1.69	g	96.2	Sand	Medium
#40	425	353.16	353.81	0.65	g	95.4	Sand	Medium
#60	250	348.44	350.54	2.10	g	92.8	Sand	Fine
#80	180	338.00	343.44	5.44	g	86.1	Sand	Fine
#100	150	328.69	334.11	5.42	g	79.4	Sand	Fine
#200	75	325.49	336.01	10.52	g	66.4	Sand	Fine
				0.00	g	66.4		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	80.7

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0190	20.0	32.4	32.3	Silt	
5	5	1.0175	20.0	20.8	29.4	Silt	
15	15	1.0155	20.0	12.3	25.4	Silt	
30	29	1.0130	20.0	9.1	20.4	Silt	
60	58	1.0105	20.0	6.6	15.4	Silt	
250	250	1.0085	20.0	3.2	11.4	Clay	
1440	1434	1.0065	20.0	1.4	7.46	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/26/2018
Client Sample ID	HT18-19-SURF	Start Date	11/04/2018 14:37
Lab Sample ID	200-45893-E-6	End Date	11/09/2018 10:44

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	51.06	g
Dry Sample + Tin	35.71	g
% Moisture	30.69	%

Non-soil material:	plant, shell
Shape (> #10):	subangular
Hardness (> #10):	hard

Date/Time in oven	11/04/2018 14:38
Date/Time out of oven	11/05/2018 14:39

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.07	244.92	200.85
Sample Weight (Oven Dried)			139

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			18.2
Sample <#10			121
% Passing #10			60.2

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500	447.25	448.44	1.19	g	99.1	Gravel	
#4	4750	488.00	495.78	7.78	g	93.5	Gravel	
#10	2000	462.60	471.85	9.25	g	86.8	Sand	Coarse
#20	850	374.53	379.29	4.76	g	83.4	Sand	Medium
#40	425	363.27	369.53	6.26	g	78.9	Sand	Medium
#60	250	353.59	370.35	16.76	g	66.8	Sand	Fine
#80	180	319.35	342.40	23.05	g	50.2	Sand	Fine
#100	150	328.68	350.94	22.26	g	34.2	Sand	Fine
#200	75	314.63	343.37	28.74	g	13.5	Sand	Fine
				0.00	g	13.5		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	139

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0110	20.0	35.3	9.53	Silt	
5	5	1.0100	20.0	22.6	8.38	Silt	
15	15	1.0090	20.0	13.1	7.22	Silt	
30	29	1.0075	20.0	9.6	5.49	Silt	
60	63	1.0065	20.0	6.6	4.33	Silt	
250	250	1.0055	20.0	3.3	3.18	Clay	
1440	1434	1.0045	20.0	1.4	2.02	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	HT18-20-SURF
Lab Sample ID	200-45893-E-7

Date Received	10/26/2018
Start Date	11/04/2018 14:40
End Date	11/09/2018 10:52

Dry Weight Determination

Tin Weight	1.03	g
Wet Sample + Tin	39.60	g
Dry Sample + Tin	20.00	g
% Moisture	50.82	%

Non-soil material:	shell, plant
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/04/2018 14:41
Date/Time out of oven	11/05/2018 14:46

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	45.19	250.60	205.41
Sample Weight (Oven Dried)			101

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			21.3
Sample <#10			79.7
% Passing #10			38.8

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500	447.25	457.66	10.41	g	89.7	Gravel	
#4	4750	488.00	497.11	9.11	g	80.7	Gravel	
#10	2000	462.60	464.36	1.76	g	79.0	Sand	Coarse
#20	850	378.83	379.96	1.13	g	77.9	Sand	Medium
#40	425	353.16	354.16	1.00	g	76.9	Sand	Medium
#60	250	348.44	350.76	2.32	g	74.6	Sand	Fine
#80	180	338.00	343.82	5.82	g	68.8	Sand	Fine
#100	150	328.69	337.75	9.06	g	59.8	Sand	Fine
#200	75	325.49	354.26	28.77	g	31.3	Sand	Fine
				0.00	g	31.3		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	101

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0185	20.0	32.6	25	Silt	
5	5	1.0155	20.0	21.3	20.3	Silt	
15	15	1.0135	20.0	12.6	17.1	Silt	
30	31	1.0115	20.0	8.9	13.9	Silt	
60	60	1.0095	20.0	6.5	10.7	Silt	
250	240	1.0085	20.0	3.3	9.14	Clay	
1440	1424	1.0065	20.0	1.4	5.96	Clay	

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Sediment Grain Size - D422

Client	
Client Sample ID	HT18-21-SURF
Lab Sample ID	200-45893-E-8

Date Received	10/26/2018
Start Date	11/04/2018 14:42
End Date	11/09/2018 10:55

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	46.59	g
Dry Sample + Tin	35.83	g
% Moisture	23.63	%

Non-soil material:	shell, plant, glass
Shape (> #10):	subangular
Hardness (> #10):	hard

Date/Time in oven	11/04/2018 14:44
Date/Time out of oven	11/05/2018 14:46

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.06	290.65	246.59
Sample Weight (Oven Dried)			188

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			128
Sample <#10			60
% Passing #10			24.3

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000	457.69	505.14	47.45	g	74.8	Gravel	
3/8 inch	9500	447.25	477.49	30.24	g	58.7	Gravel	
#4	4750	488.00	515.11	27.11	g	44.3	Gravel	
#10	2000	462.60	486.04	23.44	g	31.8	Sand	Coarse
#20	850	374.53	383.09	8.56	g	27.2	Sand	Medium
#40	425	363.27	373.15	9.88	g	21.9	Sand	Medium
#60	250	353.59	362.25	8.66	g	17.3	Sand	Fine
#80	180	319.35	322.71	3.36	g	15.5	Sand	Fine
#100	150	328.68	330.91	2.23	g	14.3	Sand	Fine
#200	75	314.63	318.47	3.84	g	12.3	Sand	Fine
				0.00	g	12.3		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	188

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0080	20.0	36.3	4.49	Silt	
5	5	1.0070	20.0	23.2	3.63	Silt	
15	15	1.0065	20.0	13.5	3.2	Silt	
30	31	1.0055	20.0	9.4	2.35	Silt	
60	59	1.0050	20.0	6.9	1.92	Silt	
250	234	1.0045	20.0	3.5	1.5	Clay	
1440	1418	1.0035	20.0	1.4	0.641	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/26/2018
Client Sample ID	HT18-15-SURF	Start Date	11/04/2018 14:48
Lab Sample ID	200-45893-E-9	End Date	11/09/2018 11:04

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	28.20	g
Dry Sample + Tin	15.55	g
% Moisture	46.59	%

Non-soil material:	shell, plant
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/04/2018 14:50
Date/Time out of oven	11/05/2018 14:46

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.05	299.19	255.14
Sample Weight (Oven Dried)			136

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			32.4
Sample <#10			104
% Passing #10			40.8

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500	447.25	459.02	11.77 g	91.3	Gravel	
#4	4750	488.00	499.12	11.12 g	83.1	Gravel	
#10	2000	462.60	472.15	9.55 g	76.1	Sand	Coarse
#20	850	378.83	383.49	4.66 g	72.7	Sand	Medium
#40	425	353.16	360.29	7.13 g	67.5	Sand	Medium
#60	250	348.44	371.51	23.07 g	50.5	Sand	Fine
#80	180	338.00	356.26	18.26 g	37.1	Sand	Fine
#100	150	328.69	339.09	10.40 g	29.5	Sand	Fine
#200	75	325.49	347.67	22.18 g	13.2	Sand	Fine
				0.00 g	13.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	136

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0130	20.0	34.6	12.1	Silt	
5	5	1.0115	20.0	22.2	10.3	Silt	
15	15	1.0100	20.0	13	8.56	Silt	
30	31	1.0090	20.0	9.1	7.38	Silt	
60	59	1.0080	20.0	6.7	6.2	Silt	
250	265	1.0065	20.0	3.2	4.43	Clay	
1440	1412	1.0055	20.0	1.4	3.25	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/26/2018
Client Sample ID	HT18-16-SURF	Start Date	11/04/2018 14:51
Lab Sample ID	200-45893-E-10	End Date	11/09/2018 11:08

Dry Weight Determination

Tin Weight	1.04	g
Wet Sample + Tin	37.15	g
Dry Sample + Tin	16.21	g
% Moisture	57.99	%

Non-soil material:	plant, shell
Shape (> #10):	subangular
Hardness (> #10):	hard

Date/Time in oven	11/04/2018 14:53
Date/Time out of oven	11/05/2018 14:47

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.09	298.00	253.91
Sample Weight (Oven Dried)			107

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			6.27
Sample <#10			101
% Passing #10			39.8

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.60	468.87	6.27 g	94.1	Sand	Coarse
#20	850	374.53	380.18	5.65 g	88.8	Sand	Medium
#40	425	363.27	370.14	6.87 g	82.4	Sand	Medium
#60	250	353.59	363.55	9.96 g	73.1	Sand	Fine
#80	180	319.35	323.82	4.47 g	68.9	Sand	Fine
#100	150	328.68	330.18	1.50 g	67.5	Sand	Fine
#200	75	314.63	316.71	2.08 g	65.6	Sand	Fine
				0.00 g	65.6		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	107

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0170	20.0	33.2	21.4	Silt	
5	5	1.0115	20.0	22.2	13.1	Silt	
15	15	1.0105	20.0	13	11.6	Silt	
30	32	1.0085	20.0	9	8.63	Silt	
60	60	1.0075	20.0	6.7	7.13	Silt	
250	259	1.0060	20.0	3.3	4.88	Clay	
1440	1406	1.0050	20.0	1.4	3.38	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	HT18-17-SURF
Lab Sample ID	200-45893-E-11

Date Received	10/26/2018
Start Date	11/04/2018 14:53
End Date	11/09/2018 11:16

Dry Weight Determination

Tin Weight	1.03	g
Wet Sample + Tin	49.60	g
Dry Sample + Tin	34.21	g
% Moisture	31.69	%

Non-soil material:	shell
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	11/04/2018 14:55
Date/Time out of oven	11/05/2018 14:47

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.06	282.46	238.4
Sample Weight (Oven Dried)			163

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			37.1
Sample <#10			126
% Passing #10			52.9

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500	447.25	457.30	10.05 g	93.8	Gravel	
#4	4750	488.00	504.55	16.55 g	83.6	Gravel	
#10	2000	462.60	473.10	10.50 g	77.2	Sand	Coarse
#20	850	378.83	386.23	7.40 g	72.7	Sand	Medium
#40	425	353.16	360.77	7.61 g	68.0	Sand	Medium
#60	250	348.44	373.48	25.04 g	52.6	Sand	Fine
#80	180	338.00	367.32	29.32 g	34.6	Sand	Fine
#100	150	328.69	342.27	13.58 g	26.3	Sand	Fine
#200	75	325.49	341.30	15.81 g	16.6	Sand	Fine
				0.00 g	16.6		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	163

Silt/Clay Fraction (Hydrometer Test)

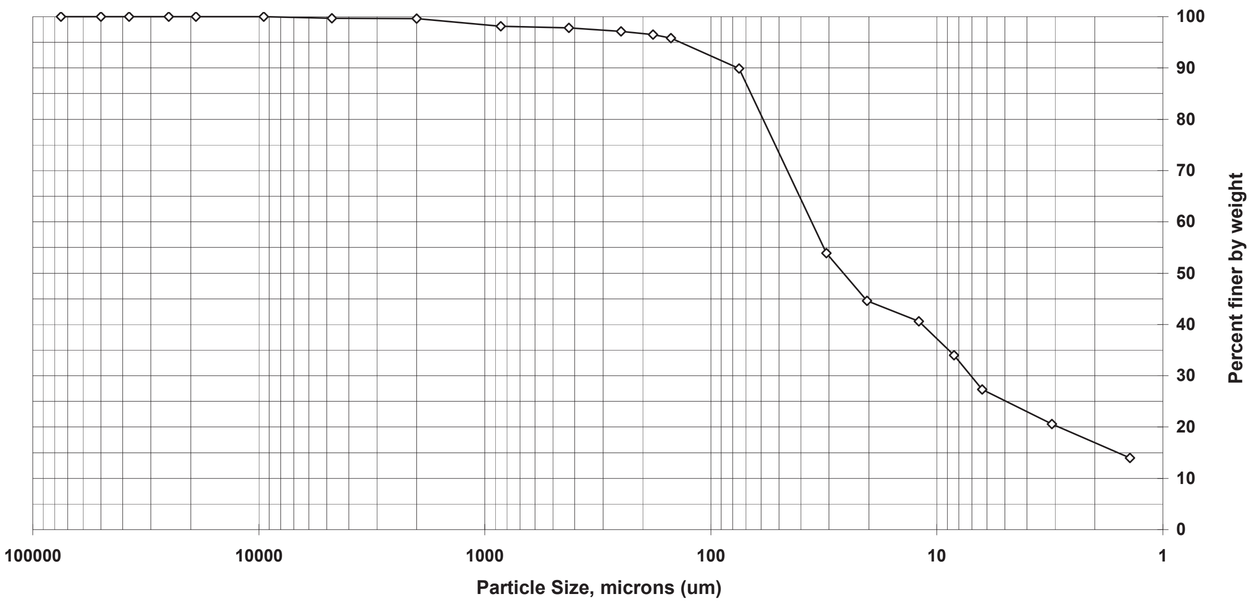
Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0150	20.0	33.9	12.1	Silt	
5	5	1.0135	20.0	21.8	10.6	Silt	
15	15	1.0115	20.0	12.8	8.62	Silt	
30	30	1.0100	20.0	9.2	7.14	Silt	
60	63	1.0090	20.0	6.4	6.16	Silt	
250	253	1.0075	20.0	3.2	4.68	Clay	
1440	1400	1.0060	20.0	1.4	3.2	Clay	

Particle Size of Soils by ASTM D422

				Date Received:	10/31/2018
Sample ID:	HT-18-01-SURF-FD	**Percent Solids:**	37.1%	**Start Date:**	11/9/2018
Lab ID:	200-45980-E-3	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

Shape (> #10): na

Non-soil material: shell
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	99.7	0.3
#10	2000	99.6	0.1
#20	850	98.1	1.5
#40	425	97.8	0.3
#60	250	97.1	0.7
#80	180	96.5	0.6
#100	150	95.8	0.7
#200	75	89.9	5.9
Hyd1	30.8	53.9	36.0
Hyd2	20.4	44.6	9.3
Hyd3	12	40.6	4.0
Hyd4	8.4	34.0	6.6
Hyd5	6.3	27.3	6.7
Hyd6	3.1	20.6	6.7
Hyd7	1.4	14.0	6.6

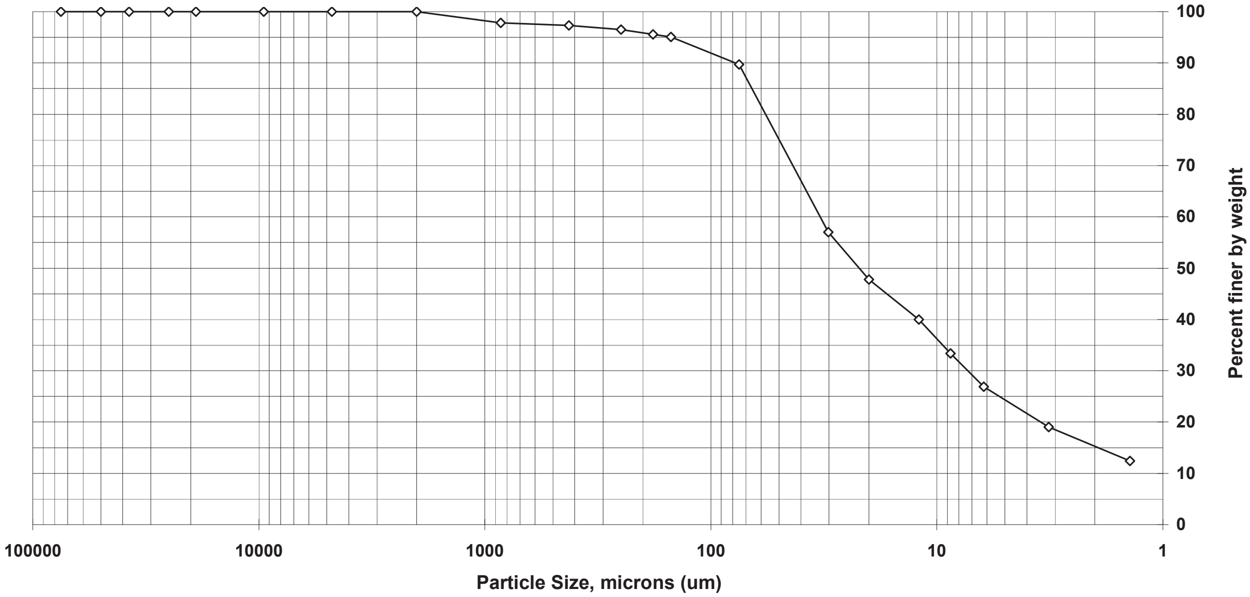
Soil Classification	Percent of sample
Gravel	0.3
Sand	9.8
Coarse Sand	0.1
Medium Sand	1.8
Fine Sand	7.9
Silt	62.6
Clay	27.3

Particle Size of Soils by ASTM D422

				Date Received:	10/31/2018
Sample ID:	HT-18-01-SURF	**Percent Solids:**	37.3%	**Start Date:**	11/9/2018
Lab ID:	200-45980-E-4	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

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	97.8	2.2
#40	425	97.3	0.5
#60	250	96.5	0.8
#80	180	95.6	0.9
#100	150	95.1	0.5
#200	75	89.7	5.4
Hyd1	30.2	57.0	32.7
Hyd2	20	47.8	9.2
Hyd3	12	40.0	7.8
Hyd4	8.7	33.4	6.6
Hyd5	6.2	26.9	6.5
Hyd6	3.2	19.0	7.9
Hyd7	1.4	12.4	6.6

Soil Classification	Percent of sample
Gravel	0.0
Sand	10.3
Coarse Sand	0.0
Medium Sand	2.7
Fine Sand	7.6
Silt	62.8
Clay	26.9

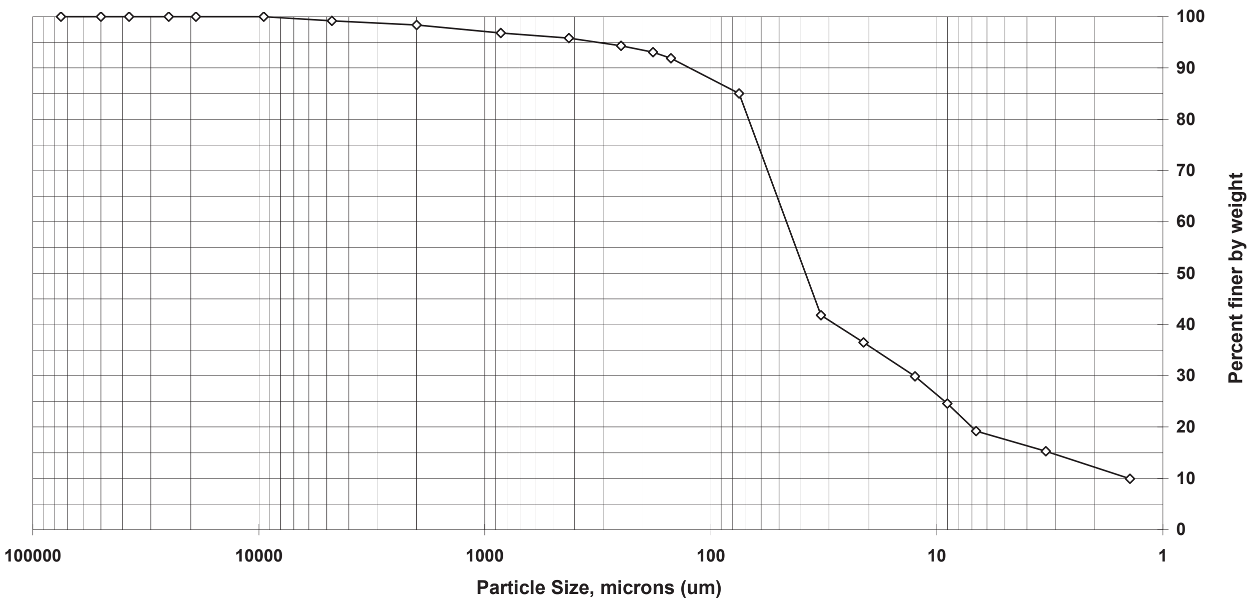
Particle Size of Soils by ASTM D422

				Date Received:	10/31/2018
Sample ID:	HT-18-02-SURF	**Percent Solids:**	39.4%	**Start Date:**	11/9/2018
Lab ID:	200-45980-E-5	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

Shape (> #10): na

Non-soil material: plant, shell

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	99.2	0.8
#10	2000	98.4	0.8
#20	850	96.8	1.6
#40	425	95.8	1.0
#60	250	94.3	1.5
#80	180	93.1	1.2
#100	150	91.9	1.2
#200	75	85.0	6.9
Hyd1	32.6	41.8	43.2
Hyd2	21.1	36.5	5.3
Hyd3	12.5	29.9	6.6
Hyd4	9	24.6	5.3
Hyd5	6.7	19.2	5.4
Hyd6	3.3	15.3	3.9
Hyd7	1.4	10.0	5.3

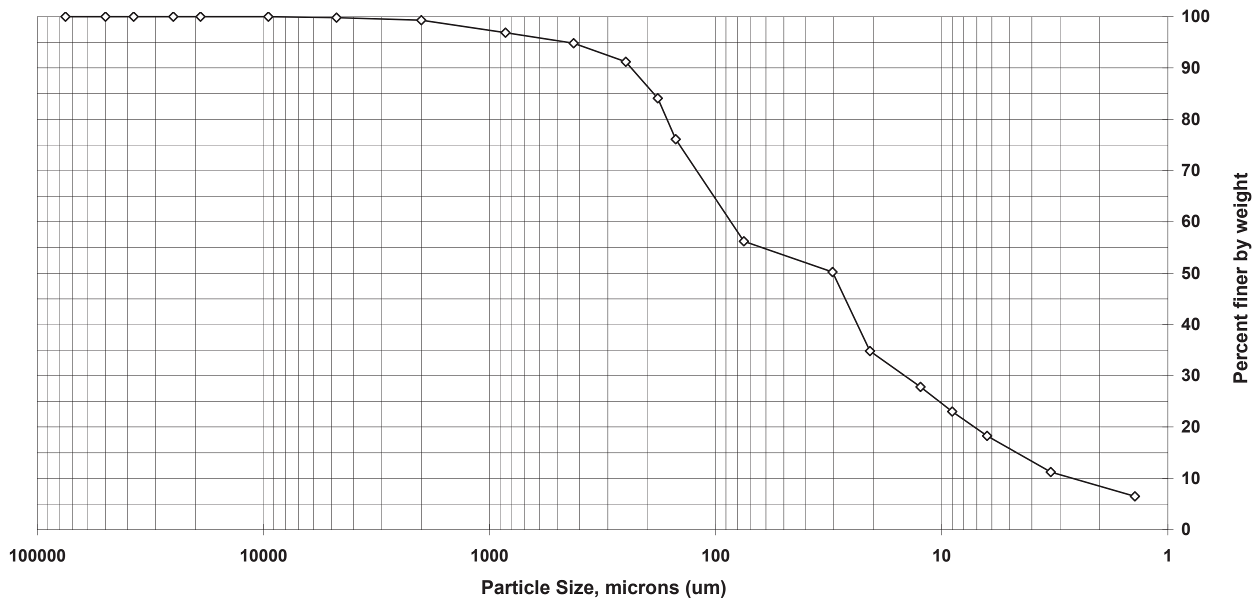
Soil Classification	Percent of sample
Gravel	0.8
Sand	14.2
Coarse Sand	0.8
Medium Sand	2.6
Fine Sand	10.8
Silt	65.8
Clay	19.2

Particle Size of Soils by ASTM D422

				Date Received:	10/31/2018
Sample ID:	HT-18-03-SURF	**Percent Solids:**	34.4%	**Start Date:**	11/9/2018
Lab ID:	200-45980-E-6	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

Shape (> #10): na

Non-soil material: plant, shell
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	99.8	0.2
#10	2000	99.3	0.5
#20	850	96.9	2.4
#40	425	94.8	2.1
#60	250	91.2	3.6
#80	180	84.1	7.1
#100	150	76.1	8.0
#200	75	56.2	19.9
Hyd1	30.4	50.2	6.0
Hyd2	20.8	34.8	15.4
Hyd3	12.4	27.8	7.0
Hyd4	9	23.0	4.8
Hyd5	6.3	18.3	4.7
Hyd6	3.3	11.2	7.1
Hyd7	1.4	6.5	4.7

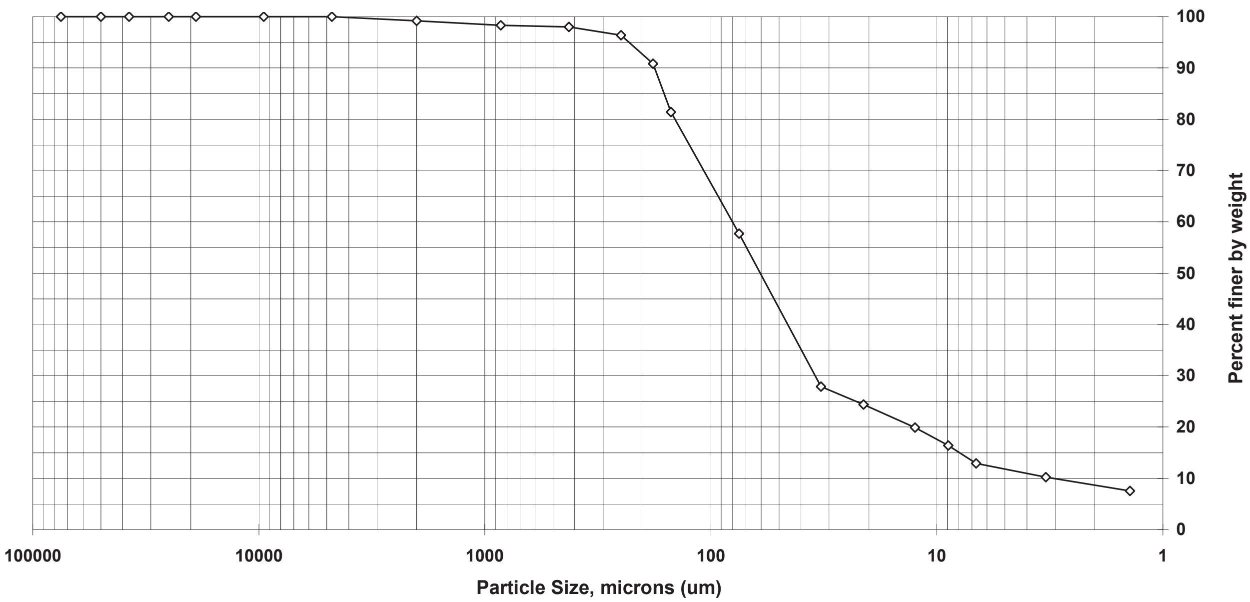
Soil Classification	Percent of sample
Gravel	0.2
Sand	43.6
Coarse Sand	0.5
Medium Sand	4.5
Fine Sand	38.6
Silt	37.9
Clay	18.3

Particle Size of Soils by ASTM D422

				Date Received:	10/31/2018
Sample ID:	HT-18-04-SURF	**Percent Solids:**	51.8%	**Start Date:**	11/9/2018
Lab ID:	200-45980-E-7	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

Shape (> #10): na

Non-soil material: plant, shell
Hardness (> #10): na



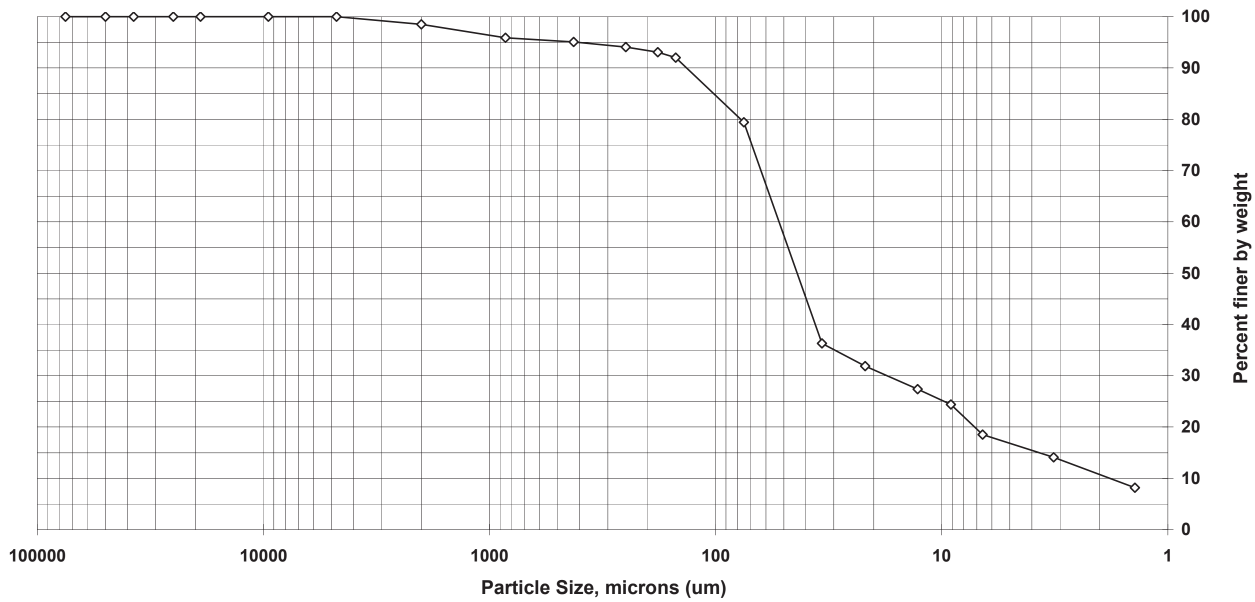
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.2	0.8
#20	850	98.3	0.9
#40	425	98.0	0.3
#60	250	96.4	1.6
#80	180	90.8	5.6
#100	150	81.4	9.4
#200	75	57.7	23.7
Hyd1	32.6	27.9	29.8
Hyd2	21.1	24.4	3.5
Hyd3	12.5	19.9	4.5
Hyd4	8.9	16.4	3.5
Hyd5	6.7	12.9	3.5
Hyd6	3.3	10.2	2.7
Hyd7	1.4	7.5	2.7

Soil Classification	Percent of sample
Gravel	0.0
Sand	42.3
Coarse Sand	0.8
Medium Sand	1.2
Fine Sand	40.3
Silt	44.8
Clay	12.9

Particle Size of Soils by ASTM D422

Date Received: 10/31/2018
Sample ID: HT-18-05-SURF **Percent Solids:** 32.8% **Start Date:** 11/9/2018
Lab ID: 200-45980-E-8 **Specific Gravity:** 2.650 **End Date:** 11/15/2018

Shape (> #10): na **Non-soil material:** plant
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	98.5	1.5
#20	850	95.9	2.6
#40	425	95.1	0.8
#60	250	94.1	1.0
#80	180	93.1	1.0
#100	150	92.0	1.1
#200	75	79.4	12.6
Hyd1	33.9	36.3	43.1
Hyd2	21.8	31.9	4.4
Hyd3	12.8	27.4	4.5
Hyd4	9.1	24.4	3.0
Hyd5	6.6	18.5	5.9
Hyd6	3.2	14.1	4.4
Hyd7	1.4	8.2	5.9

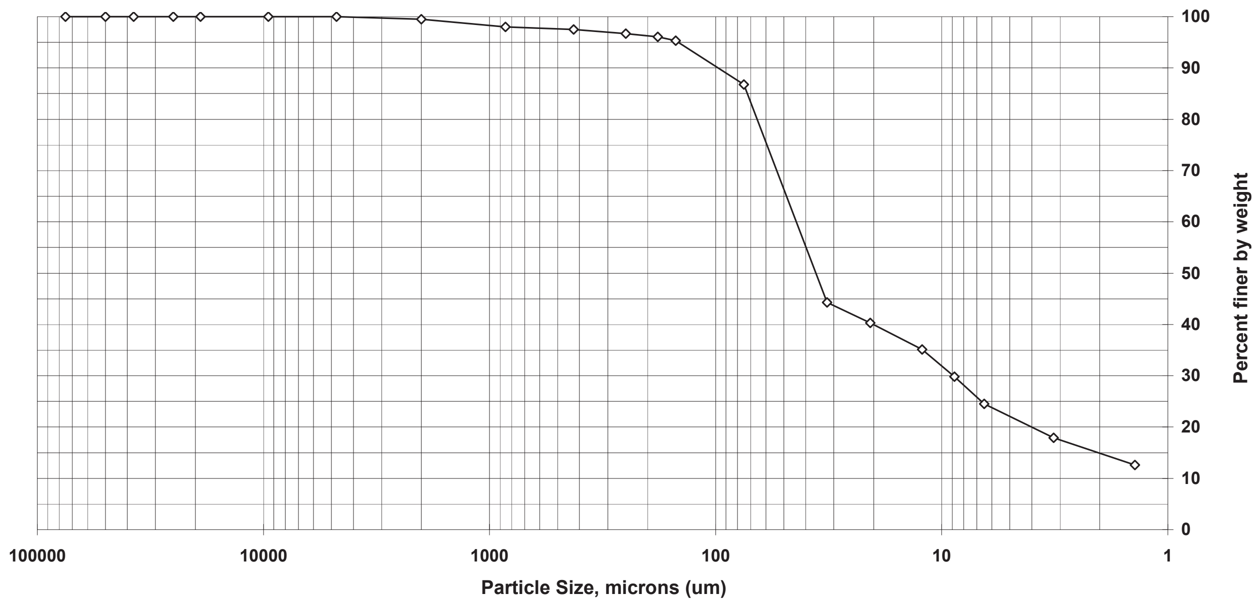
Soil Classification	Percent of sample
Gravel	0.0
Sand	20.6
Coarse Sand	1.5
Medium Sand	3.4
Fine Sand	15.7
Silt	60.9
Clay	18.5

Particle Size of Soils by ASTM D422

				Date Received:	10/31/2018
Sample ID:	HT-18-06-SURF	**Percent Solids:**	35.4%	**Start Date:**	11/9/2018
Lab ID:	200-45980-E-9	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

Shape (> #10): na

Non-soil material: plant, shell
Hardness (> #10): na



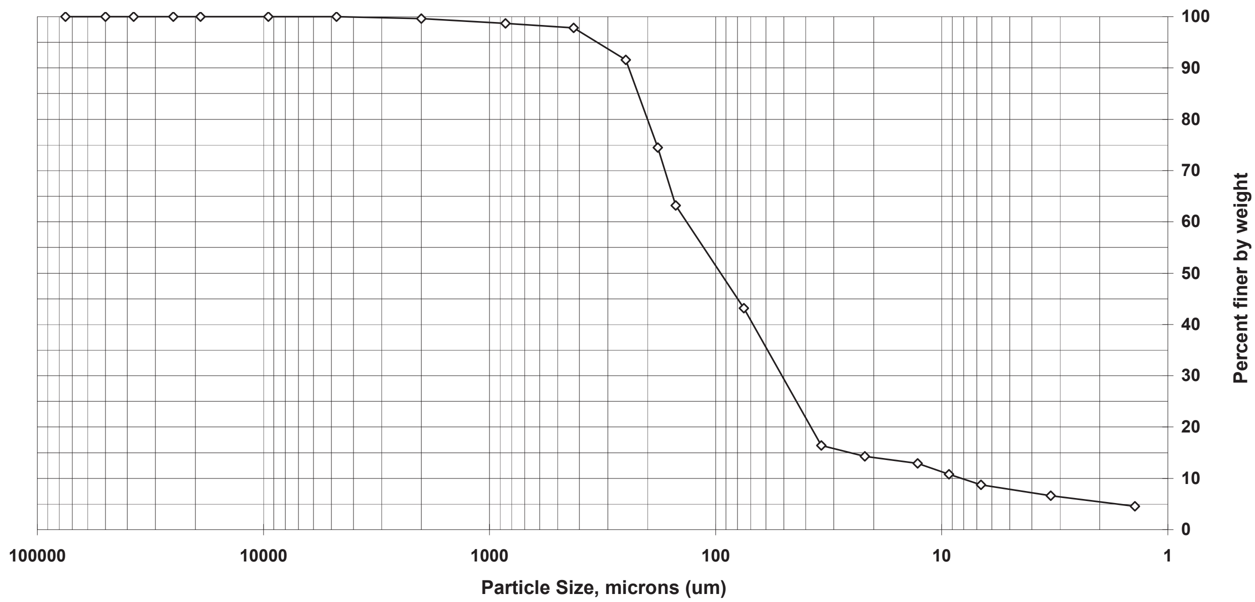
Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.5	0.5
#20	850	98.0	1.5
#40	425	97.5	0.5
#60	250	96.7	0.8
#80	180	96.1	0.6
#100	150	95.3	0.8
#200	75	86.8	8.5
Hyd1	32.2	44.3	42.5
Hyd2	20.7	40.3	4.0
Hyd3	12.2	35.1	5.2
Hyd4	8.8	29.8	5.3
Hyd5	6.5	24.5	5.3
Hyd6	3.2	17.9	6.6
Hyd7	1.4	12.6	5.3

Soil Classification	Percent of sample
Gravel	0.0
Sand	13.2
Coarse Sand	0.5
Medium Sand	2.0
Fine Sand	10.7
Silt	62.3
Clay	24.5

Particle Size of Soils by ASTM D422

Date Received: 10/31/2018
Sample ID: HT-18-07-SURF **Percent Solids:** 55.8% **Start Date:** 11/9/2018
Lab ID: 200-45980-E-10 **Specific Gravity:** 2.650 **End Date:** 11/15/2018

Shape (> #10): na **Non-soil material:** plant
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	99.6	0.4
#20	850	98.7	0.9
#40	425	97.8	0.9
#60	250	91.6	6.2
#80	180	74.5	17.1
#100	150	63.2	11.3
#200	75	43.2	20.0
Hyd1	34.1	16.4	26.8
Hyd2	21.9	14.3	2.1
Hyd3	12.8	12.9	1.4
Hyd4	9.3	10.8	2.1
Hyd5	6.7	8.7	2.1
Hyd6	3.3	6.6	2.1
Hyd7	1.4	4.5	2.1

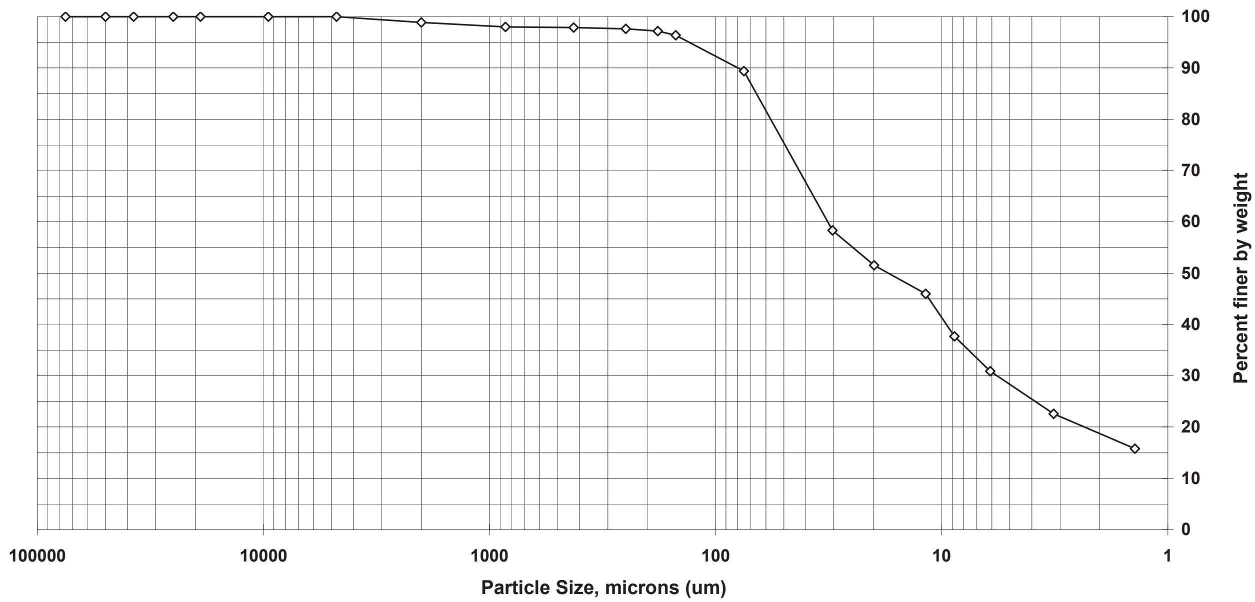
Soil Classification	Percent of sample
Gravel	0.0
Sand	56.8
Coarse Sand	0.4
Medium Sand	1.8
Fine Sand	54.6
Silt	34.5
Clay	8.7

Particle Size of Soils by ASTM D422

				Date Received:	10/31/2018
Sample ID:	HT-18-13-SURF	**Percent Solids:**	34.6%	**Start Date:**	11/9/2018
Lab ID:	200-45980-E-11	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

Shape (> #10): na

Non-soil material: plant, shell
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	98.9	1.1
#20	850	98.0	0.9
#40	425	97.9	0.1
#60	250	97.6	0.3
#80	180	97.2	0.4
#100	150	96.4	0.8
#200	75	89.4	7.0
Hyd1	30.4	58.3	31.1
Hyd2	19.9	51.5	6.8
Hyd3	11.8	46.0	5.5
Hyd4	8.8	37.7	8.3
Hyd5	6.1	30.9	6.8
Hyd6	3.2	22.6	8.3
Hyd7	1.4	15.8	6.8

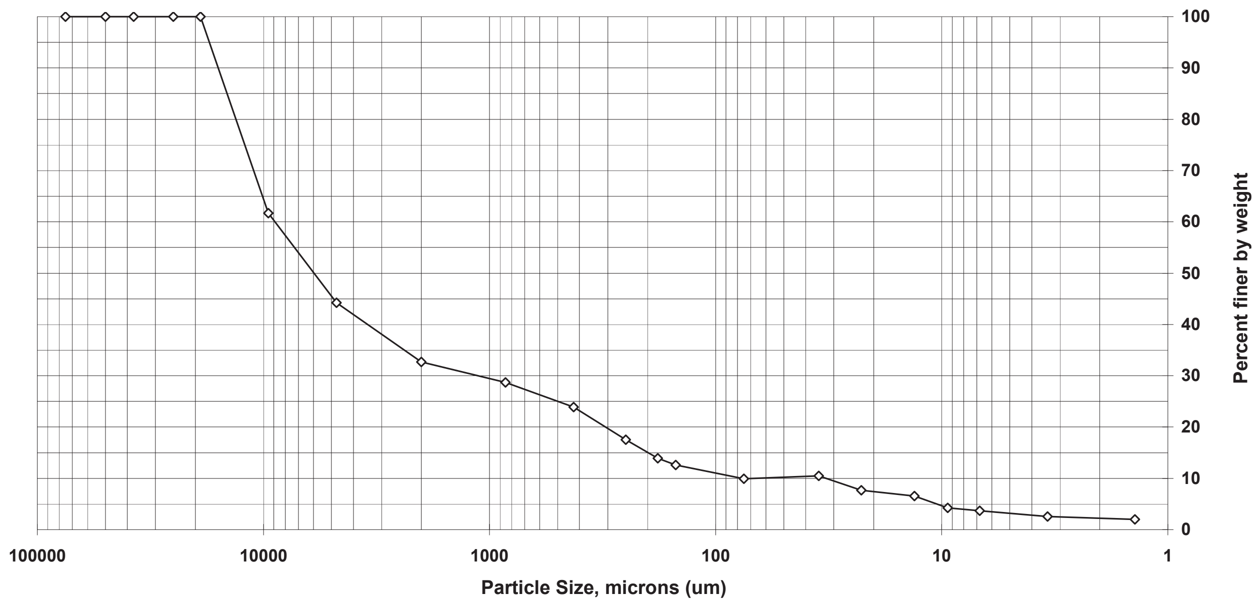
Soil Classification	Percent of sample
Gravel	0.0
Sand	10.6
Coarse Sand	1.1
Medium Sand	1.0
Fine Sand	8.5
Silt	58.5
Clay	30.9

Particle Size of Soils by ASTM D422

				Date Received:	11/1/2018
Sample ID:	HT18-14-SURF	**Percent Solids:**	59.9%	**Start Date:**	11/9/2018
Lab ID:	200-45998-E-2	**Specific Gravity:**	2.650	**End Date:**	11/15/2018

Shape (> #10): subangular

Non-soil material: shell, glass
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	61.7	38.3
#4	4750	44.2	17.5
#10	2000	32.7	11.5
#20	850	28.7	4.0
#40	425	23.9	4.8
#60	250	17.5	6.4
#80	180	13.9	3.6
#100	150	12.6	1.3
#200	75	9.9	2.7
Hyd1	35	10.5	-0.6
Hyd2	22.7	7.7	2.8
Hyd3	13.2	6.6	1.1
Hyd4	9.4	4.3	2.3
Hyd5	6.8	3.7	0.6
Hyd6	3.4	2.6	1.1
Hyd7	1.4	2.0	0.6

Soil Classification	Percent of sample
Gravel	55.8
Sand	34.3
Coarse Sand	11.5
Medium Sand	8.8
Fine Sand	14.0
Silt	6.2
Clay	3.7

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/31/2018
Client Sample ID	HT-18-01-SURF-FD	Start Date	11/09/2018 15:46
Lab Sample ID	200-45980-E-3	End Date	11/15/2018 14:23

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	27.21	g
Dry Sample + Tin	10.75	g
% Moisture	62.92	%

Non-soil material:	shell
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/09/2018 15:48
Date/Time out of oven	11/12/2018 14:18

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.12	206.66	162.54
Sample Weight (Oven Dried)			60.3

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.21
Sample <#10			60.1
% Passing #10			37

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750	488.00	488.17	0.17 g	99.7	Gravel	
#10	2000	462.69	462.73	0.04 g	99.6	Sand	Coarse
#20	850	374.61	375.50	0.89 g	98.1	Sand	Medium
#40	425	362.90	363.06	0.16 g	97.8	Sand	Medium
#60	250	353.27	353.67	0.40 g	97.1	Sand	Fine
#80	180	319.30	319.66	0.36 g	96.5	Sand	Fine
#100	150	328.44	328.85	0.41 g	95.8	Sand	Fine
#200	75	314.62	318.17	3.55 g	89.9	Sand	Fine
				0.00 g	89.9		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	60.3

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0230	20.0	30.8	53.9	Silt	
5	5	1.0195	20.0	20.4	44.6	Silt	
15	15	1.0180	20.0	12	40.6	Silt	
30	32	1.0155	20.0	8.4	34	Silt	
60	60	1.0130	20.0	6.3	27.3	Silt	
250	259	1.0105	20.0	3.1	20.6	Clay	
1440	1406	1.0080	20.0	1.4	14	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/31/2018
Client Sample ID	HT-18-01-SURF	Start Date	11/09/2018 15:50
Lab Sample ID	200-45980-E-4	End Date	11/15/2018 14:28

Dry Weight Determination

Tin Weight	1.08	g
Wet Sample + Tin	25.07	g
Dry Sample + Tin	10.03	g
% Moisture	62.69	%

Non-soil material:	na
Shape (> #10):	na
Hardness (> #10):	na
Date/Time in oven	11/09/2018 15:51
Date/Time out of oven	11/12/2018 14:19

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.15	208.48	164.33
Sample Weight (Oven Dried)			61.3

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0
Sample <#10			61.3
% Passing #10			37.3

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000			0.00	g	100.0	Sand	Coarse
#20	850	378.71	380.03	1.32	g	97.8	Sand	Medium
#40	425	352.82	353.13	0.31	g	97.3	Sand	Medium
#60	250	348.29	348.81	0.52	g	96.5	Sand	Fine
#80	180	337.93	338.48	0.55	g	95.6	Sand	Fine
#100	150	328.55	328.85	0.30	g	95.1	Sand	Fine
#200	75	325.44	328.78	3.34	g	89.7	Sand	Fine
				0.00	g	89.7		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	61.3

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0245	20.0	30.2	57	Silt	
5	5	1.0210	20.0	20	47.8	Silt	
15	15	1.0180	20.0	12	40	Silt	
30	30	1.0155	20.0	8.7	33.4	Silt	
60	63	1.0130	20.0	6.2	26.9	Silt	
250	253	1.0100	20.0	3.2	19	Clay	
1440	1400	1.0075	20.0	1.4	12.4	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client		Date Received	10/31/2018
Client Sample ID	HT-18-02-SURF	Start Date	11/09/2018 15:53
Lab Sample ID	200-45980-E-5	End Date	11/15/2018 14:35

Dry Weight Determination		
Tin Weight	1.07	g
Wet Sample + Tin	33.94	g
Dry Sample + Tin	14.02	g
% Moisture	60.60	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/09/2018 15:55
Date/Time out of oven	11/12/2018 14:19

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.10	197.59	153.49
Sample Weight (Oven Dried)			60.5

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.96
Sample <#10			59.5
% Passing #10			38.8

Hydrometer Data	
Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750	488.00	488.46	0.46 g	99.2	Gravel	
#10	2000	462.69	463.19	0.50 g	98.4	Sand	Coarse
#20	850	374.61	375.55	0.94 g	96.8	Sand	Medium
#40	425	362.90	363.49	0.59 g	95.8	Sand	Medium
#60	250	353.27	354.20	0.93 g	94.3	Sand	Fine
#80	180	319.30	320.02	0.72 g	93.1	Sand	Fine
#100	150	328.44	329.15	0.71 g	91.9	Sand	Fine
#200	75	314.62	318.81	4.19 g	85.0	Sand	Fine
				0.00 g	85.0		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	60.5

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0185	20.0	32.6	41.8	Silt	
5	5	1.0165	20.0	21.1	36.5	Silt	
15	15	1.0140	20.0	12.5	29.9	Silt	
30	30	1.0120	20.0	9	24.6	Silt	
60	57	1.0100	20.0	6.7	19.2	Silt	
250	247	1.0085	20.0	3.3	15.3	Clay	
1440	1394	1.0065	20.0	1.4	9.95	Clay	

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Sediment Grain Size - D422

Client		Date Received	10/31/2018
Client Sample ID	HT-18-03-SURF	Start Date	11/09/2018 15:58
Lab Sample ID	200-45980-E-6	End Date	11/15/2018 14:41

Dry Weight Determination

Tin Weight	1.05	g
Wet Sample + Tin	21.80	g
Dry Sample + Tin	8.19	g
% Moisture	65.59	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/09/2018 15:59
Date/Time out of oven	11/12/2018 14:19

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.10	241.58	197.48
Sample Weight (Oven Dried)			68

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.45
Sample <#10			67.6
% Passing #10			34.2

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750	488.00	488.13	0.13	g	99.8	Gravel	
#10	2000	462.69	463.01	0.32	g	99.3	Sand	Coarse
#20	850	378.71	380.37	1.66	g	96.9	Sand	Medium
#40	425	352.82	354.28	1.46	g	94.8	Sand	Medium
#60	250	348.29	350.74	2.45	g	91.2	Sand	Fine
#80	180	337.93	342.76	4.83	g	84.1	Sand	Fine
#100	150	328.55	334.01	5.46	g	76.1	Sand	Fine
#200	75	325.44	338.97	13.53	g	56.2	Sand	Fine
				0.00	g	56.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	68

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0240	20.0	30.4	50.2	Silt	
5	5	1.0175	20.0	20.8	34.8	Silt	
15	15	1.0145	20.0	12.4	27.8	Silt	
30	30	1.0125	20.0	9	23	Silt	
60	63	1.0105	20.0	6.3	18.3	Silt	
250	241	1.0075	20.0	3.3	11.2	Clay	
1440	1388	1.0055	20.0	1.4	6.5	Clay	

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Sediment Grain Size - D422

Client		Date Received	10/31/2018
Client Sample ID	HT-18-04-SURF	Start Date	11/09/2018 16:02
Lab Sample ID	200-45980-E-7	End Date	11/15/2018 14:46

Dry Weight Determination

Tin Weight	1.10	g
Wet Sample + Tin	26.85	g
Dry Sample + Tin	14.43	g
% Moisture	48.23	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na
Date/Time in oven	11/09/2018 16:04
Date/Time out of oven	11/12/2018 14:20

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.09	219.15	175.06
Sample Weight (Oven Dried)			90.6

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.72
Sample <#10			89.9
% Passing #10			51.4

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.69	463.41	0.72 g	99.2	Sand	Coarse
#20	850	374.61	375.46	0.85 g	98.3	Sand	Medium
#40	425	362.90	363.18	0.28 g	98.0	Sand	Medium
#60	250	353.27	354.74	1.47 g	96.4	Sand	Fine
#80	180	319.30	324.38	5.08 g	90.8	Sand	Fine
#100	150	328.44	336.94	8.50 g	81.4	Sand	Fine
#200	75	314.62	336.13	21.51 g	57.7	Sand	Fine
				0.00 g	57.7		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	90.6

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0185	20.0	32.6	27.9	Silt	
5	5	1.0165	20.0	21.1	24.4	Silt	
15	15	1.0140	20.0	12.5	19.9	Silt	
30	31	1.0120	20.0	8.9	16.4	Silt	
60	57	1.0100	20.0	6.7	12.9	Silt	
250	235	1.0085	20.0	3.3	10.2	Clay	
1440	1382	1.0070	20.0	1.4	7.53	Clay	

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Sediment Grain Size - D422

Client		Date Received	10/31/2018
Client Sample ID	HT-18-05-SURF	Start Date	11/09/2018 17:32
Lab Sample ID	200-45980-E-8	End Date	11/15/2018 11:29

Dry Weight Determination

Tin Weight	1.08	g
Wet Sample + Tin	19.25	g
Dry Sample + Tin	7.03	g
% Moisture	67.25	%

Non-soil material:	plant
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/09/2018 17:34
Date/Time out of oven	11/12/2018 14:24

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.11	209.70	165.59
Sample Weight (Oven Dried)			54.2

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.8
Sample <#10			53.4
% Passing #10			32.2

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.69	463.49	0.80	g	98.5	Sand	Coarse
#20	850	378.71	380.14	1.43	g	95.9	Sand	Medium
#40	425	352.82	353.25	0.43	g	95.1	Sand	Medium
#60	250	348.29	348.84	0.55	g	94.1	Sand	Fine
#80	180	337.93	338.46	0.53	g	93.1	Sand	Fine
#100	150	328.55	329.17	0.62	g	92.0	Sand	Fine
#200	75	325.44	332.26	6.82	g	79.4	Sand	Fine
				0.00	g	79.4		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	54.2

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0150	20.0	33.9	36.3	Silt	
5	5	1.0135	20.0	21.8	31.9	Silt	
15	15	1.0120	20.0	12.8	27.4	Silt	
30	30	1.0110	20.0	9.1	24.4	Silt	
60	59	1.0090	20.0	6.6	18.5	Silt	
250	256	1.0075	20.0	3.2	14.1	Clay	
1440	1440	1.0055	20.0	1.4	8.15	Clay	

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Sediment Grain Size - D422

Client			Date Received	10/31/2018
Client Sample ID	HT-18-06-SURF		Start Date	11/09/2018 17:37
Lab Sample ID	200-45980-E-9		End Date	11/15/2018 11:35

Dry Weight Determination

Tin Weight	1.04	g
Wet Sample + Tin	17.42	g
Dry Sample + Tin	6.84	g
% Moisture	64.59	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na
Date/Time in oven	11/09/2018 17:38
Date/Time out of oven	11/12/2018 14:25

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	45.03	216.57	171.54
Sample Weight (Oven Dried)			60.7

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.28
Sample <#10			60.4
% Passing #10			35.2

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.69	462.97	0.28	g	99.5	Sand	Coarse
#20	850	374.61	375.50	0.89	g	98.0	Sand	Medium
#40	425	362.90	363.23	0.33	g	97.5	Sand	Medium
#60	250	353.27	353.74	0.47	g	96.7	Sand	Fine
#80	180	319.30	319.64	0.34	g	96.1	Sand	Fine
#100	150	328.44	328.92	0.48	g	95.3	Sand	Fine
#200	75	314.62	319.76	5.14	g	86.8	Sand	Fine
				0.00	g	86.8		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	60.7

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0195	20.0	32.2	44.3	Silt	
5	5	1.0180	20.0	20.7	40.3	Silt	
15	15	1.0160	20.0	12.2	35.1	Silt	
30	30	1.0140	20.0	8.8	29.8	Silt	
60	58	1.0120	20.0	6.5	24.5	Silt	
250	256	1.0095	20.0	3.2	17.9	Clay	
1440	1440	1.0075	20.0	1.4	12.6	Clay	

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Sediment Grain Size - D422

Client	
Client Sample ID	HT-18-07-SURF
Lab Sample ID	200-45980-E-10

Date Received	10/31/2018
Start Date	11/09/2018 17:41
End Date	11/15/2018 11:42

Non-soil material:	plant
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/09/2018 17:42
Date/Time out of oven	11/12/2018 14:25

Dry Weight Determination

Tin Weight	1.03	g
Wet Sample + Tin	23.40	g
Dry Sample + Tin	13.51	g
% Moisture	44.21	%

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.11	250.44	206.33
Sample Weight (Oven Dried)			115

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.51
Sample <#10			114
% Passing #10			55.3

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.69	463.20	0.51	g	99.6	Sand	Coarse
#20	850	378.71	379.73	1.02	g	98.7	Sand	Medium
#40	425	352.82	353.82	1.00	g	97.8	Sand	Medium
#60	250	348.29	355.38	7.09	g	91.6	Sand	Fine
#80	180	337.93	357.54	19.61	g	74.5	Sand	Fine
#100	150	328.55	341.50	12.95	g	63.2	Sand	Fine
#200	75	325.44	348.39	22.95	g	43.2	Sand	Fine
				0.00	g	43.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	115

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0145	20.0	34.1	16.4	Silt	
5	5	1.0130	20.0	21.9	14.3	Silt	
15	15	1.0120	20.0	12.8	12.9	Silt	
30	29	1.0105	20.0	9.3	10.8	Silt	
60	58	1.0090	20.0	6.7	8.73	Silt	
250	250	1.0075	20.0	3.3	6.63	Clay	
1440	1434	1.0060	20.0	1.4	4.54	Clay	

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Sediment Grain Size - D422

Client	
Client Sample ID	HT-18-13-SURF
Lab Sample ID	200-45980-E-11

Date Received	10/31/2018
Start Date	11/09/2018 17:45
End Date	11/15/2018 11:48

Dry Weight Determination

Tin Weight	0.99	g
Wet Sample + Tin	23.23	g
Dry Sample + Tin	8.69	g
% Moisture	65.38	%

Non-soil material:	plant, shell
Shape (> #10):	na
Hardness (> #10):	na

Date/Time in oven	11/09/2018 17:46
Date/Time out of oven	11/12/2018 14:25

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.10	213.11	169.01
Sample Weight (Oven Dried)			58.5

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.64
Sample <#10			57.9
% Passing #10			34.3

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500			0.00	g	100.0	Gravel	
#4	4750			0.00	g	100.0	Gravel	
#10	2000	462.69	463.33	0.64	g	98.9	Sand	Coarse
#20	850	374.61	375.16	0.55	g	98.0	Sand	Medium
#40	425	362.90	362.95	0.05	g	97.9	Sand	Medium
#60	250	353.27	353.45	0.18	g	97.6	Sand	Fine
#80	180	319.30	319.56	0.26	g	97.2	Sand	Fine
#100	150	328.44	328.88	0.44	g	96.4	Sand	Fine
#200	75	314.62	318.69	4.07	g	89.4	Sand	Fine
				0.00	g	89.4		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	58.5

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0240	20.0	30.4	58.3	Silt	
5	5	1.0215	20.0	19.9	51.5	Silt	
15	15	1.0195	20.0	11.8	46	Silt	
30	29	1.0165	20.0	8.8	37.7	Silt	
60	63	1.0140	20.0	6.1	30.9	Silt	
250	250	1.0110	20.0	3.2	22.6	Clay	
1440	1434	1.0085	20.0	1.4	15.8	Clay	

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Sediment Grain Size - D422

Client		Date Received	11/1/2018
Client Sample ID	HT18-14-SURF	Start Date	11/09/2018 17:50
Lab Sample ID	200-45998-E-2	End Date	11/15/2018 11:53

Dry Weight Determination

Tin Weight	1.00	g
Wet Sample + Tin	27.28	g
Dry Sample + Tin	16.74	g
% Moisture	40.11	%

Non-soil material:	shell, glass
Shape (> #10):	subangular
Hardness (> #10):	hard

Date/Time in oven	11/09/2018 17:52
Date/Time out of oven	11/12/2018 14:26

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)	44.77	280.94	236.17
Sample Weight (Oven Dried)			141

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			95.1
Sample <#10			45.9
% Passing #10			19.4

Hydrometer Data

Serial Number	542321
Calib. Date (mm/dd/yyyy)	01/03/2018
Low Temp (C)	17.0
Reading at Low Temp	1.0035
High Temp (C)	23.0
Reading at High Temp	1.0020
Hydrometer Cal Slope	-0.00025
Hydrometer Cal Intercept	1.00775
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500	447.26	501.33	54.07	g	61.7	Gravel	
#4	4750	488.00	512.74	24.74	g	44.2	Gravel	
#10	2000	462.69	478.94	16.25	g	32.7	Sand	Coarse
#20	850	378.71	384.32	5.61	g	28.7	Sand	Medium
#40	425	352.82	359.59	6.77	g	23.9	Sand	Medium
#60	250	348.29	357.38	9.09	g	17.5	Sand	Fine
#80	180	337.93	342.94	5.01	g	13.9	Sand	Fine
#100	150	328.55	330.44	1.89	g	12.6	Sand	Fine
#200	75	325.44	329.20	3.76	g	9.9	Sand	Fine
				0.00	g	9.9		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	141

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0120	20.0	35	10.5	Silt	
5	5	1.0095	20.0	22.7	7.69	Silt	
15	15	1.0085	20.0	13.2	6.55	Silt	
30	31	1.0065	20.0	9.4	4.27	Silt	
60	60	1.0060	20.0	6.8	3.7	Silt	
250	240	1.0050	20.0	3.4	2.56	Clay	
1440	1424	1.0045	20.0	1.4	1.99	Clay	