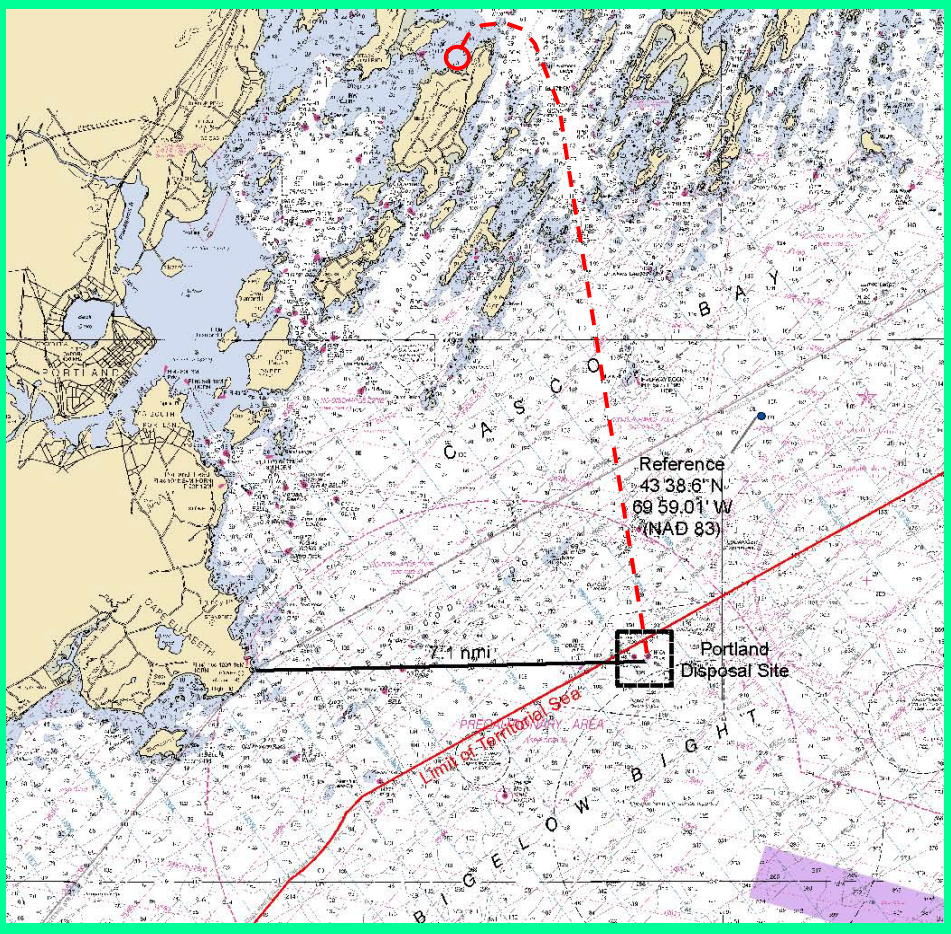
GREAT CHEBEAGUE ISLAND
MAINE
NAVIGATION IMPROVEMENT PROJECT

APPENDIX F
SEDIMENT SAMPLING AND TESTING DATA



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Appendix F – Sediment Sampling and Testing Data

This appendix contains the report on sediment sampling and testing for bioassay (toxicity) and bioaccumulation analysis of sediments proposed for dredging from the Stone Wharf Landing at Great Chebeague Island, Maine, including an extract of the test data. The complete report includes extensive QA/QC data and is available at the New England District. The analysis and report were prepared by AECOM, Chelmsford, MA, under contract to the USACE, New England District.

The results of earlier sampling and testing of sediments to be dredged from this area for physical and bulk chemical analysis have been included in the Environmental Assessment prepared for this project, and in the suitability determination for disposal of the dredged material (see Appendix H).

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USACE CONTRACT NO. W912WJ-17-D-0003
Delivery Order No. W912WJ17F0106

Final Report: Sampling and Testing in Support of Dredged Material Suitability Determination:

Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

Prepared for

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts

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April 13, 2018

Richard Ben Loyd
Department of Army
New England District
Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: Chebeague Island – Final Report (Final Version)
Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106
Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

Dear Mr. Loyd:

AECOM Technical Services, Inc. (AECOM) is pleased to provide the enclosed Final Report under Delivery Order W912WJ17F0106, Task 10 of the Performance Work Statement (PWS) entitled "*Sampling and Test ing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine" dated 4 August 2017.*

This submission has been subjected to AECOM's review and coordination procedures. Please let us now if you have any questions or if you would like a call to discuss this report further.

Best Regards,

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Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106

Sampling and Environmental Testing in Support of Dredged Material Suitability Determination

Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

April 13, 2018

Final Report (Final Version)

Final Report: Sampling and Testing in Support of Dredged Material Suitability Determination:

Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

Report Prepared By:

Christie Archer

13 April, 2018

Christine Archer
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Date

Report Reviewed By:

13 April, 2018

Kris van Naerssen
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Report Approved By:

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13 April, 2018

Maura Surprenant
AECOM Deputy Program Manager

Date

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Acronyms

ARO	Aquatic Resource Organisms
AWQC	Ambient Water Quality Criteria
COC	Chain of Custody
CWA	Clean Water Act
DO	Dissolved Oxygen
DGPS	Differential Global Positioning System
DM	Dredged Material
EC50	Median Effective Concentration
EPA	U.S. Environmental Protection Agency
ESI	EnviroSystems, Inc.
FNP	Federal Navigation Project
FSP	Field Sampling Plan
GC/ECD	Gas Chromatography/Electron Capture Detector
GC/MS	Gas Chromatography /Mass Spectrometry
LMW	High Molecular Weight
ICP/MS	Inductively Coupled Plasma Mass Spectrometry
LC50	Median Lethal Concentration
LCS	Laboratory Control Sample
LMW	Low Molecular Weight
MDL	Method Detection Limit
MLLW	Mean Lower Low Water
MPRSA	Marine Protection, Research, and Sanctuaries Act
NA	Normandeau Associates
NAE	U.S. Army Corps of Engineers, New England District
NOAA	National Oceanic and Atmospheric Administration
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PDS	Portland Disposal Site
PWS	Performance Work Statement
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RIM	Regional Implementation Manual
RL	Reporting Limit
RPD	Relative Percent Difference
SPP	Suspended Particulate Phase
SRM	Standard Reference Material
USACE	U.S. Army Corps of Engineers

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1. Introduction

The New England District (NAE) of the US Army Corps of Engineers (USACE) is currently preparing a suitability determination to assess disposal options for materials which may be generated during improvement dredging activities proposed at the Chebeague Island landing located on Great Chebeague Island, Maine. This report summarizes efforts performed by the AECOM Team (comprised of AECOM Technical Services, Inc., Normandeau Associates, Inc., EnviroSystems, Inc., and Alpha Analytical, Inc.) under Delivery Order W912WJ-17-F-0106 of USACE Contract W912WJ-17-D-0003.

The AECOM Team work scope included provision of logistical support to NAE and laboratory analysis for the generation of pertinent environmental data. Data generated under this task order will be used by NAE to assess the suitability of materials that may be dredged from the proposed Federal Navigation Project (FNP) at the Chebeague Island landing (depicted in Figure 1) for unconfined open water disposal at the Portland Disposal Site (PDS).

This report summarizes the methodology used for field sampling and laboratory analysis, the results of the testing and quality assurance/quality control (QA/QC) details regarding the analyses.

1.1 Project Background

The Town of Chebeague Island has requested that the NAE investigate the potential of establishing a federal channel to allow full time vessel traffic to the Great Chebeague Island landing. An initial study performed by NAE determined that a 0.5 acre turning basin and a 100- to 150-foot wide channel would be required to meet the project objectives. The dredged depths for the turning basin and channel would be 8 and 10 feet, respectively, at mean lower low water (MLLW), plus a 1-foot allowable overdepth. The proposed improvement dredging activities would produce approximately 33,000 cubic yards of mixed gravel, sand, and silt. NAE anticipates that this material would be mechanically dredged and placed at the PDS.

In May of 2017, NAE collected sediment cores from 8 locations within the boundaries of the FNP at the Chebeague Island landing. Samples from these cores were analyzed for physical and bulk chemical parameters in accordance with the sediment characterization requirements described in the EPA/ NAE regional protocol "*Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters*" (RIM: U.S. Environmental Protection Agency [EPA]/USACE, 2004). The results of analysis showed levels of individual metals, Polycyclic Aromatic Hydrocarbons (PAHs), and Polychlorinated Biphenyls (PCBs) above the reporting limits set forth in the RIM. This triggered the need for additional water column and benthic effects evaluations in order to determine the suitability of this material for unconfined open water disposal.

This requirement for further evaluation will be met through NAE's evaluation of data generated under this task order. A Work Plan (AECOM, 2017a; included as Appendix A) was prepared by AECOM to guide the field sampling and laboratory analyses. The Work Plan was prepared in accordance with relevant regulations and standards, as described in Section 1.2, below, and in accordance with project-specific requirements identified by NAE in its Performance Work Statement (PWS) entitled "*Sampling and Testing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine" dated 4 August 2017.* Field sampling and laboratory analyses were performed in late 2017/early 2018 and completed in accordance with the project Work Plan.

In order to further characterize materials to be generated as part of the proposed FNP improvement dredging project, sediments from 5 core locations within the Chebeague Island Landing were collected by NAE in October 2017 to undergo water column and biological testing in accordance with the RIM's evaluation requirements. Work conducted under this program included field sampling, elutriate chemistry, suspended particulate phase (SPP) toxicity testing, 10-day whole sediment toxicity testing and 28-day bioaccumulation testing with associated tissue analysis. The data presented herein will be used by USACE NAE to support a suitability determination for unconfined open water disposal of the dredged material from the proposed FNP at the PDS. The PDS and its associated reference site are depicted in Figure 2.

1.2 Relevant Regulations/Standards

Data for the dredged material suitability evaluations under the Marine Protection, Research, and Sanctuaries Act (MPRSA) and the Clean Water Act (CWA) have been collected based on quality standards outlined in *QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations* (EPA, 1995). Evaluations have followed guidance provided in the Green Book (EPA/USACE, 1991), the *Inland Testing Manual* (EPA/USACE, 1998), and the RIM (EPA/USACE, 2004).

2. Methods

Field and laboratory methods are detailed in the project Work Plan (AECOM, 2017a; included as Appendix A), which is comprised of a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). Brief summaries of the field and laboratory methods used are included in the following subsections.

Field work for the Chebeague Island proposed FNP dredged material suitability determination was completed by both USACE NAE personnel (harbor site sampling) and individuals on the AECOM and Normandeau Associates (NA) Field Team (collectively the AECOM Field Team). Field activities undertaken by the AECOM Field Team included collection and transport of sediment and water samples from the PDS Reference Site, as well as receipt and delivery of NAE-collected sediment and water samples from the proposed FNP at the Chebeague Island Landing.

Tasks described in Section 2.1, below, as well as in the accompanying Field Report (AECOM, 2017b; included as Appendix B) focus primarily on activities undertaken by the AECOM Field Team. Sampling techniques employed by NAE personnel, relative to sediment and water collection activities on Chebeague Island, are addressed under separate cover.

2.1 Field Sampling

Sample locations were established by NAE and are distributed throughout the proposed project area at the Chebeague Island landing. The AECOM Field Team collected sediment and water samples from the PDS Reference Site, located at latitude 43.643419 and longitude - 69.982990, to facilitate the evaluation of the dredge area material for placement at the PDS. Field sampling locations are depicted in Figures 1 and 2. A full field report (AECOM, 2017b) describing the AECOM Field Team's sampling effort is provided in Appendix B.

Appropriate volumes of dredge area sediment and water were collected by NAE at each of the five harbor stations for the elutriate and biological testing described in the sections below. These samples were subsequently composited by the laboratory into three project composite samples, as described in the project PWS.

The project field effort commenced on October 17, 2017 and was completed on October 18, 2017. Project mobilization activities occurred on October 16, 2017. The program was divided into three tasks: AECOM's receipt of sediment and water samples that were collected by NAE on October 17, 2017; the AECOM Field Team's collection of sediment and water samples at the PDS Reference Site on October 17, 2017; and, delivery of project samples to the EnviroSystems, Inc. (ESI) laboratory on October 18, 2017.

Vessel positioning and the determination of actual sample locations were accomplished utilizing a Differential Global Positioning System (DGPS). The sampling vessel was held on station at the PDS Reference Site with a multi-point anchor spread. Attachment 1 of the Field Report (AECOM, 2017b; Appendix B) lists the grab sample positions for each attempt. Local National Oceanic and Atmospheric Administration (NOAA) tide data was obtained from NOAA Station 8418150 to calculate tidal height in feet above MLLW.

The field report (AECOM, 2017b) provided in Appendix B provides additional detail regarding field activities, including field observations such as penetration depth, material recovery, visual descriptions and other pertinent observations.

2.1.1 Sediment Collection

Sediments from the proposed FNP at the Chebeague Island landing were collected by NAE using vibracore methodology. These sediment samples were containerized by NAE and transferred to AECOM under chain of custody (COC) at the conclusion of NAE sampling efforts.

PDS reference site sediments were collected by the AECOM Field Team using a Van Veen and Ponar sampler as outlined in the project Work Plan. Prior to use, the sediment sample collection equipment was decontaminated in accordance with the project Work Plan. In addition, equipment blanks were collected on the sediment sampling collection equipment in accordance with the project Work Plan.

The proposed FNP and PDS Reference Site sediment samples were transferred to a temperature-controlled refrigerated van unit immediately upon return to the dock and were held at temperature and in accordance with the project Work Plan until delivery to ESI.

2.1.2 Surface Water Collection

Water from the vicinity of the three sediment composite locations at the Chebeague Island landing (dredge site water) was collected by NAE personnel on 17 October, 2017 using a pump and tubing system.

Water from the PDS reference area (SPP dilution water) was collected by the AECOM Field Team on 17 October, 2017 using a large volume Niskin Bottle, as outlined in the Work Plan. Prior to use, the surface water collection equipment was decontaminated in accordance with the project Work Plan. Equipment blanks were collected on the surface water collection equipment, in accordance with the project Work Plan.

Water samples were also transferred to the refrigerated van immediately after returning to the dock and held at temperature in accordance with the project Work Plan until delivery to ESI.

2.1.3 Sampling Deviations/Difficulties Encountered

One minor deviation from the project Work Plan was noted during field sampling activities, as outlined below. Laboratory deviations, if applicable, are presented in Appendices C and D.

The Work Plan notes that HYPACK software shall be utilized in concert with the DGPS unit for navigation. The R/V P1 was equipped with a comparable navigation setup that included a Trimble DGPS system and Nobeltec navigation software (rather than HYPACK software) for vessel positioning. DGPS accuracy was achieved as specified in the Work Plan. Project coordinates were monitored in real-time in Degree Decimal Minute format. No project implications are anticipated as a result of this deviation.

2.2 Sample Processing and Analysis

The project QAPP provides detailed descriptions of the aqueous and sediment sample handling and the methods used for water column and biological testing. Section B.6 of the QAPP (AECOM, 2017a) summarize the chemical testing methods used and Section B.7 summarizes the bioassay test methods. Only minor deviations from the QAPP were noted. These minor deviations are discussed in Sections 3.1.2.3, 3.2.1.3, and 3.2.2.4 for the biological testing and Section 4 for the analytical chemistry. These deviations are not expected to have an impact on the usability of the data for decision making.

The biological and analytical project team included two laboratories:

- EnviroSystems Inc. (ESI; Hampton, NH) provided processing facilities and performed SPP analysis, 10-day whole sediment toxicity testing, 28-day bioaccumulation bioassays, and elutriate chemistry testing; and,
- Alpha Analytical Laboratories (Mansfield, MA) provided tissue testing services.

Sediment and water samples were transferred directly from the field to ESI for further processing before subsequent testing commenced. All field to lab transfers (and subsequent lab to lab transfers) were conducted under COC procedures, as specified in the project work plan. COC records are included in the laboratory backup appendices (Appendices C and D), as well as in the Field Report (Appendix B).

2.2.1 Sample Handling

Sample handling and delivery was performed as outlined in the project Work Plan. PDS Reference Site samples collected by the AECOM Team were stored in labeled, 5-gallon food grade collapsible carboys (water samples) or 3.5-gallon food grade high density polyethylene pails with locking lids (sediment samples), and kept on wet ice until returning to the dock. All sediment and water samples were securely stored in a locked, refrigerated van (set to 4°C) for the field sample transport effort.

2.2.2 Test Sample Preparation and Compositing

Following the sample compositing scheme outlined in the Work Plan / PWS, sediment composites were prepared by combining equal volumes of the material from the various stations for subsequent testing. The sample compositing scheme is depicted in Table 1. These composite samples were used in the sediment bioassays and to develop elutriate/SPP samples for chemical and toxicological testing.

2.2.3 Elutriate/Suspended Particulate Phase Sample Preparation and Analysis

Chebeague Island dredge site water was used in the preparation of all chemical elutriates and formed the basis of all elutriate/SPP sample preparations. Water from PDS was used for all SPP dilutions in the toxicity tests.

Each elutriate/SPP batch was prepared by adding the homogenized sediment to the site water in a 1:4 volumetric ratio, stirring the mixture for 30 minutes, and then allowing the mixture to settle for 1 hour. The supernatant was siphoned off prior to chemical and biological evaluations. Chemical samples were also centrifuged as required by the protocol. All samples were stored at or below 4°C when not in use. Elutriate samples were containerized for chemistry analysis (i.e., filtration of metals samples, analysis of metals and (total) organic compounds). Table 2 provides a summary of the elutriate/SPP preparation.

Elutriate samples were analyzed for metals, pesticides, pentachlorophenol, and PCB congeners in accordance with Table 5 of the PWS and in accordance with the protocol recommended in Tables 2 and 3 of the New England District RIM document, with appropriate updates to current analytical methods. Acid digestion followed by analysis using an inductively coupled plasma mass spectrometer (ICP/MS) for the analysis of the extracted metals except mercury and hexavalent chromium. Mercury was determined using Cold Vapor Atomic Fluorescence Spectrometry; the diphenylcarbazide colorimetric procedure described in Standard Methods 3500-Cr D was used to measure chromium 6 (Cr6+). Table 3 summarizes the analytes, analytical methods and method detection limits achieved for the elutriate chemistry analyses.

Water column bioassays were conducted in accordance with the RIM (EPA/USACE, 2004), the Inland Testing Manual (EPA/USACE, 1998) and the project Work Plan (AECOM, 2017a). Test organisms for the water column bioassays included *Americamysis bahia*, *Menidia beryllina*, and *Arbacia punctulata*. Table 4 summarizes the test conditions for these bioassays and Table 5 identifies the dates of the SPP testing. The toxicity tests were completed on three elutriate samples. All SPP testing was started before the 24-hour holding time for suspended particulate phase solutions. Results and protocol deviations are described in Section 3.1.2.

2.2.3.1 Test Species

A. bahia were ≤5 days old and were obtained from cultures maintained by Aquatic Resource Organisms (ARO) of Hampton, New Hampshire. *M. beryllina* were 9-14 days old at the start of the assay and were also obtained from ARO. Prior to use, test organisms were held for a minimum of 2 hours under temperature, salinity, and photoperiod conditions similar to those used in the assay. Organisms were transferred to test vessels using a large bore pipet to minimize the amount of water added to test solutions.

Adult *A. punctulata* were from cultures maintained by ESI. Original stock was obtained from a commercial supplier. Adult sea urchins are maintained in the laboratory for as long as they are viable. Male and female urchins are maintained in separate chambers at a temperature of approximately 12±3°C after spawning.

2.2.3.2 Reference Toxicant Assays

ESI completed acute 96-hour sodium dodecyl sulfate (SDS) reference toxicant assays for *A. bahia* and *M. beryllina* in August 2017 and ammonium chloride reference toxicant assays in November 2017. Results were within two standard deviations of the historic mean of ESI's control charts, indicating that the test organisms were healthy.

The *A. punctulata* copper reference toxicant assay conducted in August 2017 and the ammonium chloride reference toxicant assay conducted in October 2017 were also within two standard deviations of the corresponding control chart mean. Table 6 summarizes the results of the reference toxicant assays conducted in support of the SPP assays.

Although the Work Plan (AECOM, 2017a) specified that the reference toxicant assays be conducted concurrent with the SPP tests, the reference toxicant assays were conducted before and after the duration of the SPP tests. The RIM does not specify that the assays be conducted concurrently and the lack of concurrence between the project assay and the reference toxicant assays does not impact the findings of the project assays.

2.2.4 10-Day Whole Sediment Toxicity Testing

Bulk sediment bioassays are an important part of the overall suitability testing framework for PDS disposal consideration and agency guidance specifies that a filter feeder, a deposit feeder, and a burrowing organism be represented in the assay. Ten-day whole sediment bioassays were performed using the crustacean *A. bahia* (mysid shrimp) and the crustacean *Leptocheirus plumulosus* (amphipod) to represent these feeding strategies in accordance with the RIM (EPA/USACE, 2004), the Inland Testing Manual (EPA/USACE, 1998), and the project work plan (AECOM, 2017a). *A. bahia* is a filter and deposit feeder that spends much of its time in the water above the sediment-water interface. The amphipod *L. plumulosus* builds burrows in the sediment and feeds on particles that are in suspension and on the sediment surface.

Table 7 summarizes the test conditions for the 10-day whole sediment toxicity tests. Assays with both species began on November 03, 2017 and were terminated on November 13, 2017. The control sediment used in the assays was natural sediment collected from the Hampton Estuary, Hampton, New Hampshire. The area is not known to receive any direct industrial inputs and has been used as a laboratory reference sediment in the testing of marine sediments for over 25 years. Overlying seawater was obtained from the Hampton Estuary. Water from the estuary has been used for the culture and maintenance of test organisms at ESI since 1978. Seawater is obtained through a filter system located on the bottom of the estuary at a point approximately 1 mile from the open ocean.

Results and protocol deviations are described in Section 3.2.1.

2.2.4.1 Test Species

A. bahia were obtained from ARO. Prior to use, test organisms were held for a minimum of 2 hours under temperature, salinity, and photoperiod conditions similar to those used in the assay. *A. bahia* used in the assay were $\leq$5 days old at the start of the test.

L. plumulosus were obtained from cultures maintained by ARO. Prior to use, test organisms were held for a minimum of 2 hours under temperature, salinity, and photoperiod conditions similar to those used in the assay. *L. plumulosus* were non-reproductive adults.

2.2.4.2 Reference Toxicants

As part of the laboratory quality control program, standard reference toxicant assays were conducted with a sub-sample of the organisms received for testing, for each test species. ESI completed acute 96-hour ammonium chloride reference toxicant assays for *A. bahia* and *L. plumulosus*. Results were within two standard deviations of the historic mean of ESI's control charts, indicating that the test organisms were healthy. Table 8 summarizes the results of the reference toxicant assays conducted in support of the 10-day tests. Reference toxicant assays for the *L. plumulosus* were not conducted concurrent with the 10-day tests; however, the lack of concurrence does not impact the findings of the project assays

2.2.5 28-Day Bioaccumulation Bioassay and Tissue Analysis

The 28-day solid phase/bioaccumulation evaluation was conducted in accordance with the RIM (EPA/USACE, 2004), the Inland Testing Manual (EPA/USACE, 1998) and the project work plan (AECOM, 2017a) using the bivalve *Macoma nasuta* and the burrowing polychaete *Nereis virens*. Table 9 summarizes the test conditions for the 28-day bioaccumulation bioassay.

The *M. nasuta* assays were initiated on November 7, 2017 and were completed on December 5, 2017. The *N. virens* assays were initiated on November 7, 2017 and terminated on December 5, 2017. Results and protocol deviations are described in Section 3.2.2.

At the end of the 28-day bioaccumulation assay exposure period and the 24 hour depuration period, the test organisms were recovered, rinsed/depurated with clean seawater, homogenized, frozen and transferred to the chemistry laboratory for preparation and analysis. Tissue samples were analyzed for total lipids, percent moisture, metals, PAHs, and PCB congeners. Table 10 summarizes the analytes, analytical methods and method detection limits achieved for the tissue chemistry analyses.

2.2.5.1 Test Species

M. nasuta, approximately 28-45 mm in total length, were obtained from ARO. Organisms were field collected along the Washington coast and shipped to ARO via overnight delivery. At ESI, the clams were placed in clean holding sediment with flowing seawater and monitored for at least 24 hours prior to use. Damaged bivalves and those that would not close when prodded were discarded. The *Macoma* test commenced on November 7, 2017. A total of 20 organisms were added to each replicate in order to obtain sufficient tissue at test termination.

Adult *N. virens* were also obtained from ARO. Worms were collected in the field from the Damariscotta River in Boothbay Harbor, Maine and delivered to ARO. If not used the same day, worms were refrigerated overnight in seaweed. Damaged and inactive worms were not used in the assay. The *Nereis* test assay commenced on November 7, 2017 with a total of 20 organisms added to each replicate in order to obtain sufficient tissue at test termination.

2.2.5.2 Reference Toxicants

ESI completed acute 96-hour copper reference toxicant assays for *M. nasuta* and *N. virens* concurrent with the 28-day bioassays. Results were within two standard deviations of the historic mean of ESI's control charts, indicating that the test organisms were healthy. Table 11 summarizes the results of the reference toxicant assays conducted in support of the 28-day bioassays.

2.3 Data Analysis

The array of water column and biological testing that was performed on the Chebeague Island sediments provides a comprehensive data set from which a suitability assessment for the anticipated unconfined placement of this material at the PDS may be determined. These data sets were generally evaluated in the following ways:

- Biological testing data were compared to reference or control values;
- Tissue chemistry results were compared to the reference site tissue chemistry using non-parametric and t-tests.

A description of these evaluation methods is provided below.

2.3.1 Toxicity Bioassay Statistics

Survival and effects data were analyzed using statistical software (CETIS) to determine significant differences between the project sediments and the laboratory control, and between project sediments or suspended phase solutions and the agency-selected reference site sediments or solutions. Survival data were evaluated to determine homogeneity of sample variances and normality of distribution. Data sets were subsequently evaluated using the appropriate parametric or non-parametric analysis. Pair-wise comparisons were based on the appropriate statistical analysis presented in the EPA decision tree guidelines specified in individual test methods. Statistical difference was evaluated at α=0.05. For the SPP testing, acute exposure endpoints, the median lethal concentration (LC50) and the median effective concentration (EC50; in the *Arbacia* testing), were calculated and responses in the undiluted SPP solutions were evaluated against the responses in the reference site diluent.

2.3.2 Bioaccumulative Tissue Statistics

The statistical analyses of body burden data were completed to determine significant differences between the reference sediment and each site composite sample. The statistical analyses were completed for all compounds of concern identified in the Work Plan; however, the findings of significance discussed in Section 3.2.2.3 focus only on

those compounds detected in the reference sample. Per RIM guidelines, the MDL is used in instances when a compound is not detected for purposes of calculating a mean concentration. MDLs used in statistical computations are adjusted for differences in tissue mass and final extract volumes used in the analysis for each sample.

Data were evaluated to determine homogeneity of sample variances and normality of distribution using appropriate statistics. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance (ANOVA) statistic. Statistical difference was evaluated at $\alpha = 0.05$.

Table 1 Biological Testing and Elutriate Preparation - Sample Collection Dates and Compositing Information

Station ID	Date	Core Length (ft.) / Water Sample Collection Depth (ft.)	Water Depth (MLLW [ft.])	Latitude	Longitude	Composite ID	SPP/Elutriate testing	10-day toxicity bioassay	28-day bioassay/tissue
Sediment									
A	10/17/2017	2.0	-9.1	43.753398	-70.109738	1	X	X	X
B	10/17/2017	5.0	-5.9	43.752682	-70.109191				
C	10/17/2017	7.0	-3.8	43.751975	-70.108908	2	X	X	X
D	10/17/2017	4.0	-6.9	43.752097	-70.108580				
F	10/17/2017	6.0	-5.0	43.751506	-70.108083	3	X	X	X
CI-PDS [1]	10/17/2017	0 to -0.5	-199.0	43.643419	-69.982990	PDS-Ref	X	X	X
Seawater									
CIW-1	10/17/2017	Mid-Depth	-5.9	43.752669	-70.109278	1	X		
CIW-2	10/17/2017	Mid-Depth	-5.9	43.752669	-70.109278	2	X		
CIW-3	10/17/2017	Mid-Depth	-5.9	43.752669	-70.109278	3	X		
CIW-PDS	10/17/2017	3, 98, 195	-199.0	43.643419	-69.982990	PDS-Ref	X		

1 – Sample collected using grab sampler. Other samples collected using vibracoring device.

Table 2 Elutriate Solution Preparation Summary

Water		Sediment		Elutriate Preparation			
Station ID	ESI Code	Composite ID	ESI Code	Elutriate ID	ESI Code	Date	Time
CIW-1	29746-006	Composite 1	29747-101	Composite 1 Elutriate	29750-100	10/24/17	1250
CIW-2	29746-007	Composite 2	29747-102	Composite 2 Elutriate	29750-101	10/24/17	1400
CIW-3	29746-008	Composite 3	29747-103	Composite 3 Elutriate	29750-102	10/24/17	1535

Table 3 Elutriates and Equipment Blank - Parameters, Analytical Methods, and Method Detection Limits

Parameter	Method Reference	Method Number	MDL	MDL Units
Metals				
Arsenic	SW-846	200.8	0.000084	mg/L
Cadmium	SW-846	200.8	0.000016	mg/L
Chromium	SW-846	200.8	0.000076	mg/L
Hexavalent chromium	SW-846	3500	0.0014	mg/L
Copper	SW-846	200.8	0.000136	mg/L
Lead	SW-846	200.8	0.00002	mg/L
Mercury	SW-846	245.7	0.0000016	mg/L
Nickel	SW-846	200.8	0.000064	mg/L
Selenium	SW-846	200.8	0.000228	mg/L
Silver	SW-846	200.8	0.000052	mg/L
Zinc	SW-846	200.8	0.000252	mg/L
Semi-volatile compounds				
Pentachlorophenol[a]	SW-846	8270SIM	0.2	ug/L
Pesticides				
Aldrin	SW-846	8081B	0.0005	ug/L
Chlordane (alpha/gamma/oxy)	SW-846	8081B	0.0021	ug/L
Chloropyrifos	SW-846	8081B	0.0014	ug/L
4,4'-DDT	SW-846	8081B	0.0011	ug/L
Dieldrin	SW-846	8081B	0.0005	ug/L
Endosulfan and derivatives (I, II)	SW-846	8081B	0.0009	ug/L
Endrin	SW-846	8081B	0.0011	ug/L
Heptachlor & derivative (epoxide)	SW-846	8081B	0.001	ug/L
Hexachlorocyclohexane (lindane)	SW-846	8081B	0.0021	ug/L
Toxaphene	SW-846	8081B	0.004	ug/L
PCBs				
C12(8)	SW-846	8270C/EPA 680	0.0008	ug/L
C13(18)	SW-846	8270C/EPA 680	0.0008	ug/L
C13(28)	SW-846	8270C/EPA 680	0.0008	ug/L
C14(44)	SW-846	8270C/EPA 680	0.0008	ug/L
C14(52)	SW-846	8270C/EPA 680	0.0008	ug/L
C14(66)	SW-846	8270C/EPA 680	0.0008	ug/L
C15(101)	SW-846	8270C/EPA 680	0.0008	ug/L
C15(105)	SW-846	8270C/EPA 680	0.0008	ug/L
C15(118)	SW-846	8270C/EPA 680	0.0008	ug/L
C16(128)	SW-846	8270C/EPA 680	0.0008	ug/L
C16(138)	SW-846	8270C/EPA 680	0.0008	ug/L
C16(153)	SW-846	8270C/EPA 680	0.0008	ug/L
C17(170)	SW-846	8270C/EPA 680	0.0008	ug/L
C17(180)	SW-846	8270C/EPA 680	0.0008	ug/L
C17(187)	SW-846	8270C/EPA 680	0.0008	ug/L
C18(195)	SW-846	8270C/EPA 680	0.0008	ug/L
C19(206)	SW-846	8270C/EPA 680	0.0008	ug/L
C110(209)	SW-846	8270C/EPA 680	0.0008	ug/L

[a] Pentachlorophenol was not requested or analyzed in the core or grab sampler equipment blank.
Maximum MDL listed per parameter. MDLs are adjusted to reflect differences in dilutions used in the analysis for each sample.

Table 4 Suspended Particulate Phase Testing - Testing Conditions

Parameter	*A. bahia*	*M. beryllina*	*A. punctulata*
Treatments (SPP prepared from sediment composites and harbor water)	3 Sample Composites and 1 PDS Reference Site water	3 Sample Composites and 1 PDS Reference Site water	3 Sample Composites and 1 PDS Reference Site water
Replicates	5	5	5
Test population	1-5 days old	9-14 days	2 hours after fertilization
Temperature	Mean of 20 ± 2°C Maximum Deviation of 3°C	Mean of 20 ± 2°C Maximum Deviation of 3°C	Mean of 20 ± 1°C Maximum Deviation of 3°C
Dissolved Oxygen	40% Saturation	40% Saturation	NA
Salinity	30 ‰ ±2‰	30 ‰ ± 2‰	30 ‰ ±2‰
Feeding	Daily, <24 hour old Artemia nauplii	Daily, <24 hour old Artemia nauplii	None
Reference Toxicant	SDS / NH4Cl	SDS / NH4Cl	Copper / NH4Cl

Ammonia and pH are monitored during the assay but the RIM does not present required limits.

Table 5 Suspended Particulate Phase Testing – Period of Assay Conduct

Elutriate			Assay Start		Assay End	
Comp/Elutriate ID	ESI Code	Test Species	Date	Time	Date	Time
Composite 1 Elutriate	29750-100	*A. bahia*	10/24/17	1745	10/28/17	1450
Composite 2 Elutriate	29750-101	*M. beryllina*	10/24/17	1755	10/28/17	1450
Composite 3 Elutriate	29750-102	*A. punctulata*	10/24/17	1735	10/27/17	1240

Table 6 Suspended Particulate Phase Testing – Reference Toxicant Results

Date	Organism Lot	Endpoint	Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
A. bahia						
08/31/17	03AbARO083017	96Hr LC-50	20.5	18.0	13.3 - 22.8	SDS (mg/L)
11/02/17	03AbARO110217	96Hr LC-50	53.7	53.7 [a]	[a]	NH4Cl (mg/L)
M. beryllina						
08/31/17	-	96Hr LC-50	7.2	6.2	3.6 - 8.8	SDS (mg/L)
11/02/17	10MbARO110217	96Hr LC-50	60.9	60.9 [a]	[a]	NH4Cl (mg/L)
A. punctulata						
08/30/17	99ApARO083017	EC-50	16.1	18.9	10.4 - 27.5	Copper (mg/L)
10/24/17	99ApARO082917	EC-50	1.8	1.8 [a]	[a]	NH4Cl (mg/L)

Means and Acceptable Ranges based on the most recent 20 reference toxicant assays.
[a] Values are based on the results of 1 assay, therefore an acceptable range is not available.

Table 7 10-Day Whole Sediment Testing – Test Conditions

Parameter	*L. plumulosus*	*A. bahia*
Treatments	3 Sample Composites and 1 PDS Reference Site Control	3 Sample Composites and 1 PDS Reference Site Control
Replicates	5	5
Test population	Juvenile -non reproductive adult (2-4mm)	1-5 days old
Temperature	Mean of 20± 1°C Maximum Deviation of 3°C	Mean of 20 ± 1°C Maximum Deviation of 3°C
Dissolved Oxygen	40% Saturation	40% Saturation
Salinity	20‰ ±2‰	30‰ ±2‰
Ammonia	Porewater unionized ammonia <0.8 mg/L	Overlying water unionized ammonia <0.6 mg/L
Feeding	None	Daily, <24 hour old *Artemia nauplii*
Reference Toxicant	NH4Cl	NH4Cl

pH is monitored during the assay but the RIM does not present required limits.

Table 8 10-Day Whole Sediment Testing – Reference Toxicant Results

Date	Organism Lot	Endpoint	Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
A. bahia						
11/02/17	03AbARO110217	96Hr LC-50	53.7	53.7 [a]	[a]	NH4Cl (mg/L)
11/16/17	03AbARO111517	96Hr LC-50	54.6	54.2 [b]	52.9 - 55.4 [b]	NH4Cl (mg/L)
L. plumulosus						
05/05/17	18LpARO050517	96Hr LC-50	176.0	176.0 [a]	[a]	NH4Cl (mg/L)
11/28/17	99LpARO112817	96Hr LC-50	180.0	202.6 [b]	110.1 - 295.1 [b]	NH4Cl (mg/L)

Means and Acceptable Ranges based on the most recent 20 reference toxicant assays unless otherwise noted.

[a] Values are based on the results of 1 assay. No historic range is available.

[b] Values are based on the results of 2 assays.

Table 9 28-Day Bioaccumulation Bioassay – Test Conditions

Parameter	*M. nasuta*	*N. virens*
Treatments*	3 Sample Composites and 1 PDS Reference Site Control	3 Sample Composites and 1 PDS Reference Site Control
Replicates	5	5
Test population	Adult clam; 28-45 mm	Adult Polychaete; 3-15 grams
Temperature	Mean of 12 ±2°C Maximum Deviation of 3°C	Mean of 12 ± 2°C Maximum Deviation of 3°C
Dissolved Oxygen	>40% Saturation	>40% Saturation
Salinity	30‰ ±2‰	30‰ ±2‰
Feeding	None	None
Reference Toxicant	Copper	Copper

Ammonia and pH are monitored during the assay but the RIM does not present required limits.

Table 10 Tissue Analysis - Parameters, Analytical Methods, and Method Detection Limits

Parameter	Method Reference	Method Number	MDL	MDL Units
Physical tests				
Percent Moisture	SM 2540	SM 2540	0.1	%
Total lipids	NOAA 130, 1998	NOAA Tech Memo NOS ORCA 130, 1998	0.1	%
Metals (wet wt.)				
Arsenic	EPA OW	6020A	0.034	mg/kg
Cadmium	EPA OW	6020A	0.011	mg/kg
Chromium	EPA OW	6020A	0.036	mg/kg
Copper	EPA OW	6020A	0.033	mg/kg
Lead	EPA OW	6020A	0.006	mg/kg
Mercury	SW-846	7474	0.004	mg/kg
Nickel	EPA OW	6020A	0.037	mg/kg
Zinc	EPA OW	6020A	0.15	mg/kg
PAHs (wet wt.)				
Acenaphthene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Acenaphthylene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Anthracene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Benzo(a)anthracene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Benzo(a)pyrene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Benzo(b)fluoranthene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Benzo(k)fluoranthene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Benzo(g,h,I)perylene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Dibenz(a,h)anthracene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Chrysene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Fluoranthene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Fluorene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Indeno(1,2,3-cd)pyrene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Naphthalene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Phenanthrene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
Pyrene	SW-846	8270D-SIM/680(M)	9.94	ug/kg
PCBs (wet wt.)				
C12(8)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C13(18)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C13(28)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C14(44)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C14(52)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C14(66)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C15(101)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C15(105)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C15(118)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C16(128)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C16(138)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C16(153)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C17(170)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C17(180)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C17(187)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C18(195)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C19(206)	SW-846	8270D-SIM/680(M)	0.994	ug/kg
C110(209)	SW-846	8270D-SIM/680(M)	0.994	ug/kg

Maximum MDL listed per parameter. MDLs are adjusted for differences in tissue mass and final extract volumes used in the analysis for each sample.

Table 11 28-Day Bioaccumulation Bioassay – Reference Toxicant Results

Date	Organism Lot	Endpoint	Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
M. nasuta						
11/07/17	110117MN	96Hr LC-50	9.8	9.0	1.3 – 16.8	Copper (mg/L)
N. virens						
11/07/17	110717NV	96Hr LC-50	4.2	3.6	1.5 – 5.8	Copper (mg/L)

Means and Acceptable Ranges based on the most recent 20 reference toxicant assays.

Figure 1 Chebeague Island Landing Proposed FNP (Figure from PWS, NAE, 2017)

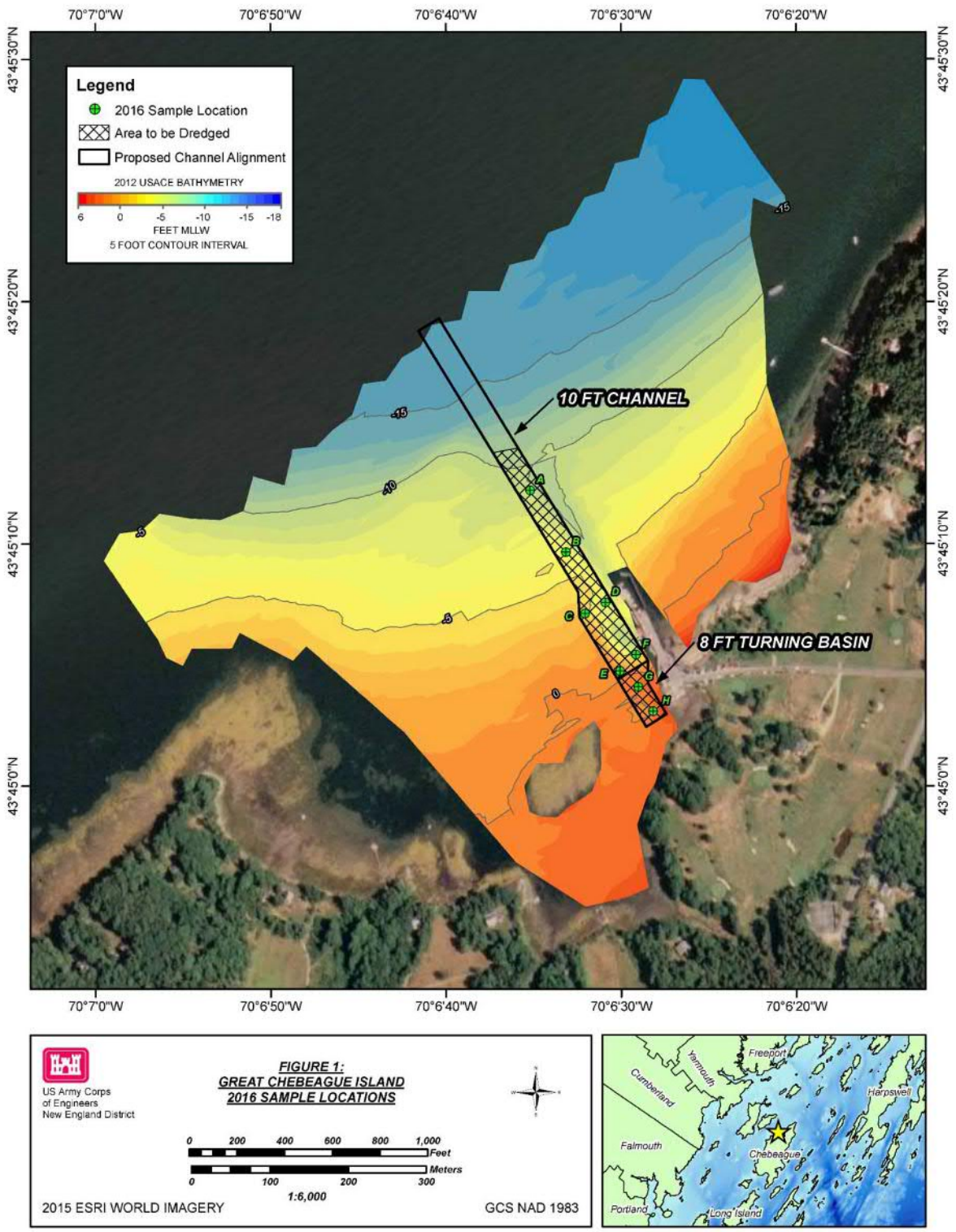
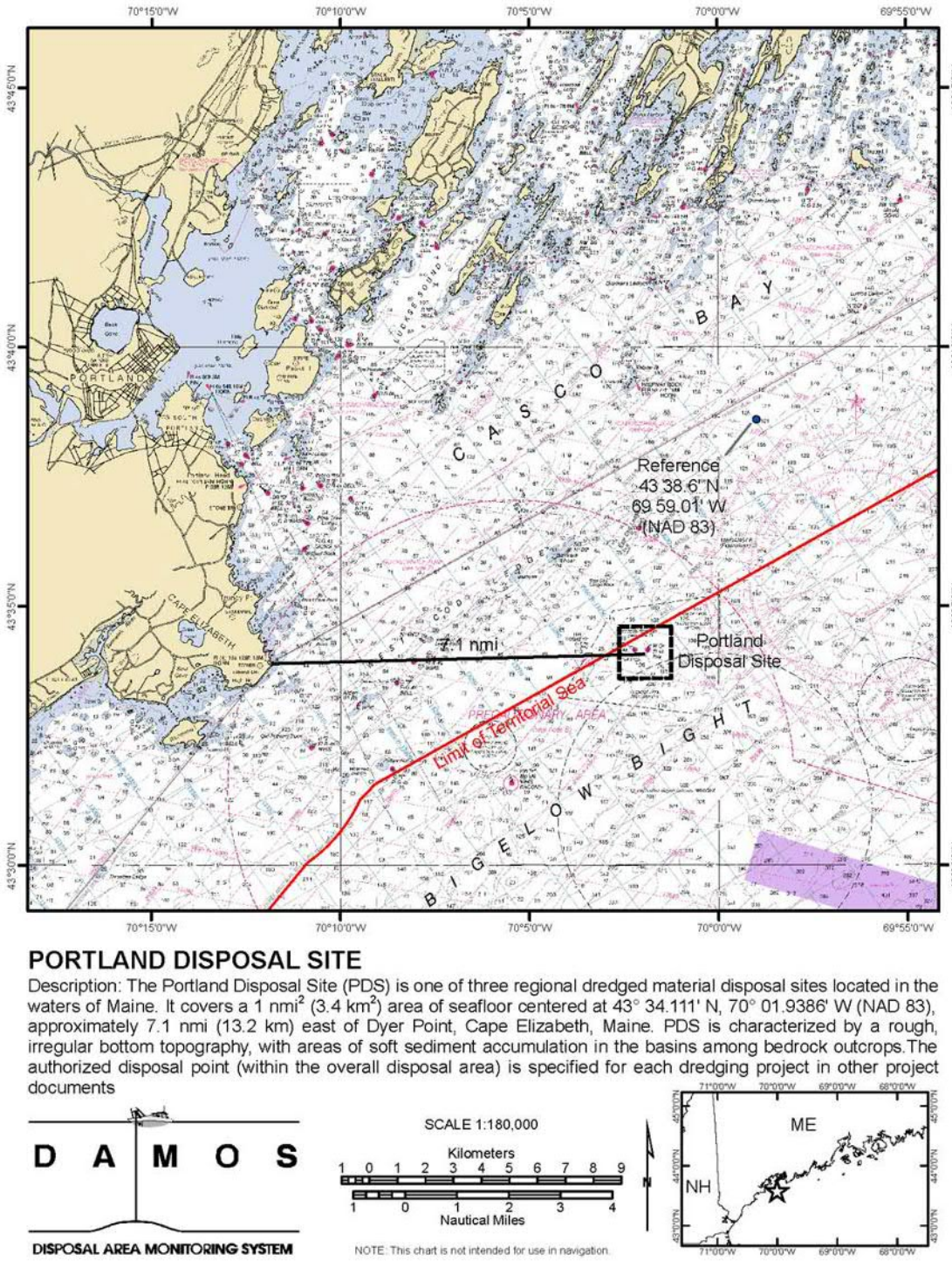


Figure 2 PDS Reference Site Grab Sample and Water Sample Locations (Figure from PWS, NAE 2017)



3. Results and Discussion

The Section 3 subsections present results evaluating the following potential exposure pathways associated with the anticipated unconfined open water material placement at the PDS:

- Direct exposure to the water column during/after mixing (elutriate and particulate phase analysis);
- Direct exposure to the dredged material (DM) following placement (bulk sediment; chemistry previously analyzed); and
- Bioaccumulation potential resulting from DM exposure over a period of time (bioaccumulation bioassays followed by tissue analysis).

As described in Section 1, physical and chemical analyses were previously completed for the Chebeague Island proposed FNP. The May 2017 investigation results showed levels of individual metals, Polycyclic Aromatic Hydrocarbons (PAHs), and Polychlorinated biphenyls (PCBs) above the reporting limits set forth in the RIM. This triggered the need for additional water column and benthic effects evaluations in order to revise the suitability determination of the material for unconfined open water disposal.

The October 2017 sampling and analysis efforts, described herein, include the evaluation of elutriate chemistry, SPP toxicity testing, 10-day whole sediment toxicity testing and 28-day bioaccumulation bioassay data with accompanying tissue analysis at sampled stations. This data will form the basis of a suitability determination for unconfined open water disposal at PDS.

3.1 Water Column Evaluations

Water column evaluations performed in this study incorporated the analysis of chemical elutriate samples and SPP bioassay tests. The full suite of chemicals were measured in the elutriate mixtures to evaluate possible DM effects on water quality at the PDS. SPP toxicity bioassays included three test species: crustacean, fish, and sea urchin larvae. Acute toxicity as well as sensitive (larvae) developmental effects have been evaluated.

3.1.1 Elutriate Chemistry

Table 12 summarizes elutriate chemistry results obtained after mixing the site materials with reference site seawater to simulate DM mixing at the PDS. Analytical results for the PDS Reference water are also included in Table 12. Laboratory elutriate chemistry data are included in Appendix C.

Pentachlorophenol, pesticides, and PCBs were below target reporting limits for all samples analyzed. In general, metals results were also below reporting limits in most samples, with the exception of As and Zn which were detected in all three elutriate samples. Copper was detected in the Composite 1 elutriate, but not in the elutriates prepared from Composites 2 or 3.

3.1.2 SPP Bioassay Results

The SPP toxicity tests were completed on three elutriate samples. The SPP endpoints and adverse effects are presented in Table 13. Associated SPP water quality data is presented in Table 14. Laboratory summary reports, including laboratory bench data, are presented in Appendix D.1.

All SPP laboratory control samples met minimum survival criteria. Survival in laboratory controls was 98% for *A. bahia* and 90% for *M. beryllina* which meets the minimum test acceptability criteria of $\geq$90% survival in the laboratory control and is an indication that the test organisms were healthy and not stressed by handling. In the *A. punctulata* assays, embryo counts in the laboratory control treatment showed 81% of the embryos survived at the end of the assay and, of the original embryos, 81% were normally developed pluteus larvae. These results meet the minimum test acceptability criteria of $\geq$70% embryo survival and $\geq$70% normal development in the laboratory control sample.

A notable amount of total ammonia was observed in the elutriates from Composites 2 (9.9 mg/L) and 3 (16 mg/L) at the start of the assays for all three test species. EPA guidance suggests that ammonia, generally in the unionized form, can be a source of

toxicity when total ammonia values are >5 mg/L (EPA 2002). EPA Ambient Water Quality Criteria (AWQC) for unionized ammonia in saltwater references LC50 values for two of the species tested: *A. bahia* (1.04 mg/L) and *M. beryllina* (0.88 mg/L) (EPA 1989). AWQC for unionized ammonia in saltwater are not available for *A. punctulata*, however, effects levels are available in the literature for urchin species ranging from 0.06 mg/L for an EC50 for development (Maguire Group Inc., 2003) to approximately 0.336 mg/L for a 96-hour LC50 (Chang-Hoon Lee et al., 2013).

Calculated unionized ammonia values from the start of the assays for Composites 2 and 3 ranged between 0.14 to 0.16 mg/L for all three species. However, by the end of these assays, the unionized ammonia levels ranged from 0.15 to 0.20 mg/L (*A. bahia*), 0.47 to 0.51 mg/L (*M. beryllina*) and 0.58 to 1.0 mg/L (*A. punctulata*). The higher ending unionized ammonia levels in the minnow and urchin assays are coincident with rising pH levels in those assays and the 0.20 mg/L level in the *A. bahia* assay was recorded in the 50% treatment (due to prior mortality in the 100% treatment).

It is possible that the total and/or unionized ammonia content may have contributed in part to the observed toxicity to *A. bahia*, *M. beryllina* and to *A. punctulata*. Given the rapid toxicity observed in the *A. bahia* assay (complete mortality in the 100% treatment within 1 hour) and to a lesser extent in the *M. beryllina* assay, it is also possible that additional factors contributed to the toxicity observed in elutriate from Composite 3. The laboratory data sheets for Composite 3 indicate a “sulfur” smell was observed and hydrogen sulfide, if present at sufficient levels in the water, could contribute to toxicity. While sulfide as a driver of toxicity is difficult to determine, non-conservative[1] parameters such as ammonia and sulfide are the most likely source of these types of effects

Given the low levels of chemicals detected in the elutriate samples (Table 12; Section 3.1.1), the elevated ammonia levels in two of the tested elutriates, and the observed response of the test organisms to ammonia in the reference toxicant assays, it is likely that the observed toxicity in these elutriates is driven primarily by total and unionized ammonia content and other non-conservative parameters, rather than sediment-related chemicals of concern. As stated above, given the rapid toxicity observed for *A. bahia* (and to a lesser extent *M. beryllina*) exposed to Composite 3 elutriate, it is possible that additional factors also contributed to the toxicity observed in that sample, but a review of water quality parameters did not identify any anomalies.

3.1.2.1 *A. bahia* and *M. beryllina* Acute SPP Evaluations

Mysid shrimp were not adversely affected by exposure to SPP solutions prepared from Composites 1 or 2 with LC50 values of >100% for these samples. In SPP solutions prepared from Composite 3, the LC50 value was 43%.

Minnows were not adversely affected by exposure to SPP solutions prepared from Composites 1 or 2 with LC50 values of >100% for these samples. In SPP solutions prepared from Composite 3, the LC50 value was 76%.

M. beryllina survival in the PDS reference was 60% at test termination. Survival in the PDS reference water had dropped to 70% after 24 hours while the laboratory control survival was at 94%. Given the poor performance in the PDS reference water and the impacts to *M. beryllina* exposed to SPP solutions prepared from Composite 3, an additional data review was completed to consider whether the respective performances were attributable to sources other than the individual samples. First, adverse effects on mysids and urchins also occurred following exposure to SPP solutions prepared from Composite 3, demonstrating a commonality of effects from exposure to this sample. It was noted that 60% minnow mortality was observed approximately 1 hour after exposure to the 100% SPP treatment prepared from Composite 3, when survival in the PDS reference water was still at 100% survival, also demonstrating that toxicity in the elutriate solution is distinct from that in the reference site water, with ammonia being a likely source of toxicity in elutriate 3. Additionally, impacts from the reference site water were limited to *M. beryllina* and a general inverse trend in toxicity for this species was observed in all 3 composite elutriate solutions (excluding the 100% treatment for SPP solutions prepared from Composite 3), demonstrating that impairment stemming from the reference water was consistent across treatments for this species. Water qualities obtained during testing were comparable across species and waters, demonstrating that the samples themselves were consistent and representative across all assays and species, and also indicating it’s unlikely that outside contaminants influenced performance in the *M. beryllina* study. Based on this weight of evidence, observed effects to the minnow following exposure to the reference water and to SPP solutions prepared from Composite 3 are considered distinct and representative for the species and samples.

[1] Non-conservative pollutants are those that are transformed to non-toxic substances through physical, chemical, or biological processes in the receiving water. Non-conservative pollutants can transform or degrade into other compounds, but the rate of transformation depends on the physical, chemical, and biological conditions occurring within the receiving water environment.

As indicated in Section 3.1.2, the elevated unionized ammonia levels in Composite 3 may have contributed to the observed toxicity, but other factors may also have contributed to the rapid toxicity observed in the 100% treatment (60% mortality within 1 hour; 86% mortality within 96 hours). A review of elutriate chemistry results and water quality parameters did not identify any additional sources of toxicity.

3.1.2.2 *A. punctulata* Acute SPP Evaluations

Arbacia punctulata is the most sensitive of the project SPP exposed species. Survival and normal development were quantified when it was determined that the majority of the larvae (>90%) in the laboratory controls had reached the pluteus larval stage.

Review of the data collected at the end of the assay indicated that site composites from SPP solutions prepared from Composites 2 and 3 had negative impacts on embryonic survival and/or development. LC50s from SPP solutions prepared from Composites 2 and 3 ranged from 3 to 23% for survival and EC50s ranged from 3 to 15% for development. Both the LC50 and EC50 for the SPP solution prepared from Composite 1 were >100% for survival and development.

As described above, ammonia levels were elevated at the start of the assays and *A. punctulata* appears to be even more sensitive to ammonia than the mysid shrimp or minnows. Composites 2 and 3, which showed more toxicity than Composite 1, had higher levels of total and un-ionized ammonia at both test initiation and termination. At test termination, un-ionized ammonia levels for SPP solutions prepared from Composites 2 and 3 were 0.5776 and 0.9897 mg/L, respectively. It is expected that these elevated ammonia levels contributed to the observed survival and development impacts in these tests.

3.1.2.3 SPP Protocol Deviations

Review of the data collected for these assays documented a few minor deviations from the method protocol and/or ESI's standard procedures, as described below.

The protocol requires that the assays be conducted at 20±1°C for the *A. punctulata* assay. Although the assay was maintained in an incubator set at the target temperatures, some temperatures recorded during the assays fell outside of the protocol range (ranging from 20 to 22 °C), due to the ambient laboratory temperature at the time that dilutions were mixed and water quality measurements were taken. Urchins can tolerate temperatures within the ranges measured, and EPA protocol allows temperatures of 25±2°C for these species.

In addition, the protocol requires that the assays be conducted at a salinity of 30±2‰. It is not uncommon for the salinity to drift upwards during assay conduct, due to evaporation and to exceed the protocol requirement, but the salinities are adjusted daily as needed to account for this occurrence, except at assay termination.

At 48, 72 and 96 hours, replicate A of the PDS reference water sample in the *A. bahia* assay was found to contain 11 mysids, therefore the same number of animals were presumed to have been added to the test chamber at the start of the assay for purposes of the statistical analyses. This is a reasonable assumption as technicians are checked for their ability to count live organisms and the staff on hand has documented a high degree of counting accuracy. Despite this, counting errors can occur. These impacts should be mitigated by the test design. Testing incorporated 5 replicates for each sample, thereby reducing the impact of a single replicate on the overall assessment.

These lab issues are considered to have had no impact on the outcome of the assays.

3.2 Sediment Toxicity Characteristics

Under the current program, 10-day whole sediment toxicity testing and 28-day bioaccumulation bioassays with associated tissue analyses were conducted at the proposed FNP stations. These investigations are described in further detail below.

3.2.1 10-Day Whole Sediment Toxicity Testing

A summary of survival data from the 10-day *A. bahia* and *L. plumulosus* assays is included in Table 15. Supporting data, including copies of bench sheets, are included in Appendix D.2. Table 16 summarizes the laboratory control results and other assay acceptability criteria for the 10-day assays. Tables 17 and 18 present the water quality data for *A. bahia* and *L.*

plumulosus, respectively, as measured during the 10-day bioassays. Overlying water quality data is presented for *A. bahia* and overlying and pore water quality data is presented for the *L. plumulosus* assays.

Before organisms were added to the test vessels, sediments and overlying water were added to the tests vessels during a pre-assay phase. Test chambers were renewed daily with two volume additions of overlying water and sediments were monitored until pore waters showed acceptable ammonia levels (less than 0.8 mg/L of unionized ammonia). Test organisms were added after acceptable ammonia levels were measured.

For the *A. bahia* assay, sediments were added to the test chambers on October 26, 2017 and overlying water was renewed twice daily for seven days. Test organisms were added on November 3, 2017 and total ammonia levels in overlying water at test initiation ranged from <0.1 to 0.54 mg/L (Table 17).

For the *L. plumulosus* assay, sediments were also added to the test chambers on October 26, 2017. After five days of water renewals, porewater ammonia samples were collected on October 31, 2017 and unionized ammonia concentrations ranged from 0.0085 to 0.0692 mg/L (Table 18). Test organisms were added to the test vessels on November 3, 2017.

3.2.1.1 *A. bahia* 10-Day Solid Phase Assay

Mean mysid survival in the laboratory control sediment was 92%, and met guideline acceptance criteria (e.g. mean survival ≥90%; ≥70% in any replicate). Mean survival in the PDS reference sediment was 90%. Mean survival of mysid shrimp exposed to the three Chebeague Island sediment composites ranged from 93% (Composites 1 and 3) to 97% (Composite 2), and the statistical analyses show that there were no negative effects on survival for mysids exposed to site Composite samples as compared to mysids exposed to the PDS reference sediment.

3.2.1.2 *L. plumulosus* 10-day solid phase assay

Mean amphipod survival in the laboratory control was 98% and met acceptance criteria. Mean survival among organisms exposed to PDS reference sediment was 92%. Mean survival of amphipods exposed to the three Chebeague Island sediment composites ranged from 91% (Composite 1) to 93% (Composites 2 and 3), and the statistical analyses show that there were no negative effects on survival for amphipods exposed to site Composite samples as compared to amphipods exposed to the PDS reference sediment.

3.2.1.3 Whole Sediment Protocol Deviations

Review of the data collected for these assays documented one minor deviation from the method protocol and/or ESI's standard procedures.

There were two respective dissolved oxygen (DO) measurements that fell below 6.0 mg/L: one on day 7 in the *A. bahia* assay and one on day 1 in the *L. plumulosus* assay. The assays were aerated prior to initiation to ensure the requirement was met, and mean DO levels were well above the threshold, indicating that overall the desired DO levels were maintained. Furthermore, both assays met the RIM protocol of ≥40% saturation. This minor deviation is considered to have had no impact on the outcome of the assays.

3.2.2 28-Day Bioaccumulation Bioassay and Tissue Analysis

To evaluate bioaccumulation potential of dredge sediments, the clam *Macoma nasuta* and the worm *Nereis virens* were exposed to material from the three sediment Composites. Table 19 provides a summary of the *M. nasuta* and *N. virens* survival data and Table 20 summarizes the laboratory control results and other assay acceptability criteria. Tissue chemistry data and statistical results (relative to reference) are summarized in Table 21 and Table 22. Laboratory bench sheets are included in Appendix D.3.

3.2.2.1 Survival Analysis

Mean *M. nasuta* survival was 95% for clams maintained in both the laboratory control and PDS reference site sediments, respectively. Mean percent survival of the bivalves exposed to harbor sediment composites ranged from 96 to 100%. The

statistical evaluation of the survival data showed no significant reduction in survival for bivalves maintained in the site composites when compared to the PDS reference sediment.

Polychaete survival was 95% and 98% in the laboratory control and PDS reference site sediments, respectively. Mean percent survival among *N. virens* exposed to harbor sediment composites ranged from 94 to 99%. The statistical evaluation of the data showed no significant reduction in survival for polychaetes maintained in the site composites when compared to the PDS reference sediment.

Survival of clams and worms met established guideline criteria. Surviving organisms for both species tested provided sufficient tissue for preparation and analysis of body burdens.

3.2.2.2 Tissue Chemistry

Test organism tissues were analyzed for the full set of chemical parameters established for the program (AECOM, 2017a) to evaluate the bioaccumulative aspect of the project material. The chemical results provided in Table21 (*M. nasuta*) and Table 22 (*N. virens*) are presented on a wet weight basis. Backup laboratory tissue chemistry data are included in Appendix C. Statistical comparisons of tissue body burdens are discussed in Section 3.2.2.3.

Review of *M. nasuta* tissue data documented that there were no PAHs or PCB congeners detected above the MDL. Arsenic, cadmium, copper, lead, nickel, and zinc were detected in *M. nasuta* tissues from all three composites. In addition, two metals (chromium and mercury) were either detected or estimated (J-qualified as below the RL, but above the MDL) in *M. nasuta* tissues from all three composites.

Review of *N. virens* tissue data documented that there were no PCB congeners detected above the MDL. With the exception of acenaphthene in replicate 5 from Composite 2, PAHs were not detected above the MDL in *N. virens* tissues. Mercury was not detected above the MDL in tissues from any composite samples; however, the remaining metals were detected or estimated in *N. virens* tissues from all three composites.

3.2.2.3 Tissue Body Burden Analysis

Review of *M. nasuta* tissue data document statistically significant uptake of two metals (Table 21). Based on NAE criteria, there were significant increases in cadmium and zinc body burdens for clams reared in all three site composites as compared to PDS reference tissue. In addition, mercury body burdens for clams reared in site Composite 1 sediment were also significantly higher than clam tissue from the PDS reference sediment. Review of body burden data showed that there were no additional chemicals of concern detected in site composite tissues that were not also detected in PDS reference tissue.

The review of *N. virens* tissue data found no statistically significant uptake of chemicals in site composites (Table 22). Based on NAE criteria, there were no significant increases in polychaete body burdens for any chemical of concern as compared to PDS reference tissue. Review of body burden data showed that acenaphthene was detected in site composite tissue, but no further analysis was required because the chemical of concern was not detected in reference tissue.

3.2.2.4 28-Day Bioaccumulation Bioassay and Tissue Protocol Deviations

Review of the data collected for these assays documented minor deviations from the method protocol and/or ESI's standard procedures.

No hourly temperature logger was activated for either assays, therefore no hourly temperature measurements were collected. Throughout the assays, there were no temperature abnormalities observed in the daily water quality measurements that were collected. Although this represents a deviation from ESI's SOP and a data gap, this deviation did not adversely affect the outcome of the assay.

Protocol requires that assays be conducted at 30±2‰ for the *M. nasuta* and *N. virens* assays, and, as a practice, salt or water are added to the aquaria to bring low or high salinity levels back within range. Some salinity values recorded in the laboratory control and PDS reference aquaria on Day 16 of the *M. nasuta* assay were lower than the protocol range (19.1‰). This deviation had no adverse impact on the outcome of the assay.

Table 12 Elutriate Chemistry - Results

Analyte		PDS Reference Water		Composite 1		Composite 2		Composite 3	
Total Metals (mg/L)									
Arsenic		0.0015	R1	0.0258		0.0129		0.0064	
Cadmium		0.0001	U,R1	0.0002	U	0.0002	U	0.0002	U
Chromium		0.0001	U,R1	0.001	U	0.001	U	0.001	U
Copper		0.0008	R1	0.0005		0.0005	U	0.0005	U
Lead		0.0002	U,R1	0.0002	U	0.0002	U	0.0002	U
Nickel		0.0002	U,R1	0.001	U	0.0010		0.0016	
Selenium		0.001	U,R1	0.001	U	0.001	U	0.0011	
Silver		0.0001	U,R1	0.0002	U	0.0002	U	0.0002	U
Zinc		0.0012	B,R1	0.0027		0.0037		0.0129	
Mercury		0.00001	U,R1	0.00001	U	0.00001	U	0.00001	U
Hexavalent Chromium		0.0004	U,O,R1	0.0050	U	0.0050	U	0.0050	U
Organochlorine Pesticides (ug/L)									
Aldrin		0.002	U,R1	0.002	U	0.002	U	0.002	U
alpha-BHC		0.002	U,R1	0.002	U	0.002	U	0.002	U
alpha-Chlordane		0.002	U,R1	0.002	U	0.002	U	0.002	U
beta-BHC		0.002	U,R1	0.002	U	0.002	U	0.002	U
Chlorpyrifos		0.002	U,R1	0.002	U	0.002	U	0.002	U
cis-Nonachlor		0.002	U,R1	0.002	U	0.002	U	0.002	U
delta-BHC		0.002	U,R1	0.002	U	0.002	U	0.002	U
Dieldrin		0.004	U,R1	0.004	U	0.004	U	0.004	U
Endosulfan I		0.002	U,R1	0.002	U	0.002	U	0.002	U
Endosulfan II		0.004	U,R1	0.004	U	0.004	U	0.004	U
Endosulfan Sulfate		0.004	U,R1	0.004	U	0.004	U	0.004	U
Endrin		0.004	U,R1	0.004	U	0.004	U	0.004	U
Endrin Aldehyde		0.004	U,R1	0.004	U	0.004	U	0.004	U
Endrin Ketone		0.004	U,R1	0.004	U	0.004	U	0.004	U
gamma-BHC (Lindane)		0.002	U,R1	0.002	U	0.002	U	0.002	U
gamma-Chlordane		0.002	U,R1	0.002	U	0.002	U	0.002	U
Heptachlor		0.002	U,R1	0.002	U	0.002	U	0.002	U
Heptachlor Epoxide		0.002	U,R1	0.002	U	0.002	U	0.002	U
Hexachlorobenzene		0.002	U,R1	0.002	U	0.002	U	0.002	U
Methoxychlor		0.02	U,R1	0.02	U	0.02	U	0.02	U
Oxychlordane		0.002	U,R1	0.002	U	0.002	U	0.002	U
Toxaphene		0.1	U,R1	0.1	U	0.1	U	0.1	U
trans-Nonachlor		0.002	U,R1	0.002	U	0.002	U	0.002	U
4,4-DDD		0.004	U,R1	0.004	U	0.004	U	0.004	U
4,4-DDE		0.004	U,R1	0.004	U	0.004	U	0.004	U
4,4-DDT		0.004	U,R1	0.004	U	0.004	U	0.004	U
Total DDT		0.0013	U,R1	0.0013	U	0.0013	U	0.0013	U
Pentachlorophenol (ug/L)									
Pentachlorophenol		1	U,R1	1.1	U	1.1	U	1.1	U
Polychlorinated Biphenyl Congeners (ug/L)									
PCB 8		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 18		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 28		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 44		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 49	x	0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 52		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 66		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 77	x	0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 87	x	0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 101		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 105		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 118		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 126	x	0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 128		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 138		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 153		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 170		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 180		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 183	x	0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 184	x	0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 187		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 195		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 206		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
PCB 209		0.00080	U,R1	0.00083	U	0.00083	U	0.00083	U
Total PCBs		0.007	U,R1	0.003	U	0.003	U	0.003	U

Results presented for composites are the mean of three replicate samples.
One-half of the sample-specific method detection limit (MDL) is used to represent non-detects in calculation of Total DDT and Total PCBs.
Sample-specific MDLs are adjusted for differences in dilutions used in the analysis for each sample.
Total PCBs calculated as the sum of the 18 NOAA congeners multiplied by 2.

B – Analyte found in laboratory blank at 0.0003 mg/L.
J – Estimated value.
NA – Not analyzed.
O – Sample out of hold time. Value obtained from ICP-MS.
R1 – Sample analyzed out of hold time.
RL – Reporting Limit.
U – Not detected above the laboratory RL. Total DDT and Total PCBs are calculated using½ MDL.
x – Congener is not one of the 18 NOAA congeners included in Total PCBs.

Table 13 Suspended Particulate Phase Testing – Bioassay Findings

Sample ID	*A. bahia*	*M. beryllina*	*A. punctulata*	
	LC50 (%)	LC50 (%)	LC50 (%)	EC50 (%)
Composite 1	>100%	>100%	>100%	>100%
Composite 2	>100%	>100%	23%	15%
Composite 3	43%	76%	3%	3%

Notes:
Americamysis bahia – survival endpoint
Menidia beryllina – survival endpoint
Arbacia punctulata – survival and development endpoints

Table 14 Suspended Particulate Phase Testing – Water Quality Data Summary

	Temperature (°C)		pH (SU)		Salinity (‰)		Ammonia (mg/L) Start		Ammonia (mg/L) End	
Sample ID	Start	End	Start	End	Start	End	Total	Unionized	Total	Unionized
A. bahia										
Lab Control	22	20	8.12	7.65	31	31	<0.1	<0.0028	1.8	0.0313
PDS Reference Water	22	20	7.88	7.68	32	32	<0.1	<0.0017	1.6	0.0297
Composite 1	22	19	7.65	7.91	31	32	2.9	0.0581	3.2	0.0929
Composite 2	22	19	7.56	7.70	31	32	9.9	0.1618	8.0	0.1452
Composite 3 (100% SPP) [a]	22 [a]	-	7.29 [a]	-	31 [a]	-	16 [a]	0.1415 [a]	-	-
Composite 3 (50% SPP) [b]	22 [b]	19 [b]	7.48 [b]	8.03 [b]	31 [b]	32 [b]	-	-	5.2 [b]	0.1972 [b]
M. beryllina										
Lab Control	22	20	8.12	7.69	31	33	<0.1	<0.0028	1.7	0.0323
PDS Reference Water	22	20	7.88	7.71	32	32	<0.1	<0.0017	1.7	0.0338
Composite 1	22	19	7.65	7.95	31	33	2.9	0.0581	3.2	0.1016
Composite 2	22	20	7.56	8.27	31	33	9.9	0.1618	6.9	0.4736
Composite 3	22	20	7.20	8.16	31	33	16	0.1415	9.5	0.5141
A. punctulata										
Lab Control	22	20	8.12	8.02	31	31	<0.1	<0.0028	0.12	0.0048
PDS Reference Water	22	20	7.88	8.00	31	32	<0.1	<0.0017	0.15	0.0057
Composite 1	22	21	7.65	8.18	31	32	2.9	0.0581	2.9	0.1755
Composite 2	22	20	7.55	8.19	31	31	9.9	0.1582	10	0.5776
Composite 3	22	21	7.31	8.19	31	31	16	0.1481	16	0.9897

[a] Data at test initiation obtained from the 100% SPP treatment. Unionized ammonia concentrations at assay start are from the 100% test concentration and are calculated using the temperature and pH values at hour 0 with the Day 0 ammonia data. The 100% treatment experienced 100% mortality within the first hour of the assay. There are no test termination ammonia data available for the 100% test concentration at hour 1.
[b] Data at test termination obtained from the 50% SPP treatment due to mortality in the 100% treatment. Un-ionized ammonia concentrations at assay end are from the 50% test concentration and are calculated using the 96 hour temperature and pH values with the 96 hour total ammonia data. Test initiation data provided, as available. There are no start ammonia data available for the 50% test concentration.

Table 15 10-Day Whole Sediment Bioassay - Findings

A. bahia percent survival results

	Replicate Survival at the End of 10-Day Exposure (%)							
	A	B	C	D	E	Mean Survival (%)	Statistically Different from PDS Reference [a]?	Difference in Survival >20% Compared to PDS Reference?
Lab Control	80%	85%	95%	100%	100%	92%	--	--
PDS Reference	80%	85%	90%	100%	95%	90%	--	--
Composite 1	80%	100%	95%	90%	100%	93%	No	No
Composite 2	100%	100%	85%	100%	100%	97%	No	No
Composite 3	95%	95%	95%	85%	95%	93%	No	No

L. plumulosus percent survival results

	Replicate Survival at the End of 10-Day Exposure (%)							
	A	B	C	D	E	Mean Survival (%)	Statistically Different from PDS Reference [a]?	Difference in Survival >20% Compared to PDS Reference?
Lab Control	100%	95%	100%	95%	100%	98%	--	--
PDS Reference	100%	80%	100%	85%	95%	92%	--	--
Composite 1	100%	80%	85%	95%	95%	91%	No	No
Composite 2	95%	95%	95%	85%	95%	93%	No	No
Composite 3	100%	90%	80%	100%	95%	93%	No	No

[a] Statistically significant difference (α=0.05) from PDS Reference.

Table 16 10-Day Whole Sediment Bioassay - Lab Control Performance and Assay Acceptability Criteria Summary

Endpoint / Measurement		Protocol Criteria	Unit	*A. bahia*	*L. plumulosus*
Mean Survival		Laboratory Control ≥ 90%	%	92%	98%
			Protocol Met	Yes	Yes
Salinity	Minimum:	*A. bahia* - 28ppt	ppt	28.1	18.8
		L. plumulosus - 18ppt	Protocol Met	Yes	Yes
	Maximum:	*A. bahia* - 32ppt	ppt	31.1	19.9
		L. plumulosus - 22ppt	Protocol Met	Yes	Yes
Temperature		Mean: 20±1°C	Daily / Hourly °C	19.7 / 19.3	19.8 / 19.3
		Minimum: 17°C	Daily / Hourly °C	16.8 [1] / 16.6 [1]	17.0 / 16.6 [1]
		Maximum: 23°C	Daily / Hourly °C	21.1 / 21.9	21.1 / 21.9
			Protocol Met[1]	Yes / Yes	Yes / Yes

1 -The value meets the protocol requirement when rounded to the whole number precision reflected in the method, therefore is not considered a protocol deviation. Observed temperatures were within the species tolerance range.

Table 17 10-Day Whole Sediment Bioassay Water Quality Data Summary: *A. bahia*

Sample ID	Day	Temperature (° C)	pH (SU)	Salinity (‰)	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)
A. bahia – Overlying Water Quality Data						
Lab Control	00	21.0	7.94	28	0.14	0.0050
PDS Reference	00	21.0	7.94	28	<0.1	<0.0018
Composite 1	00	21.0	7.95	28	<0.1	<0.0018
Composite 2	00	20.9	7.95	28	0.54	0.0196
Composite 3	00	20.9	7.92	28	0.45	0.0153
Lab Control	03	21.0	7.88	30	0.28	0.0088
PDS Reference	03	21.1	7.84	30	0.21	0.0016
Composite 1	03	21.1	7.86	30	0.19	0.0057
Composite 2	03	21.0	7.92	30	0.65	0.0222
Composite 3	03	21.0	7.87	30	0.53	0.0162
Lab Control	10	19.3	7.68	30	<0.1	<0.0009
PDS Reference	10	19.3	7.76	30	<0.1	<0.0011
Composite 1	10	19.3	7.74	30	<0.1	<0.0010
Composite 2	10	19.2	7.77	31	<0.1	<0.0011
Composite 3	10	19.1	7.73	31	0.45	0.0088

Note: Data in overlying water summary were obtained from the “A” replicate of each *A. bahia* treatment. Day 00 results reflect measurements made after seven days of overlying water renewals to reduce ammonia levels prior to test initiation.

Table 18 10-Day Whole Sediment Bioassay Water Quality Data Summary: *L. plumulosus*

Sample ID	Day	Temperature (° C)	pH (SU)	Salinity (‰)	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)
L. plumulosus – Overlying Water Quality Data						
Lab Control	00	20.9	7.86	19	<0.1	<0.0015
PDS Reference	00	20.9	7.86	19	<0.1	<0.0015
Composite 1	00	20.9	7.82	19	0.64	0.0174
Composite 2	00	20.9	7.81	19	<0.1	<0.0013
Composite 3	00	20.9	7.81	19	0.9	0.0239
Lab Control	03	21.1	7.86	20	0.19	0.0057
PDS Reference	03	21.1	7.83	20	<0.1	<0.0014
Composite 1	03	21.1	7.81	20	<0.1	<0.0013
Composite 2	03	21.1	7.82	20	<0.72	0.0198
Composite 3	03	21.0	7.81	20	1	0.0268
Lab Control	10	19.4	7.55	19	<0.1	<0.0007
PDS Reference	10	19.3	7.61	19	<0.1	<0.0008
Composite 1	10	19.4	7.66	19	<0.1	<0.0009
Composite 2	10	19.4	7.68	19	<0.1	<0.0009
Composite 3	10	19.3	7.72	19	0.11	0.0021
L. plumulosus – Pore Water Quality Data[a]						
Lab Control	-03	23	7.11	NR	3.3	0.0208
PDS Reference Site	-03	23	7.61	NR	0.61	0.0120
Composite 1	-03	23	7.68	NR	0.37	0.0085
Composite 2	-03	23	7.43	NR	5.3	0.0692
Composite 3	-03	23	7.48	NR	3.8	0.0556
L. plumulosus – Pore Water Quality Data[b]						
Lab Control	00	23	6.99	NR	3.2	0.0153
PDS Reference	00	23	7.28	NR	1.3	0.0121
Composite 1	00	23	7.49	NR	0.41	0.0061
Composite 2	00	23	7.27	NR	3.2	0.0290
Composite 3	00	23	7.28	NR	4.7	0.0436
Lab Control	03	23	7.12	NR	2.6	0.0167
PDS Reference r	03	23	7.32	NR	0.72	0.0073
Composite 1	03	23	7.53	NR	0.28	0.0046
Composite 2	03	23	7.23	NR	2.2	0.0182
Composite 3	03	23	7.32	NR	1.9	0.0193

Table 18 10-Day Whole Sediment Bioassay Water Quality Data Summary: *L. plumulosus* (cont.)

Sample ID	Day	Temperature (° C)	pH (SU)	Salinity (‰)	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)
Lab Control	10	22	7.01	NR	1.9	0.0089
PDS Reference	10	22	7.27	NR	0.38	0.0032
Composite 1	10	22	7.48	NR	<0.1	<0.0007
Composite 2	10	22	6.98	NR	0.53	0.0023
Composite 3	10	22	7.13	NR	0.3	0.0018

Note: Data in *L. plumulosus* overlying and pore water summaries were obtained from the "Surrogate" replicate of each treatment.
NR – Not recorded. Salinity in pore water is not measured as part of the test protocol.
[a] Pre-assay pore water monitoring. Measurements on Day -03 reflect five days of overlying water renewals to reduce ammonia levels prior to test initiation.
[b] In-life assay pore water monitoring

Table 19 28-Day Bioaccumulation Bioassay - Findings

***M. nasuta* percent survival results**

	Replicate Survival at the End of 28-Day Exposure (%)					Mean Survival (%)	Statistically Different from PDS Reference[1]?
	A	B	C	D	E		
Lab Control	100%	100%	100%	80%	95%	95%	--
PDS Reference	95%	95%	95%	95%	95%	95%	--
Composite 1	100%	100%	100%	100%	100%	100%	No
Composite 2	100%	100%	95%	95%	90%	96%	No
Composite 3	95%	100%	95%	100%	95%	97%	No

***N. virens* percent survival results**

	Replicate Survival at the End of 28-Day Exposure (%)					Mean Survival (%)	Statistically Different from PDS Reference[1]?
	A	B	C	D	E		
Lab Control	90%	95%	90%	85%	100%	95%	--
PDS Reference	100%	100%	90%	95%	100%	98%	--
Composite 1	100%	100%	100%	100%	95%	99%	No
Composite 2	100%	90%	100%	90%	100%	96%	No
Composite 3	95%	100%	95%	100%	85%	94%	No

Table 20 28-Day Bioaccumulation Bioassay – Lab Control Performance and Assay Acceptability Criteria Summary

Endpoint/ Measurement	Protocol Criteria	Unit	*M. nasuta*	*N. virens*
Mean Survival	Laboratory control >90%	%	95%	95%
		Protocol Met	Yes	Yes
Tissue Mass	Sufficient for analysis	Protocol Met	Yes	Yes
Salinity	Minimum: 28ppt	ppt	19.1	28
		Protocol Met	No[a]	Yes
	Maximum:32ppt	ppt	31.4	31.3
		Protocol Met	Yes	Yes
Temperature	Mean: 12-16°C	Daily/Hourly	12.7 / [b]	12.6 / [b]
	Minimum: 9°C	Daily/Hourly	12.4 / [b]	12.1 / [b]
	Maximum: 15°C	Daily/Hourly	13.4 / [b]	13.7 / [b]
		Protocol Met	Yes / [b]	Yes / [b]

[a] Low salinity recorded in laboratory control and PDS reference replicates on Day 16 of the *M. nasuta* assay. Low readings may have been due to sediment lodged in the tip of the probe.

[b] No hourly temperature logger was activated for these assays, therefore no hourly temperature measurements were collected. There were no temperature abnormalities observed in the daily water quality measurements that were collected.

Table 21 Tissue Analysis – Mean Wet Weight Chemical Concentrations and Statistical Findings for *M. nasuta* Tissue

Analyte	PDS Ref Site		Composite 1		Composite 2		Composite 3	
	Mean	Qual	Mean	Qual	Mean	Qual	Mean	Qual
Total Metals (mg/kg)								
Arsenic, total	2.2		2.2	NS	1.8	NS	2	NS
Cadmium, total	0.036	b	0.046	bS	0.047	S	0.044	bS
Chromium, total	0.38	b	0.37	bNS	0.35	bNS	0.32	bNS
Copper, total	1.7		2	NS	1.5	NS	1.7	NS
Lead, total	0.36		0.23	NS	0.26	NS	0.32	NS
Mercury, total	0.011	b	0.013	bS	0.011	bNS	0.011	bNS
Nickel, total	0.44		0.44	NS	0.41	NS	0.4	NS
Zinc, total	9.64		15.8	S	14.3	S	15.3	S
Polycyclic Aromatic Hydrocarbons (ug/kg)								
Acenaphthene	9.1	a	8.9	ac	9	ac	9.1	ac
Acenaphthylene	9.1	a	8.9	ac	9	ac	9.1	ac
Anthracene	9.1	a	8.9	ac	9	ac	9.1	ac
Benzo(a)anthracene	9.1	a	8.9	ac	9	ac	9.1	ac
Benzo(a)pyrene	9.1	a	8.9	ac	9	ac	9.1	ac
Benzo(b)fluoranthene	9.1	a	8.9	ac	9	ac	9.1	ac
Benzo(k)fluoranthene	9.1	a	8.9	ac	9	ac	9.1	ac
Benzo(g,h,i)perylene	9.1	a	8.9	ac	9	ac	9.1	ac
Chrysene	9.1	a	8.9	ac	9	ac	9.1	ac
Dibenz(a,h)anthracene	9.1	a	8.9	ac	9	ac	9.1	ac
Fluoranthene	9.1	a	8.9	ac	9	ac	9.1	ac
Fluorene	9.1	a	8.9	ac	9	ac	9.1	ac
Indeno(1,2,3-c,d)pyrene	9.1	a	8.9	ac	9	ac	9.1	ac
Naphthalene	9.1	a	8.9	ac	9	ac	9.1	ac
Phenanthrene	9.1	a	8.9	ac	9	ac	9.1	ac
Pyrene	9.1	a	8.9	ac	9	ac	9.1	ac
Total LMW PAHs [1]	27		27		27		27	
Total HMW PAHs [1]	46		45		45		46	
Total PAHs [1]	73		71		72		73	
Polychlorinated Biphenyl Congeners (ug/kg)								
PCB 8	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 18	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 28	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 44	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 52	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 66	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 101	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 105	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 118	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 128	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 138	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 153	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 170	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 180	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 187	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 195	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 206	0.91	a	0.89	ac	0.9	ac	0.91	ac
PCB 209	0.91	a	0.89	ac	0.9	ac	0.91	ac
Total PCBs [1]	16		16		16		16	

Results presented are the mean of five replicate samples.

1 - Totals calculated for informational purposes only using 1/2 MDL for non-detected values. Statistical analysis not conducted on total values and qualifiers not applied.

Statistical qualifiers -

a - Analyte not detected (below MDL) in at least one replicate; mean value was calculated using the project specific MDL for non-detected values.

b - Analyte estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.

c - Analyte was detected in the treatment tissue sample replicates at an equal or higher mean concentration than in the associated reference site tissue, however statistical analysis is not required as the analyte was not detected in any of the reference site replicates.

NS - Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.

S - Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05

Table 22 Tissue Analysis – Mean Wet Weight Chemical Concentrations and Statistical Findings for *N. virens* Tissue

Analyte	PDS Ref Site	Composite 1	Composite 2	Composite 3
Total Metals (mg/kg)				
Arsenic, total	2	1.6 NS	1.6 NS	1.6 NS
Cadmium, total	0.055	0.043 bNS	0.037 bNS	0.042 bNS
Chromium, total	0.053 b	0.069 bNS	0.089 bNS	0.047 bNS
Copper, total	1.2	0.92 NS	1.1 NS	1.1 NS
Lead, total	0.35	0.26 NS	0.21 NS	0.21 NS
Mercury, total	0.008 b	0.0032 aNS	0.0036 aNS	0.0038 aNS
Nickel, total	0.18	0.089 bNS	0.093 bNS	0.074 bNS
Zinc, total	14.3	11.6 NS	16.7 NS	14.2 NS
Polycyclic Aromatic Hydrocarbons (ug/kg)				
Acenaphthene	9 a	9.1 ac	8.9 abc	9.2 ac
Acenaphthylene	9 a	9.1 ac	8.9 ac	9.2 ac
Anthracene	9 a	9.1 ac	8.9 ac	9.2 ac
Benzo(a)anthracene	9 a	9.1 ac	8.9 ac	9.2 ac
Benzo(a)pyrene	9 a	9.1 ac	8.9 ac	9.2 ac
Benzo(b)fluoranthene	9 a	9.1 ac	8.9 ac	9.2 ac
Benzo(k)fluoranthene	9 a	9.1 ac	8.9 ac	9.2 ac
Benzo(g,h,i)perylene	9 a	9.1 ac	8.9 ac	9.2 ac
Chrysene	9 a	9.1 ac	8.9 ac	9.2 ac
Dibenz(a,h)anthracene	9 a	9.1 ac	8.9 ac	9.2 ac
Fluoranthene	9 a	9.1 ac	8.9 ac	9.2 ac
Fluorene	9 a	9.1 ac	8.9 ac	9.2 ac
Indeno(1,2,3-c,d)pyrene	9 a	9.1 ac	8.9 ac	9.2 ac
Naphthalene	9 a	9.1 ac	8.9 ac	9.2 ac
Phenanthrene	9 a	9.1 ac	8.9 ac	9.2 ac
Pyrene	9 a	9.1 ac	8.9 ac	9.2 ac
Total LMW PAHs [1]	27	27	27	28
Total HMW PAHs [1]	45	46	45	46
Total PAHs [1]	72	73	71	74
Polychlorinated Biphenyl Congeners (ug/kg)				
PCB 8	1.2 a	1.1 aNS	0.89 aNS	0.92 aNS
PCB 18	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 28	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 44	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 52	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 66	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 101	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 105	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 118	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 128	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 138	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 153	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 170	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 180	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 187	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 195	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 206	0.9 a	0.91 ac	0.89 ac	0.92 ac
PCB 209	0.9 a	0.91 ac	0.89 ac	0.92 ac
Total PCBs [1]	17	17	16	17

Results presented are the mean of five replicate samples.

1 - Totals calculated for informational purposes only using 1/2 MDL for non-detected values. Statistical analysis not conducted on total values and qualifiers not applied.

Statistical qualifiers -

a - Analyte not detected (below MDL) in at least one replicate; mean value was calculated using the project specific MDL for non-detected values.

b - Analyte estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.

c - Analyte was detected in the treatment tissue sample replicates at an equal or higher mean concentration than in the associated reference site tissue, however statistical analysis is not required as the analyte was not detected in any of the reference site replicates.

NS - Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.

S - Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05

4. Chemical Analyses QA/QC

This section provides quality control information and documents the overall quality of the analytical data upon which the project conclusions are drawn. Project QA/QC information (e.g., laboratory control survival, reference toxicant results) for the biological testing program is discussed in Sections 2 and 3.

The chemical data collected during the investigation were of sufficient quality and sensitivity to meet the project objectives. The majority of the QC results associated with the analytical parameters met the measurement objectives presented in the work plan (AECOM, 2017a). Specific nonconformances with those measurement objectives are presented in the laboratory report narrative, RIM Checklist and validation memo associated with each laboratory report. A full set of QC sample findings (method blanks, duplicate precision results, laboratory control sample results, and matrix spike results) is provided in Appendix C.

4.1 Deviations

As noted above, all samples were delivered to ESI's laboratory on October 18, 2017 at the conclusion of the sampling program. During the sampling and analysis program, there was one noted deviation from the sample hold times and preservation conditions outlined in the workplan. Due to an initial laboratory processing error, PDS water samples were subsequently processed on 12/18/18, in accordance with conversations with NAE but out of the recommended hold times; therefore, the results have been qualified R1 (Appendix C) due to the holding time exceedance for these analytes. Results for arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver and zinc, which usually have a 6 month holding time, are considered estimated with a possible low bias since the sample wasn't preserved with nitric acid at the time of collection.

The laboratory has qualified the PCB congener data for the PDS Reference Site Water since this sample was extracted outside of the method holding time. However, PCB congeners are generally stable; therefore these results are considered as estimated (UJ). Similarly, the pesticide results for the PDS Reference Site Water have been qualified R1 due to the extraction holding time exceedance. However, many of the pesticide compounds can remain stable over time and the results may be usable as estimated values.

The pentachlorophenol (PCP) analysis was not reported from the initial submission of the laboratory report due to a surrogate spiking error. All PCP samples with the exception of the Water Pump Blanks 1 and 2 were extracted beyond the 14 day specified method to extraction holding time and have been qualified as R1 by the laboratory. These results should be used with caution and may be biased low due to the holding time exceedance. No other deviations relative to chemical analysis were noted.

4.2 Analytical Sensitivity

The sensitivity of program chemical measurements can sometimes dictate the ultimate usefulness of the final data. Results that are insufficiently sensitive to detect changes can limit the final project conclusions. The Chebeague Island project required RLs were specified in the agency approved work plan (AECOM, 2017a) to detect sedimentary contaminant considerations, ambient seawater and elutriate concentrations, and bioaccumulative tissue concerns.

The work plan prepared by AECOM (AECOM, 2017a) summarized the laboratory RLs and project required RLs. Nondetect chemistry results were reported at laboratory RLs since they provide greater confidence. The majority of the RLs met the QAPP specifications. Laboratory reporting limits for hexavalent chromium and toxaphene in the elutriate were slightly higher than the project required limits shown in the QAPP. Selected semivolatile results associated with the tissue analysis were elevated due to interferents present in the sample matrix which resulted in the need for dilution.

Sample contamination can sometimes affect sample results, particularly when measuring chemical parameters at very low concentrations. In this study, potential contamination has been monitored using equipment blank QC samples. Equipment blanks were collected in a parking lot setting. Consequently, potential existed for ambient dust to potentially impact the field blank results. In the future, corrective actions will be taken to generate the equipment blank in an area that minimizes the possibility of ambient dust influence in future work. A few target metals were detected in the equipment blanks associated with the water pump, core sediment and grab sediment equipment, but

at very low levels and are not considered to have an impact on sample results. Equipment blank performance data is presented in Appendix C.

4.3 Data Precision

Analytical precision was measured at the laboratory level using laboratory control sample (LCS) duplicates or matrix spike duplicates.

4.3.1 Elutriate and Ambient Seawater Measurement Precision

Elutriate analysis precision was evaluated using matrix duplicates, matrix spike duplicates, and Laboratory Control Sample (LCS) duplicates. RPD objectives for this project were equivalent to the sediment objectives (20 percent for metals, 30 percent for trace organic compounds). The RPD criteria were met for all elutriate parameters.

4.3.2 Tissue Measurement Precision

Tissue analysis precision was evaluated using matrix spike and LCS duplicates. The tissue RPD objectives for this project were also 20 percent for metals and 30 percent for trace organic compounds. The RPD criteria were not met for the LCS/LCSD for several target congeners; reported RPD values ranged from 33-43%. Laboratory duplicates for the determination of PCBs and PAHs in field samples were within precision limits. Chromium and zinc in laboratory duplicates analyzed for metals exceeded the 20% RPD limit but this may be the result of sample homogeneity. RPD values for selected PAH and congener results in MS/MSD analyses exceeded the 30% RPD limit however this may reflect homogeneity of the native sample matrix used for spiking. These variances are not considered to adversely affect the tissue dataset.

4.4 Data Accuracy

Accuracy was evaluated using several QC sample types by calculating the percent recovered for each parameter of interest. A recovery value of 100% corresponds to 100% accuracy in this analysis. LCS and matrix spiked samples were incorporated as accuracy QC samples. Additionally, surrogate spikes were used to evaluate the accuracy of organic measurements and certified reference materials (CRMs) were included where available.

4.4.1 Elutriate and Ambient Seawater Analysis Accuracy

Matrix spike results associated with hexavalent chromium in the elutriate samples were reported at 71% which is slightly below the lower control limit of 75% for this analysis.

Low recovery (29%) of the decachlorobiphenyl surrogate was reported for Replicates 2 and 3 of the Composite 3 Elutriate pesticide analysis. Elevated surrogate results (168%) were reported for decachloribiphenyl in Replicate 3 of the Composite 2 Elutriate Blank. It was noted that the laboratory was using wider control limits (30-150%) than the 50-120% limits stated in the RIM Checklist for the MS and MSD recoveries associated with organic compounds Individual pesticide results were within the 30-150% laboratory limits but outside the 50-120% limits of the RIM checklist. The lab has been asked to revise the MS/MSD control limits for organic analytes in future reports to reflect the RIM guidance.

Elevated recoveries were reported for several congeners in the LCSD associated with samples L1745513-21 -40; recoveries above the 120% upper control limit were reported for Cl4-BZ#44 (123%), Cl4-BZ#52 (121%), Cl4-BZ#66 (123%), Cl5-BZ#87 (127%), Cl5-BZ#101 (124%), Cl5-BZ#105(128%), Cl5-BZ#118 (127%), Cl6-BZ#128 (126%), Cl6-BZ#138 (129%), Cl6-BZ#153 (124%), Cl7-BZ#170(121%), Cl9-BZ#206 (138%) and Cl10-BZ#209 (138%). Since these congeners were not detected in the associated samples there is no impact on data usability.

4.4.2 Tissue Analysis Accuracy

LCSs, matrix spikes, and SRMs were used to assess the accuracy of the tissue chemical measurements. The SRMs represent an excellent measure of overall analytical accuracy. Elevated results were reported for C13-BZ#28 in the

PCB Congener SRM; associated sample results for this analyte would be considered biased high however since it appears all results for C13-BZ#28 are reported as nondetect there is no impact on data usability.

Matrix spike recovery measurements were largely within work plan specified limits. Metals MS/MSDs were within control limits. Elevated recoveries (134% and 127%) were reported for C13-BZ#18 in the MS and MSD associated with samples L1745513-21- 40 and the MSD (121%) associated with C15-BZ#101 in samples L1745513-41-60. More information can be found in the individual laboratory reports.

4.5 Chemical QA/QC Summary

Analytical results, with the exception of PCP data for samples extracted outside the method holding time and results for the PDS Reference Site Water, are considered usable as reported. The hexavalent chromium, mercury and PCP data may be used for information purposes but are considered rejected due to the holding time exceedance documented by the laboratory. PCB congener and pesticide results for the PDS Reference Site Water should be considered estimated since it appears the initial extraction took place outside of the recommended holding time. The results for arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver and zinc in the PDS Reference Site Water should be considered estimated with a possible low bias since the sample was not acidified upon arrival at the laboratory.

5. References

AECOM, 2017a. Sampling and Environmental Testing in Support of Dredged Material Suitability Determination: Work Plan Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine. October 2017.

AECOM. 2017b. Field Report: Sampling and Testing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine. October, 2017.

Chang-Hoon Lee, Chan-Gyoung Sung, Seong-Dae Moon and Jong-Hyeon Lee. 2013. Effects of Ammonia on Fertilization, Development, and Larval Survival in the Northern Pacific Asteroid, *Asterias amurensis* (Sea urchin). Bulletin of Environmental Contamination and Toxicology. 91:102-106.

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Appendix B: Field Report

AECOM

Field Report: Sampling and Testing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

United States Army Corps of Engineers

Project Number: 60551931

October 2017

Quality information

Prepared by	Checked by	Approved by
		
K. van Naerssen AECOM Field Team Lead / Task Order Manger	K. Durocher AECOM Sediments Technical Practice Network Lead Verifier	Maura Surprenant Deputy Program Manager

Revision History

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Table of Contents

Tables

Figures

Attachments

Acronyms

°C	degrees Celsius
COC	Chain of Custody
DGPS	Differential Global Positioning System
ESI	EnviroSystems, Inc.
L	liter
MLLW	Mean Lower Low Water
NA	Normandeau Associates
NAE	New England District
NOAA	National Oceanographic and Atmospheric Administration
PDS	Portland Disposal Site
R/V	Research Vessel
SAP	Sampling and Analysis Plan
SPP	Suspended Particulate Phase
USACE	United States Army Corps of Engineers

1. Introduction

The Chebeague Island Navigation Improvement Project dredged material suitability determination field program was completed by both U.S. Army Corps of Engineers (USACE) New England District (NAE) personnel (harbor landing site sampling) and individuals on the AECOM and Normandeau Associates (NA) Field Team (collectively the AECOM Field Team). Field activities undertaken by the AECOM Field Team included collection and transport of sediment and water samples from the Portland Disposal Site (PDS) Reference Site, as well as receipt and delivery of NAE-collected representative sediment and water samples from the Great Chebeague Island harbor landing.

Tasks described within this Field Report focus primarily on activities undertaken by the AECOM Field Team. Sampling techniques employed by NAE personnel, relative to sediment and water collection activities at Great Chebeague Island, are addressed under separate cover.

2. Great Chebeague Island / PDS Sampling Field Summary

The project field effort commenced on October 17, 2017 and was completed on October 18, 2017. Project mobilization activities occurred on October 16, 2017. The program was divided into three tasks: AECOM's receipt of sediment and water samples that were collected by NAE on October 17, 2017; the AECOM Field Team's collection of sediment and water samples at the PDS Reference Site October 17, 2017; and, sample delivery to the project laboratory, EnviroSystems, Inc. (ESI), on October 18, 2017.

PDS Reference Site samples (sediment/water) were collected by the AECOM Field Team from NA's sampling platform, the research vessel (R/V) P1. Table 1 summarizes the activities accomplished during the field effort. Daily Activity Logs are provided in Attachment 1.

3. Health and Safety

Great Chebeague Island and the associated PDS sampling activities were completed safely and without incident. AECOM Team participants took an active part during the project safety briefing, conducted on October 17, 2017 (the one day of active field sampling by the AECOM Team). The AECOM Deputy Program Manager was de-briefed at the completion of field activities. The daily safety briefings are documented on the attached Daily Activity Logs (Attachment 1). The Float Plan and Tailgate meeting form covering boating activities and safety protocols, respectively, are compiled as Attachment 2.

4. Sediment Collection

Great Chebeague Island landing sediments were collected by NAE using vibracore methodology. These sediment samples were containerized by NAE and transferred to AECOM under chain of custody (COC) at the conclusion of NAE sampling efforts.

PDS Reference Site sediments were collected by the AECOM Field Team using Van Veen and ponar grab samplers as outlined in and in accordance with the project Sampling and Analysis Plan (SAP)[1].

Great Chebeague Island landing and PDS Reference Site sediment samples were held in a temperature-controlled refrigerated van unit in accordance with the project SAP until delivery to ESI.

4.1 Vessel Positioning

Vessel positioning was accomplished utilizing a Differential Global Positioning System (DGPS) unit. The sampling vessel was held on station as outlined in the SAP. The local National Oceanic and Atmospheric Administration (NOAA) tide data were obtained from Station 8418150.

[1] AECOM, 2017. Sampling and Testing in Support of Dredged Material Suitability Determination: Work Plan - Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine. USACE Contract No. W912WJ-17-D-003. Delivery Order No. W912WJ17F0106. October, 2017.

4.2 Grab Sample Handling

Grab sampling at the PDS Reference Site was accomplished as outlined in the SAP using Van Veen and ponar grab samplers. Multiple deployments of the samplers were required to obtain the 23.5-gallons of PDS sediment required for testing. For each grab, the sample was examined for disturbance and then transferred to a polyethylene bucket. The sediments collected by grab sampler at the reference site were transferred from the vessel and into a locked refrigerated van set to 2.2 degrees Celsius (°C) upon return to the dock.

Before and after sediment collection, the sampling gear was decontaminated as outlined in the SAP.

5. Water Collection

Water samples from the harbor area (site water) were collected by NAE from three representative harbor locations on October 17, 2017. These water samples were transferred to AECOM under COC at the conclusion of NAE sampling efforts.

The PDS Reference Site water sample (suspended particulate phase [SPP] dilution water) was collected using a large (8 liter [L]) Niskin bottle. Given the site depth at the PDS Reference Site, water was collected from three separate depths in the water column (approximately 3-feet below the surface, mid-depth, and approximately 3-feet off the bottom). Water samples from PDS were transferred to the refrigerated van immediately after returning to the dock.

Before and after water collection, the sampling gear was decontaminated as outlined in the SAP.

6. Field QA/QC Procedures

Equipment blanks were collected from the coring equipment by NAE on October 17, 2017. Equipment blanks were collected from the Niskin bottle and sediment grab sampler used for PDS Reference Site sampling on October 17, 2017.

All equipment blanks were placed in the locked refrigerated van after collection and iced for transport to the laboratory.

All samples were held under COC, and signed for during ownership transfer (Attachment 3).

7. SAP Deviations/Difficulties Encountered

There are a few notes of interest relative to the Great Chebeague Island / PDS sediment collection effort:

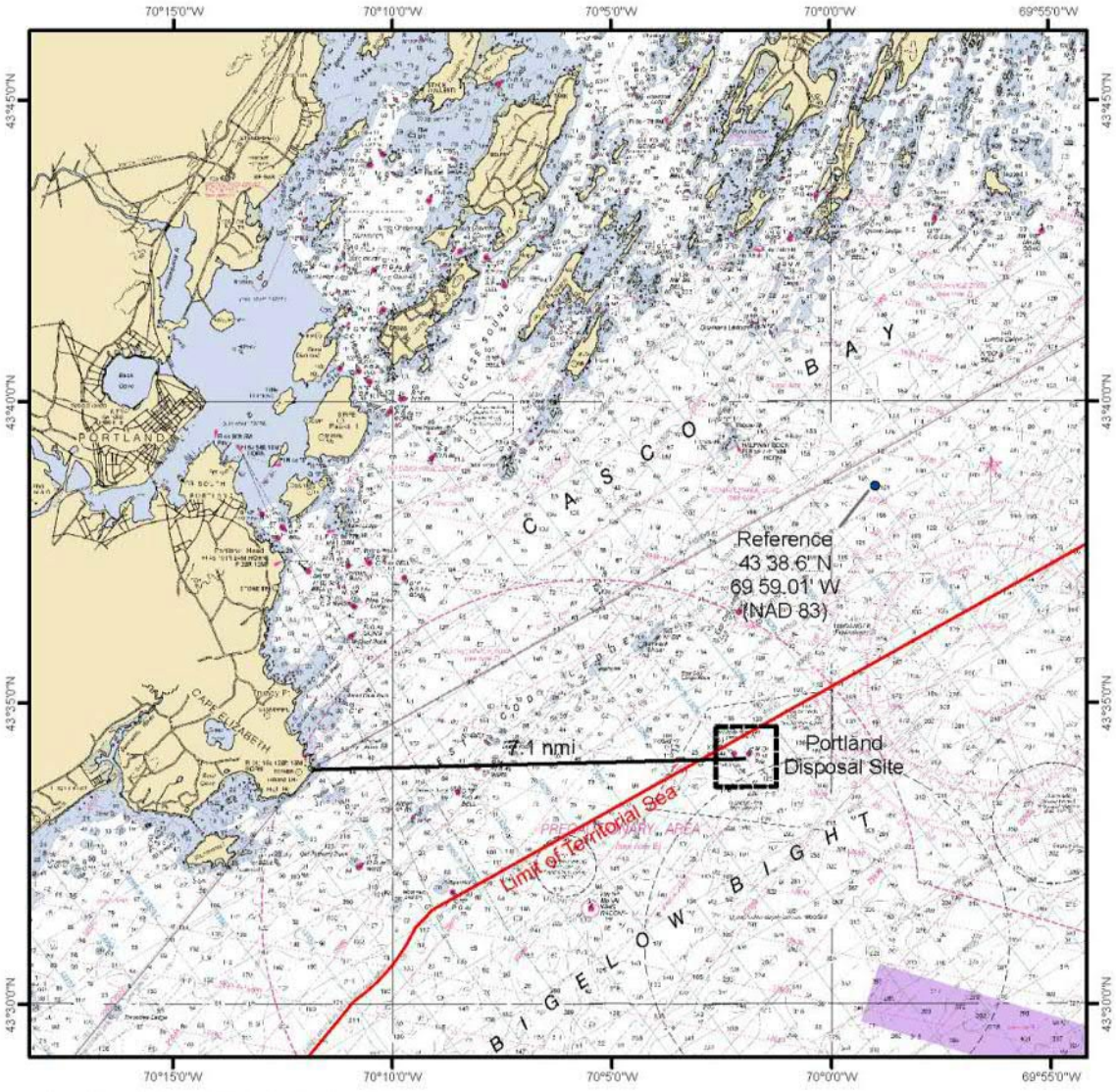
- The SAP notes that HYPACK software shall be utilized in concert with the DGPS unit for navigation. The R/V P1 was equipped with a comparable navigation setup that included a Trimble DGPS system and Nobeltec navigation software (rather than HYPACK software) for vessel positioning. DGPS accuracy was achieved as specified in the SAP. Project coordinates were monitored in real-time in Degree Decimal Minute format. No project implications are anticipated as a result of this deviation.

All project logbook entries are included as Attachment 4.

Table 1 Great Chebeague Island / PDS Field Survey Activity Summary

Date	AECOM Survey Activities	Equipment	Platform
October 16, 2017	Project Mobilization	Refrigerated Van	Refrigerated Van
October 17, 2017	PDS Reference Site water and sediment grab sampling. Equipment blank collected for Niskin Bottle and Grab Samplers	Niskin Bottle / Van Veen / Ponar Grab Samplers, Refrigerated Van	R/V P1, Refrigerated Van
	Great Chebeague Island sediment and water sample receipt from NAE and subsequent storage/transport	Refrigerated Van	Refrigerated Van
October 18, 2017	Sample transport to ESI	Refrigerated Van	Refrigerated Van

Figure 1 PDS Reference Site Sediment and Water Sampling Location – Great Chebeague Island Sediment Characterization Study

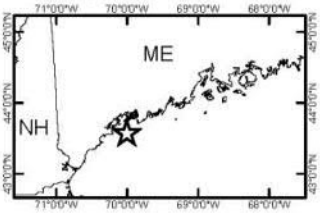


PORTLAND DISPOSAL SITE

Description: The Portland Disposal Site (PDS) is one of three regional dredged material disposal sites located in the waters of Maine. It covers a 1 nmi^2 (3.4 km^2) area of seafloor centered at 43° 34.111' N, 70° 01.9386' W (NAD 83), approximately 7.1 nmi (13.2 km) east of Dyer Point, Cape Elizabeth, Maine. PDS is characterized by a rough, irregular bottom topography, with areas of soft sediment accumulation in the basins among bedrock outcrops.The authorized disposal point (within the overall disposal area) is specified for each dredging project in other project documents

D A M O S
DISPOSAL AREA MONITORING SYSTEM

SCALE 1:180,000
Kilometers
1 0 1 2 3 4 5 6 7 8 9
1 0 1 2 3 4
Nautical Miles
NOTE: This chart is not intended for use in navigation.



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Appendix C: Chemistry Data

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March 5, 2018

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Concord, MA 01742

RE: Chebeague Island Elutriate Chemistry – Final Progress Report (Revised)
Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106
Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

Dear Mr. Loyd:

AECOM Technical Services, Inc. (AECOM) is pleased to provide the enclosed revised Elutriate Testing final progress report under Delivery Order W912WJ17F0106, Task 5 of the Performance Work Statement (PWS) entitled "*Sampling and Testing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine*", dated 4 August 2017.

The enclosed report details the project's elutriate chemistry results, including revisions implemented to address edits which arose during Final Report preparation for this project. A revised elutriate chemistry electronic data deliverable (EDD) accompanies this submittal. Please let us know if you have any questions or would like anything further.

This submission has been subject to AECOM's review and coordination procedures. Please let us know if you have any questions or if you would like a call to discuss the attached.

Best Regards,

Kris van Naerssen
Project Manager
AECOM
E: kris.vannaerssen@aecom.com

cc: Maura Surprenant, AECOM
Mary O'Connell-Kozik, AECOM

Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106

Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

March 5, 2018

Elutriate Chemistry – Final Progress Report (Revised)

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT - ELUTRIATE SOLUTION:

Chebeague Island Navigation Improvement Project
Tier III Sediment Evaluation
Great Chebeague Island, Maine

New England District Corps of Engineers
USACE Contract No.: W912WJ17F0106

Prepared For:

AECOM
250 Apollo Drive
Chelmsford, MA 01824

Prepared By:

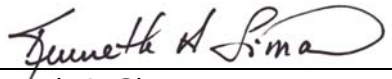
EnviroSystems, Incorporated
One Lafayette Road
Hampton, New Hampshire 03842

EnviroSystems, Inc. Sample Deliver Group Reference 29746

Study Specific Reference 29751

LABORATORY STANDARDS STATEMENT

This study was performed by EnviroSystems, Incorporated at its facility in Hampton, New Hampshire. EnviroSystems' laboratory is accredited by the State of New Hampshire under the National Environmental Laboratory Accreditation (NELAC) program. Additionally, ESI is accredited under the Department of Defense (DoD) ELAP program, ISO/IEC 17025:2005, Certificate Number L2340. All testing conducted by EnviroSystems as part of this program was compliant with NELAC guidelines and standards. Additionally, this study was conducted in accordance with guidelines presented in the 2004 version of the New England District's Regional Implementation Manual (RIM) for Evaluation of Dredged Material Proposed for Disposal In New England Waters. Any deviations from specific elements of the RIM are detailed in the completeness checklist of this Report.

For EnviroSystems, Inc.  February 14, 2018

Kenneth A. Simon
Technical Director

Date

CHEMICAL ANALYSIS
OF A MARINE SEDIMENT - ELUTRIATE SOLUTION:

Chebeague Island Navigation Improvement Project
Tier III Sediment Evaluation
Great Chebeague Island, Maine

1.0 SAMPLE COLLECTION, PRESERVATION AND STORAGE

Sediment samples for chemical and physical analysis were provided by AECOM from locations specified within the project work plan. Samples were received under chain of custody in sample containers appropriate for the specified analysis. Upon arrival at the laboratory, all samples received an internal sample control number and were logged into the project sample control system. Samples were placed in a secure sample holding location and stored at a temperature of 4±2°C until analysis.

2.0 ANALYSIS

Sample analysis was carried out following methods and protocol specified in the project Sample Analysis Plan by EnviroSystems, Inc. at its Hampton, NH facility. Review of the data report document showed that all sample holding times were met, unless otherwise qualified, that the analytical methods used in the analysis were appropriate for the parameter and sample matrix and met New England District Regional Implementation Manual requirements. Review of supporting quality assurance data documented that, except where qualified, all data collected meet all of the requirements of NELAC, for all NELAC accredited parameters.

3.0 RESULTS

Analytical methods used in the analysis of sediment samples were analyzed using protocol recommended in Tables 2 and 3 of the New England District RIM document with appropriate updates related to current methods. Trace metals were evaluated using EPA Method 200.8, Inductively Coupled Plasma - Mass Spectrometry (ICP-MS), mercury was evaluated using EPA Method 245.7, Cold Vapor Atomic Fluorescence Spectrometry. PCB Congeners were analyzed by EPA Method 608. Pentachlorophenol was analyzed by EPA Method 680. Pesticides were analyzed by EPA Method 8081B. In cases where dilution of the sample extract was required the final reporting limit remained below the RIM document specified limits and did not result in artificial “Non Detects.”

A review of QC data documented three incidences where the surrogate recovery fell outside of acceptable limits. There was one incidence of the %R exceeding the acceptable limit in a matrix spike. The reporting limit for the compound toxaphene was above the reporting limit stated in the Sampling and Analysis Plan (SAP).

A full copy of the analytical report is included in the following data appendix

TABLE OF CONTENTS

Report No: 29993 SDG:
Project: Ref Site Background

Sample ID: PDS Reference Site Water
Matrix: Water
Sampled: 10/17/17 1425

Parameter		Result		Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Arsenic, total	29993-103	0.0015	R1	0.0004	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Cadmium, total	29993-103	ND	R1	0.0002	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Chromium, total	29993-103	ND	R1	0.0004	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Hexavalent Chromium	29993-103	ND	O,R1	0.0004	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Copper, total	29993-103	0.0008	R1	0.0004	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Lead, total	29993-103	ND	R1	0.0002	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Mercury, total	29993-104	ND	R1	0.01	ug/L	12/08/17 1533	12/10/17 1015	JHW/EPA 245.7
Nickel, total	29993-103	ND	R1	0.0008	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Selenium, total	29993-103	ND	R1	0.001	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Silver, total	29993-103	ND	R1	0.0002	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8
Zinc, total	29993-103	0.0012	B,R1	0.0008	mg/L	12/18/17 0915	12/18/17 1904	JLH/EPA 200.8

Notes:

ND = Not Detected

O = Sample out of hold time. Value obtained from ICP-MS

R1 = Sample was run out of recomended hold time.

B = Analyte found in laboratory blank at level indicated. 0.0003 mg/L.

Inorganic Analytes in Elutriates
SW 846 6020/EPA 200.8 modified
EPA 245.7 and SM 3500-Cr D

Project: Chebeague

Sample ID:	Composite 1 Elutriate Blank - Rep 1	Composite 1 Elutriate Blank - Rep 2	Composite 1 Elutriate Blank - Rep 3
Lab ID:	29751-001	29751-002	29751-003
Date Sampled:	10/24/17 1012	10/24/17 1012	10/24/17 1012
Matrix:	Water	Water	Water

Analyte	Units	Result	Qual	Result	Qual	Result	Qual
Arsenic, total	mg/L	0.0017		0.0017		0.0015	
Cadmium, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Chromium, total	mg/L	0.001	U	0.001	U	0.001	U
Chromium, hexavalent	mg/L	0.005	U	0.005	U	0.005	U
Copper, total	mg/L	0.0005	U	0.0005	U	0.0009	
Lead, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Mercury, total	ug/L	0.01	U	0.01	U	0.01	U
Nickel, total	mg/L	0.0018		0.0011		0.001	U
Selenium, total	mg/L	0.001	U	0.001	U	0.001	U
Silver, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Zinc, total	mg/L	0.001	U	0.001	U	0.0012	

U = Below quantitation limit

Inorganic Analytes in Elutriates
SW 846 6020/EPA 200.8 modified
EPA 245.7 and SM 3500-Cr D

Project: Chebeague

Sample ID:	Composite 1 Elutriate - Rep 1	Composite 1 Elutriate - Rep 2	Composite 1 Elutriate - Rep 3
Lab ID:	29751-019	29751-020	29751-021
Date Sampled:	10/24/17 1250	10/24/17 1250	10/24/17 1250
Matrix:	Water	Water	Water

Analyte	Units	Result	Qual	Result	Qual	Result	Qual
Arsenic, total	mg/L	0.0257		0.0257		0.0260	
Cadmium, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Chromium, total	mg/L	0.001	U	0.001	U	0.001	U
Chromium, hexavalent	mg/L	0.005	U	0.005	U	0.005	U
Copper, total	mg/L	0.0006		0.0005	U	0.0005	U
Lead, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Mercury, total	ug/L	0.01	U	0.01	U	0.01	U
Nickel, total	mg/L	0.001	U	0.001	U	0.001	U
Selenium, total	mg/L	0.001	U	0.001	U	0.001	U
Silver, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Zinc, total	mg/L	0.0045		0.0016		0.0020	

U = Below quantitation limit

Inorganic Analytes in Elutriates
SW 846 6020/EPA 200.8 modified
EPA 245.7 and SM 3500-Cr D

Project: Chebeague

Sample ID:	Composite 2 Elutriate Blank - Rep 1	Composite 2 Elutriate Blank - Rep 2	Composite 2 Elutriate Blank - Rep 3
Lab ID:	29751-037	29751-038	29751-039
Date Sampled:	10/24/17 1012	10/24/17 1012	10/24/17 1012
Matrix:	Water	Water	Water

Analyte	Units	Result	Qual	Result	Qual	Result	Qual
Arsenic, total	mg/L	0.0015		0.0016		0.0016	
Cadmium, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Chromium, total	mg/L	0.001	U	0.001	U	0.001	U
Chromium, hexavalent	mg/L	0.005	U	0.005	U	0.005	U
Copper, total	mg/L	0.0005	U	0.0005	U	0.0006	
Lead, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Mercury, total	ug/L	0.01	U	0.01	U	0.01	U
Nickel, total	mg/L	0.001	U	0.0015		0.0024	
Selenium, total	mg/L	0.001	U	0.001	U	0.001	U
Silver, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Zinc, total	mg/L	0.0015		0.0013		0.001	U

U = Below quantitation limit

Inorganic Analytes in Elutriates
SW 846 6020/EPA 200.8 modified
EPA 245.7 and SM 3500-Cr D

Project: Chebeague

Sample ID:	Composite 2 Elutriate - Rep 1	Composite 2 Elutriate - Rep 2	Composite 2 Elutriate - Rep 3
Lab ID:	29751-055	29751-056	29751-057
Date Sampled:	10/24/17 1400	10/24/17 1400	10/24/17 1400
Matrix:	Water	Water	Water

Analyte	Units	Result	Qual	Result	Qual	Result	Qual
Arsenic, total	mg/L	0.0129		0.0130		0.0128	
Cadmium, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Chromium, total	mg/L	0.001	U	0.001	U	0.001	U
Chromium, hexavalent	mg/L	0.005	U,J5	0.005	U	0.005	U
Copper, total	mg/L	0.0005	U	0.0005	U	0.0005	U
Lead, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Mercury, total	ug/L	0.01	U	0.01	U	0.01	U
Nickel, total	mg/L	0.001	U	0.001	U	0.0011	
Selenium, total	mg/L	0.001	U	0.001	U	0.001	U
Silver, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Zinc, total	mg/L	0.0027		0.0055		0.0029	

J5 = MS %R below limit

U = Below quantitation limit

Inorganic Analytes in Elutriates
SW 846 6020/EPA 200.8 modified
EPA 245.7 and SM 3500-Cr D

Project: Chebeague

Sample ID:	Composite 3 Elutriate Blank - Rep 1	Composite 3 Elutriate Blank - Rep 2	Composite 3 Elutriate Blank - Rep 3
Lab ID:	29751-073	29751-074	29751-075
Date Sampled:	10/24/17 1054	10/24/17 1054	10/24/17 1054
Matrix:	Water	Water	Water

Analyte	Units	Result	Qual	Result	Qual	Result	Qual
Arsenic, total	mg/L	0.0016		0.0016		0.0015	
Cadmium, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Chromium, total	mg/L	0.001	U	0.001	U	0.001	U
Chromium, hexavalent	mg/L	0.005	U	0.005	U	0.005	U
Copper, total	mg/L	0.0005	U	0.0005	U	0.0015	
Lead, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Mercury, total	ug/L	0.01	U	0.01	U	0.01	U
Nickel, total	mg/L	0.0011		0.001	U	0.001	U
Selenium, total	mg/L	0.001	U	0.001	U	0.001	U
Silver, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Zinc, total	mg/L	0.0012		0.0024		0.0015	

U = Below quantitation limit

Inorganic Analytes in Elutriates
SW 846 6020/EPA 200.8 modified
EPA 245.7 and SM 3500-Cr D

Project: Chebeague

Sample ID:	Composite 3 Elutriate - Rep 1	Composite 3 Elutriate - Rep 2	Composite 3 Elutriate - Rep 3
Lab ID:	29751-091	29751-092	29751-093
Date Sampled:	10/24/17 1535	10/24/17 1535	10/24/17 1535
Matrix:	Water	Water	Water

Analyte	Units	Result	Qual	Result	Qual	Result	Qual
Arsenic, total	mg/L	0.0065		0.0064		0.0064	
Cadmium, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Chromium, total	mg/L	0.001	U	0.001	U	0.001	U
Chromium, hexavalent	mg/L	0.005	U	0.005	U	0.005	U
Copper, total	mg/L	0.0005	U	0.0005	U	0.0005	U
Lead, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Mercury, total	ug/L	0.01	U	0.01	U	0.01	U
Nickel, total	mg/L	0.0023		0.0011		0.0013	
Selenium, total	mg/L	0.0013		0.001	U	0.001	U
Silver, total	mg/L	0.0002	U	0.0002	U	0.0002	U
Zinc, total	mg/L	0.0210		0.0057		0.0121	

U = Below quantitation limit

Project:	Chebeague Composite 1 Elutriate Blank		
Lab Number:	29751-010	29751-011	29751-012
Sample Designation:	Composite 1 Elutriate Blank - Rep 1	Composite 1 Elutriate Blank - Rep 2	Composite 1 Elutriate Blank - Rep 3
Date Sampled:	10/24/17 1012	10/24/17 1012	10/24/17 1012
Date Extracted:	10/23/17 0920	10/23/17 0920	10/23/17 0920
Date Analyzed:	11/02/17	11/02/17	11/02/17
Matrix:	Water	Water	Water
Sample Amount (mL):	960	960	960
Final Volume (mL)	0.4	0.4	0.4
Dilution Factor:	1	1	1

		Rep 1		Rep 2		Rep 3	
Number	PCB Congener	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
8	2,4'-dichlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
18	2,2',5-trichlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
28	2,4,4'-trichlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
44	2,2',3,5'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
49	2,2',4,5'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
52	2,2',5,5'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
66	2,3',4,4'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
77	3,3',4,4'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
87	2,2',3,4,5'-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
101	2,2',4,5,5'-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
105	2,3,3',4,4'-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
118	2,3',4,4',5-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
126	3,3',4,4',5-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
128	2,2',3,3',4,4'-hexachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
138	2,2',3,4,4',5'-hexachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
153	2,2',4,4',5,5'-hexachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
156	2,3,3',4,4',5-hexachlorobiphenyl						
169	3,3',4,4',5,5'-hexachlorobiphenyl						
170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
183	2,2',3,4,4',5',6-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
184	2,2',3,4,4',6,6'-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
209	2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U

	Surrogate Standard	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
198	2,2',3,3',4,5,5',6-octachlorobiphenyl	66	67	71	30-150

PCB Congeners in Water
SW 846 8082/EPA 680 modified

Project:	Chebeague Composite 1

Lab Number:	29751-028	29751-029	29751-030
Sample Designation:	Composite 1 Elutriate - Rep 1	Composite 1 Elutriate - Rep 2	Composite 1 Elutriate - Rep 3
Date Sampled:	10/24/17 1250	10/24/17 1250	10/24/17 1250
Date Extracted:	10/23/17 0920	10/23/17 0920	10/23/17 0920
Date Analyzed:	11/01/17	11/01/17	11/01/17
Matrix:	Water	Water	Water
Sample Amount (mL):	960	950	970
Final Volume (mL)	0.4	0.4	0.4
Dilution Factor:	1	1	1

		Rep 1		Rep 2		Rep 3	
Number	PCB Congener	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
8	2,4'-dichlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
18	2,2',5-trichlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
28	2,4,4'-trichlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
44	2,2',3,5'-tetrachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
49	2,2',4,5'-tetrachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
52	2,2',5,5'-tetrachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
66	2,3',4,4'-tetrachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
77	3,3',4,4'-tetrachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
87	2,2',3,4,5'-pentachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
101	2,2',4,5,5'-pentachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
105	2,3,3',4,4'-pentachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
118	2,3',4,4',5-pentachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
126	3,3',4,4',5-pentachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
128	2,2',3,3',4,4'-hexachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
138	2,2',3,4,4',5'-hexachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
153	2,2',4,4',5,5'-hexachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
156	2,3,3',4,4',5-hexachlorobiphenyl						
169	3,3',4,4',5,5'-hexachlorobiphenyl						
170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
183	2,2',3,4,4',5',6-heptachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
184	2,2',3,4,4',6,6'-heptachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U
209	2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	0.00083	U	0.00084	U	0.00082	U

	Surrogate Standard	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
198	2,2',3,3',4,5,5',6-octachlorobiphenyl	78	81	81	30-150

Project:	Chebeague Composite 2 Elutriate Blank		
Lab Number:	29751-046	29751-047	29751-048
Sample Designation:	Composite 2 Elutriate Blank - Rep 1	Composite 2 Elutriate Blank - Rep 2	Composite 2 Elutriate Blank - Rep 3
Date Sampled:	10/24/17 1012	10/24/17 1012	10/24/17 1012
Date Extracted:	10/23/17 0920	10/23/17 0920	10/23/17 0920
Date Analyzed:	11/02/17	11/02/17	11/02/17
Matrix:	Water	Water	Water
Sample Amount (mL):	970	970	980
Final Volume (mL)	0.4	0.4	0.4
Dilution Factor:	1	1	1

		Rep 1		Rep 2		Rep 3	
Number	PCB Congener	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
8	2,4'-dichlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
18	2,2',5-trichlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
28	2,4,4'-trichlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
44	2,2',3,5'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
49	2,2',4,5'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
52	2,2',5,5'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
66	2,3',4,4'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
77	3,3',4,4'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
87	2,2',3,4,5'-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
101	2,2',4,5,5'-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
105	2,3,3',4,4'-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
118	2,3',4,4',5-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
126	3,3',4,4',5-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
128	2,2',3,3',4,4'-hexachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
138	2,2',3,4,4',5'-hexachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
153	2,2',4,4',5,5'-hexachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
156	2,3,3',4,4',5-hexachlorobiphenyl						
169	3,3',4,4',5,5'-hexachlorobiphenyl						
170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
183	2,2',3,4,4',5',6-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
184	2,2',3,4,4',6,6'-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
209	2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U

	Surrogate Standard	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
198	2,2',3,3',4,5,5',6-octachlorobiphenyl	67	73	78	30-150

PCB Congeners in Water
SW 846 8082/EPA 680 modified

Project: Chebeague
Composite 2

Lab Number:	29751-064	29751-065	29751-066
Sample Designation:	Composite 2 Elutriate - Rep 1	Composite 2 Elutriate - Rep 2	Composite 2 Elutriate - Rep 3
Date Sampled:	10/24/17 1400	10/24/17 1400	10/24/17 1400
Date Extracted:	10/23/17 0920	10/23/17 0920	10/23/17 0920
Date Analyzed:	11/02/17	11/02/17	11/02/17
Matrix:	Water	Water	Water
Sample Amount (mL):	960	960	960
Final Volume (mL)	0.4	0.4	0.4
Dilution Factor:	1	1	1

		Rep 1		Rep 2		Rep 3	
Number	PCB Congener	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
8	2,4'-dichlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
18	2,2',5-trichlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
28	2,4,4'-trichlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
44	2,2',3,5'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
49	2,2',4,5'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
52	2,2',5,5'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
66	2,3',4,4'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
77	3,3',4,4'-tetrachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
87	2,2',3,4,5'-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
101	2,2',4,5,5'-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
105	2,3,3',4,4'-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
118	2,3',4,4',5-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
126	3,3',4,4',5-pentachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
128	2,2',3,3',4,4'-hexachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
138	2,2',3,4,4',5'-hexachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
153	2,2',4,4',5,5'-hexachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
156	2,3,3',4,4',5-hexachlorobiphenyl						
169	3,3',4,4',5,5'-hexachlorobiphenyl						
170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
183	2,2',3,4,4',5',6-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
184	2,2',3,4,4',6,6'-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U
209	2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	0.00083	U	0.00083	U	0.00083	U

	Surrogate Standard	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
198	2,2',3,3',4,5,5',6-octachlorobiphenyl	63	85	76	30-150

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Project:	Chebeague Composite 3 Elutriate Blank

Lab Number:	29751-082	29751-083	29751-084
Sample Designation:	Composite 3 Elutriate Blank - Rep 1	Composite 3 Elutriate Blank - Rep 2	Composite 3 Elutriate Blank - Rep 3
Date Sampled:	10/24/17 1054	10/24/17 1054	10/24/17 1054
Date Extracted:	10/23/17 0920	10/23/17 0920	10/23/17 0920
Date Analyzed:	11/02/17	11/02/17	11/02/17
Matrix:	Water	Water	Water
Sample Amount (mL):	970	970	970
Final Volume (mL)	0.4	0.4	0.4
Dilution Factor:	1	1	1

		Rep 1		Rep 2		Rep 3	
Number	PCB Congener	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
8	2,4'-dichlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
18	2,2',5-trichlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
28	2,4,4'-trichlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
44	2,2',3,5'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
49	2,2',4,5'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
52	2,2',5,5'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
66	2,3',4,4'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
77	3,3',4,4'-tetrachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
87	2,2',3,4,5'-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
101	2,2',4,5,5'-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
105	2,3,3',4,4'-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
118	2,3',4,4',5-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
126	3,3',4,4',5-pentachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
128	2,2',3,3',4,4'-hexachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
138	2,2',3,4,4',5'-hexachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
153	2,2',4,4',5,5'-hexachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
156	2,3,3',4,4',5-hexachlorobiphenyl						
169	3,3',4,4',5,5'-hexachlorobiphenyl						
170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
183	2,2',3,4,4',5',6-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
184	2,2',3,4,4',6,6'-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U
209	2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	0.00082	U	0.00082	U	0.00082	U

	Surrogate Standard	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
198	2,2',3,3',4,5,5',6-octachlorobiphenyl	72	81	82	30-150

PCB Congeners in Water
SW 846 8082/EPA 680 modified

Project:	Chebeague Composite 3		
Lab Number:	29751-100	29751-101	29751-102
Sample Designation:	Composite 3 Elutriate - Rep 1	Composite 3 Elutriate - Rep 2	Composite 3 Elutriate - Rep 3
Date Sampled:	10/24/17 1535	10/24/17 1535	10/24/17 1535
Date Extracted:	10/23/17 0920	10/23/17 0920	10/23/17 0920
Date Analyzed:	11/02/17	11/02/17	11/02/17
Matrix:	Water	Water	Water
Sample Amount (mL):	950	980	980
Final Volume (mL)	0.4	0.4	0.4
Dilution Factor:	1	1	1

Number	PCB Congener	Rep 1 Result (ug/L)	Qual	Rep 2 Result (ug/L)	Qual	Rep 3 Result (ug/L)	Qual
8	2,4'-dichlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
18	2,2',5-trichlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
28	2,4,4'-trichlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
44	2,2',3,5'-tetrachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
49	2,2',4,5'-tetrachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
52	2,2',5,5'-tetrachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
66	2,3',4,4'-tetrachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
77	3,3',4,4'-tetrachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
87	2,2',3,4,5'-pentachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
101	2,2',4,5,5'-pentachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
105	2,3,3',4,4'-pentachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
118	2,3',4,4',5-pentachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
126	3,3',4,4',5-pentachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
128	2,2',3,3',4,4'-hexachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
138	2,2',3,4,4',5'-hexachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
153	2,2',4,4',5,5'-hexachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
156	2,3,3',4,4',5-hexachlorobiphenyl						
169	3,3',4,4',5,5'-hexachlorobiphenyl						
170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
183	2,2',3,4,4',5',6-heptachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
184	2,2',3,4,4',6,6'-heptachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U
209	2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	0.00084	U	0.00082	U	0.00082	U

	Surrogate Standard	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
198	2,2',3,3',4,5,5',6-octachlorobiphenyl	85	81	79	30-150

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PCB Congeners in Water
SW 846 8082/EPA 680 modified

Lab Number:	29993-100
Sample Designation:	PDS Reference Site Water
Date Sampled:	10/17/17 1425
Date Extracted:	11/20/17 0900
Date Analyzed:	11/23/17
Matrix:	Water
Sample Amount (mL):	970
Final Volume (mL)	0.4
Dilution Factor:	1

Congener Number	PCB Congener	Concentration (ug/L)	Qualifier
8	2,4'-dichlorobiphenyl	0.008	U,R1
18	2,2',5-trichlorobiphenyl	0.008	U,R1
28	2,4,4'-trichlorobiphenyl	0.008	U,R1
44	2,2',3,5'-tetrachlorobiphenyl	0.008	U,R1
49	2,2',4,5'-tetrachlorobiphenyl	0.008	U,R1
52	2,2',5,5'-tetrachlorobiphenyl	0.008	U,R1
66	2,3',4,4'-tetrachlorobiphenyl	0.008	U,R1
77	3,3',4,4'-tetrachlorobiphenyl	0.008	U,R1
87	2,2',3,4,5'-pentachlorobiphenyl	0.008	U,R1
101	2,2',4,5,5'-pentachlorobiphenyl	0.008	U,R1
105	2,3,3',4,4'-pentachlorobiphenyl	0.008	U,R1
118	2,3',4,4',5-pentachlorobiphenyl	0.008	U,R1
126	3,3',4,4',5-pentachlorobiphenyl	0.008	U,R1
128	2,2',3,3',4,4'-hexachlorobiphenyl	0.008	U,R1
138	2,2',3,4,4',5'-hexachlorobiphenyl	0.008	U,R1
153	2,2',4,4',5,5'-hexachlorobiphenyl	0.008	U,R1
156	2,3,3',4,4',5-hexachlorobiphenyl		
169	3,3',4,4',5,5'-hexachlorobiphenyl		
170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.008	U,R1
180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.008	U,R1
183	2,2',3,4,4',5',6-heptachlorobiphenyl	0.008	U,R1
184	2,2',3,4,4',6,6'-heptachlorobiphenyl	0.008	U,R1
187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.008	U,R1
195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.008	U,R1
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.008	U,R1
209	2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	0.008	U,R1

Surrogate Standards	Recovery (%)	Advisory Limits (%)
PCB 198	59	30 - 150

U = Not deteced at value reported.
R1 = Sample was run out of hold time.

Chebeague Harbor
Composite 1 Elutriate Blank

Lab Number:	29751-109	29751-110	29751-111
Sample Designation:	Composite 1 Elutriate Blank - Rep 1	Composite 1 Elutriate Blank - Rep 2	Composite 1 Elutriate Blank - Rep 3
Date Sampled:	11/15/17 1105	11/15/17 1105	11/15/17 1105
Date Extracted:	11/16/17 0900	11/16/17 0900	11/16/17 0900
Date Analyzed:	11/21/17	11/21/17	11/21/17
Matrix:	Water	Water	Water
Sample Amount (mL):	980	980	980
Final Volume (mL)	0.50	0.50	0.50
Dilution Factor:	1	1	1

Compound	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
pentachlorophenol	1	U,R1	1	U,R1	1	U,R1

Surrogate Standards	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
2,4,6-tribromophenol	64	66	70	30-150

U = Not deteced.
R1 = Sample was run out of recomended hold time.

Chebeague Harbor
Composite 1

Lab Number:	29751-112	29751-113	29751-114
Sample Designation:	Composite 1 Elutriate - Rep 1	Composite 1 Elutriate - Rep 2	Composite 1 Elutriate - Rep 3
Date Sampled:	11/15/17 1105	11/15/17 1105	11/15/17 1105
Date Extracted:	11/16/17 0900	11/16/17 0900	11/16/17 0900
Date Analyzed:	11/21/17	11/21/17	11/21/17
Matrix:	Water	Water	Water
Sample Amount (mL):	980	920	920
Final Volume (mL)	0.50	0.50	0.50
Dilution Factor:	1	1	1

Compound	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
pentachlorophenol	1	U,R1	1.1	U,R1	1.1	U,R1

Surrogate Standards	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
2,4,6-tribromophenol	62	65	52	30-150

U = Not deteced.
R1 = Sample was run out of recomended hold time.

Chebeague Harbor
Composite 2 Elutriate Blank

Lab Number:	29751-117	29751-118	29751-119
Sample Designation:	Composite 2 Elutriate Blank - Rep 1	Composite 2 Elutriate Blank - Rep 2	Composite 2 Elutriate Blank - Rep 3
Date Sampled:	11/15/17 1155	11/15/17 1155	11/15/17 1155
Date Extracted:	11/16/17 0900	11/16/17 0900	11/16/17 0900
Date Analyzed:	11/21/17	11/22/17	11/22/17
Matrix:	Water	Water	Water
Sample Amount (mL):	540	430	930
Final Volume (mL)	0.50	0.50	0.50
Dilution Factor:	1	1	1

Compound	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
pentachlorophenol	1.9	U,R1	2.3	U,R1	1.1	U,R1

Surrogate Standards	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
2,4,6-tribromophenol	63	68	114	30-150

U = Not deteced.
R1 = Sample was run out of recomended hold time.

Chebeague Harbor
Composite 2 Elutriate

Lab Number:	29751-120	29751-121	29751-122
Sample Designation:	Composite 2 Elutriate - Rep 1	Composite 2 Elutriate - Rep 2	Composite 2 Elutriate - Rep 3
Date Sampled:	11/15/17 1155	11/15/17 1155	11/15/17 1155
Date Extracted:	11/16/17 0900	11/16/17 0900	11/16/17 0900
Date Analyzed:	11/22/17	11/22/17	11/22/17
Matrix:	Water	Water	Water
Sample Amount (mL):	940	940	920
Final Volume (mL)	0.50	0.50	0.50
Dilution Factor:	1	1	1

Compound	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
pentachlorophenol	1.1	U,R1	1.1	U,R1	1.1	U,R1

Surrogate Standards	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
2,4,6-tribromophenol	118	104	98	30-150

U = Not deteced.
R1 = Sample was run out of recomended hold time.

Chebeague Harbor
Composite 3 Elutriate Blank

Lab Number:	29751-123	29751-124	29751-125
Sample Designation:	Composite 3 Elutriate Blank - Rep 1	Composite 3 Elutriate Blank - Rep 2	Composite 3 Elutriate Blank - Rep 3
Date Sampled:	11/15/17 1315	11/15/17 1315	11/15/17 1315
Date Extracted:	11/16/17 0900	11/16/17 0900	11/16/17 0900
Date Analyzed:	11/22/17	11/22/17	11/22/17
Matrix:	Water	Water	Water
Sample Amount (mL):	480	480	890
Final Volume (mL)	0.50	0.50	0.50
Dilution Factor:	1	1	1

Compound	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
pentachlorophenol	2.1	U,R1	2.1	U,R1	1.1	U,R1

Surrogate Standards	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
2,4,6-tribromophenol	96	116	93	30-150

U = Not deteced.
R1 = Sample was run out of recomended hold time.

Chebeague Harbor
Composite 3 Elutriate

Lab Number:	29751-126	29751-127	29751-128
Sample Designation:	Composite 3 Elutriate - Rep 1	Composite 3 Elutriate - Rep 2	Composite 3 Elutriate - Rep 3
Date Sampled:	11/15/17 1315	11/15/17 1315	11/15/17 1315
Date Extracted:	11/16/17 0900	11/16/17 0900	11/16/17 0900
Date Analyzed:	11/22/17	11/22/17	11/22/17
Matrix:	Water	Water	Water
Sample Amount (mL):	910	920	920
Final Volume (mL)	0.50	0.50	0.50
Dilution Factor:	1	1	1

Compound	Result (ug/L)	Qual	Result (ug/L)	Qual	Result (ug/L)	Qual
pentachlorophenol	1.1	U,R1	1.1	U,R1	1.1	U,R1

Surrogate Standards	Recovery (%)	Recovery (%)	Recovery (%)	Limit (%)
2,4,6-tribromophenol	104	103	102	30-150

U = Not deteced.
R1 = Sample was run out of recomended hold time.

Lab Number:	29993-100
Sample Designation:	PDS Reference Site Water
Date Sampled:	10/17/17 1425
Date Extracted:	11/17/17 0900
Date Analyzed:	11/24/17
Matrix:	Water
Sample Amount (mL):	980
Final Volume (mL)	0.50
Dilution Factor:	1

Compound	Concentration (ug/L)	Qualifier
pentachlorophenol	1	U,R1

Surrogate Standards	Recovery (%)	Advisory Limits (%)
2,4,6-tribromophenol	107	30 - 150

U = Below quantitation limit.
R1 = Sample was run out of recomended hold time.

Pesticides in Elutriates
SW 846 8081B

Lab Number:	29751-016	29751-017	29751-018
Sample Designation:	Composite 1 Elutriate Blank - Rep 1	Composite 1 Elutriate Blank - Rep 2	Composite 1 Elutriate Blank - Rep 3
Date Sampled:	10/24/17 1012	10/24/17 1012	10/24/17 1012
Date Extracted:	10/26/17 0830	10/26/17 0830	10/26/17 0830
Date Analyzed:	11/07/17	11/08/17	11/08/17
Matrix:	Water	Water	Water
Sample Amount (mL):	980	980	980
Final Volume (mL)	1.0	1.0	1.0
Dilution Factor:	1	1	1

	Elutriate Replicate 1		Elutriate Replicate 2		Elutriate Replicate 3	
Analyte	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier
aldrin	0.002	U	0.002	U	0.002	U
gamma-chlordane (cis)	0.002	U	0.002	U	0.002	U
alpha-chlordane (trans)	0.002	U	0.002	U	0.002	U
chlopyrifos	0.002	U	0.002	U	0.002	U
dieldrin	0.004	U	0.004	U	0.004	U
4,4'-DDT	0.004	U	0.004	U	0.004	U
endosulfan I	0.002	U	0.002	U	0.002	U
endosulfan II	0.004	U	0.004	U	0.004	U
endrin	0.004	U	0.004	U	0.004	U
heptachlor	0.002	U	0.002	U	0.002	U
heptachlor epoxide	0.002	U	0.002	U	0.002	U
gamma-BHC (lindane)	0.002	U	0.002	U	0.002	U
toxaphene	0.1	U	0.1	U	0.1	U

Surrogate Standard	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)
tetrachloro-m-xylene	76	30 - 150	55	30 - 150	93	30 - 150
decachlorobiphenyl	45	30 - 150	46	30 - 150	45	30 - 150

U = Not detected at indicated level.

Pesticides in Elutriates
SW 846 8081B

Lab Number:	29751-034	29751-035	29751-036
Sample Designation:	Composite 1 Elutriate - Rep 1	Composite 1 Elutriate - Rep 2	Composite 1 Elutriate - Rep 3
Date Sampled:	10/24/17 1250	10/24/17 1250	10/24/17 1250
Date Extracted:	10/26/17 0830	10/26/17 0830	10/26/17 0830
Date Analyzed:	11/07/17	11/08/17	11/08/17
Matrix:	Water	Water	Water
Sample Amount (mL):	960	960	960
Final Volume (mL)	1.0	1.0	1.0
Dilution Factor:	1	1	1

	Elutriate Replicate 1		Elutriate Replicate 2		Elutriate Replicate 3	
Analyte	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier
aldrin	0.002	U	0.002	U	0.002	U
gamma-chlordane (cis)	0.002	U	0.002	U	0.002	U
alpha-chlordane (trans)	0.002	U	0.002	U	0.002	U
chlopyrifos	0.002	U	0.002	U	0.002	U
dieldrin	0.004	U	0.004	U	0.004	U
4,4'-DDT	0.004	U	0.004	U	0.004	U
endosulfan I	0.002	U	0.002	U	0.002	U
endosulfan II	0.004	U	0.004	U	0.004	U
endrin	0.004	U	0.004	U	0.004	U
heptachlor	0.002	U	0.002	U	0.002	U
heptachlor epoxide	0.002	U	0.002	U	0.002	U
gamma-BHC (lindane)	0.002	U	0.002	U	0.002	U
toxaphene	0.1	U	0.1	U	0.1	U

Surrogate Standard	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)
tetrachloro-m-xylene	61	30 - 150	94	30 - 150	85	30 - 150
decachlorobiphenyl	134	30 - 150	32	30 - 150	37	30 - 150

U = Not detected at indicated level.

Pesticides in Elutriates
SW 846 8081B

Lab Number:	29751-052	29751-053	29751-054
Sample Designation:	Composite 2 Elutriate Blank - Rep 1	Composite 2 Elutriate Blank - Rep 2	Composite 2 Elutriate Blank - Rep 3
Date Sampled:	10/24/17 1012	10/24/17 1012	10/24/17 1012
Date Extracted:	10/26/17 0830	10/26/17 0830	10/26/17 0830
Date Analyzed:	11/08/17	11/08/17	11/08/17
Matrix:	Water	Water	Water
Sample Amount (mL):	890	920	940
Final Volume (mL)	1.0	1.0	1.0
Dilution Factor:	1	1	1

	Elutriate Replicate 1		Elutriate Replicate 2		Elutriate Replicate 3	
Analyte	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier
aldrin	0.002	U	0.002	U	0.002	U
gamma-chlordane (cis)	0.002	U	0.002	U	0.002	U
alpha-chlordane (trans)	0.002	U	0.002	U	0.002	U
chlopyrifos	0.002	U	0.002	U	0.002	U
dieldrin	0.004	U	0.004	U	0.004	U
4,4'-DDT	0.004	U	0.004	U	0.004	U
endosulfan I	0.002	U	0.002	U	0.002	U
endosulfan II	0.004	U	0.004	U	0.004	U
endrin	0.004	U	0.004	U	0.004	U
heptachlor	0.002	U	0.002	U	0.002	U
heptachlor epoxide	0.002	U	0.002	U	0.002	U
gamma-BHC (lindane)	0.002	U	0.002	U	0.002	U
toxaphene	0.1	U	0.1	U	0.1	U

Surrogate Standard	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)
tetrachloro-m-xylene	88	30 - 150	111	30 - 150	116	30 - 150
decachlorobiphenyl	58	30 - 150	98	30 - 150	168,J18	30 - 150

U = Not detected at indicated level.
J18 = Surrogate %R above limit.

Pesticides in Elutriates
SW 846 8081B

Lab Number:	29751-070	29751-071	29751-072
Sample Designation:	Composite 2 Elutriate - Rep 1	Composite 2 Elutriate - Rep 2	Composite 2 Elutriate - Rep 3
Date Sampled:	10/24/17 1400	10/24/17 1400	10/24/17 1400
Date Extracted:	10/26/17 0830	10/26/17 0830	10/26/17 0830
Date Analyzed:	11/08/17	11/08/17	11/08/17
Matrix:	Water	Water	Water
Sample Amount (mL):	970	970	970
Final Volume (mL)	1.0	1.0	1.0
Dilution Factor:	1	1	1

	Elutriate Replicate 1		Elutriate Replicate 2		Elutriate Replicate 3	
Analyte	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier
aldrin	0.002	U	0.002	U	0.002	U
gamma-chlordane (cis)	0.002	U	0.002	U	0.002	U
alpha-chlordane (trans)	0.002	U	0.002	U	0.002	U
chlopyrifos	0.002	U	0.002	U	0.002	U
dieldrin	0.004	U	0.004	U	0.004	U
4,4'-DDT	0.004	U	0.004	U	0.004	U
endosulfan I	0.002	U	0.002	U	0.002	U
endosulfan II	0.004	U	0.004	U	0.004	U
endrin	0.004	U	0.004	U	0.004	U
heptachlor	0.002	U	0.002	U	0.002	U
heptachlor epoxide	0.002	U	0.002	U	0.002	U
gamma-BHC (lindane)	0.002	U	0.002	U	0.002	U
toxaphene	0.1	U	0.1	U	0.1	U

Surrogate Standard	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)
tetrachloro-m-xylene	119	30 - 150	122	30 - 150	114	30 - 150
decachlorobiphenyl	46	30 - 150	72	30 - 150	70	30 - 150

U = Not detected at indicated level.

Pesticides in Elutriates
SW 846 8081B

Lab Number:	29751-088	29751-089	29751-090
Sample Designation:	Composite 3 Elutriate Blank - Rep 1	Composite 3 Elutriate Blank - Rep 2	Composite 3 Elutriate Blank - Rep 3
Date Sampled:	10/24/17 1054	10/24/17 1054	10/24/17 1054
Date Extracted:	10/26/17 0830	10/26/17 0830	10/26/17 0830
Date Analyzed:	11/08/17	11/08/17	11/08/17
Matrix:	Water	Water	Water
Sample Amount (mL):	960	980	940
Final Volume (mL)	1.0	1.0	1.0
Dilution Factor:	1	1	1

	Elutriate Replicate 1		Elutriate Replicate 2		Elutriate Replicate 3	
Analyte	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier
aldrin	0.002	U	0.002	U	0.002	U
gamma-chlordane (cis)	0.002	U	0.002	U	0.002	U
alpha-chlordane (trans)	0.002	U	0.002	U	0.002	U
chlopyrifos	0.002	U	0.002	U	0.002	U
dieldrin	0.004	U	0.004	U	0.004	U
4,4'-DDT	0.004	U	0.004	U	0.004	U
endosulfan I	0.002	U	0.002	U	0.002	U
endosulfan II	0.004	U	0.004	U	0.004	U
endrin	0.004	U	0.004	U	0.004	U
heptachlor	0.002	U	0.002	U	0.002	U
heptachlor epoxide	0.002	U	0.002	U	0.002	U
gamma-BHC (lindane)	0.002	U	0.002	U	0.002	U
toxaphene	0.1	U	0.1	U	0.1	U

Surrogate Standard	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)
tetrachloro-m-xylene	116	30 - 150	81	30 - 150	72	30 - 150
decachlorobiphenyl	73	30 - 150	59	30 - 150	50	30 - 150

U = Not detected at indicated level.

Pesticides in Elutriates
SW 846 8081B

Lab Number:	29751-106	29751-107	29751-108
Sample Designation:	Composite 3 Elutriate - Rep 1	Composite 3 Elutriate - Rep 2	Composite 3 Elutriate - Rep 3
Date Sampled:	10/24/17 1535	10/24/17 1535	10/24/17 1535
Date Extracted:	10/26/17 0830	10/26/17 0830	10/26/17 0830
Date Analyzed:	11/08/17	11/08/17	11/08/17
Matrix:	Water	Water	Water
Sample Amount (mL):	940	950	960
Final Volume (mL)	1.0	1.0	1.0
Dilution Factor:	1	1	1

	Elutriate Replicate 1		Elutriate Replicate 2		Elutriate Replicate 3	
Analyte	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier	Concentration (ug/L)	Qualifier
aldrin	0.002	U	0.002	U	0.002	U
gamma-chlordane (cis)	0.002	U	0.002	U	0.002	U
alpha-chlordane (trans)	0.002	U	0.002	U	0.002	U
chlopyrifos	0.002	U	0.002	U	0.002	U
dieldrin	0.004	U	0.004	U	0.004	U
4,4'-DDT	0.004	U	0.004	U	0.004	U
endosulfan I	0.002	U	0.002	U	0.002	U
endosulfan II	0.004	U	0.004	U	0.004	U
endrin	0.004	U	0.004	U	0.004	U
heptachlor	0.002	U	0.002	U	0.002	U
heptachlor epoxide	0.002	U	0.002	U	0.002	U
gamma-BHC (lindane)	0.002	U	0.002	U	0.002	U
toxaphene	0.1	U	0.1	U	0.1	U

Surrogate Standard	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)	Recovery (%)	Advisory Limits (%)
tetrachloro-m-xylene	105	30 - 150	115	30 - 150	92	30 - 150
decachlorobiphenyl	31	30 - 150	27,J17	30 - 150	29,J17	30 - 150

U = Not detected at indicated level.
J17 = Surrogate %R below limit.

Pesticides in Water
SW 846 8081B

Lab Number:	29993-101
Sample Designation:	PDS Reference Site Water
Date Sampled:	11/20/17 0900
Date Extracted:	11/20/17 0900
Date Analyzed:	11/23/17
Matrix:	Water
Sample Amount (mL):	980
Final Volume (mL)	1.0
Dilution Factor:	1

Analyte	Concentration (ug/L)	Qualifier
aldrin	0.002	U,R1
gamma-chlordane (cis)	0.002	U,R1
alpha-chlordane (trans)	0.002	U,R1
chlorpyrifos	0.002	U,R1
dieldrin	0.004	U,R1
4,4'-DDT	0.004	U,R1
endosulfan I	0.002	U,R1
endosulfan II	0.004	U,R1
endrin	0.004	U,R1
heptachlor	0.002	U,R1
heptachlor epoxide	0.002	U,R1
gamma-BHC (lindane)	0.002	U,R1
toxaphene	0.1	U,R1

Surrogate Standard	Recovery (%)	Advisory Limits (%)
tetrachloro-m-xylene	85	30 - 150
decachlorobiphenyl	76	30 - 150

U = Not detected at indicated level.
R1 = Sample was run out of recomended hold time.

Appendix D: Biology Data

Appendix D.1: Suspended Particulate Phase Evaluation

AECOM
250 Apollo Drive
Chelmsford
MA, 01824
USA
aecom.com

November 10, 2017

R. Ben Loyd
Department of Army
New England District
Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: Chebeague Island SPP Report
Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0076
Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

Dear Mr. Loyd:

AECOM Technical Services, Inc. (AECOM) is pleased to provide the Suspended Particulate Phase (SPP) Toxicity Testing report under Delivery Order W912WJ17F0106, Task 6 of the Performance Work Statement (PWS) entitled "*Sampling and Testing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine*" dated 4 August 2017.

For your review and use, please find the attached report with SPP results for *Americamysis bahia, Menidia beryllina* and *Arbacia punctulata*. Please let us know if you have any questions or would like anything further.

AECOM certifies that this submission has been subjected to AECOM's review and coordination procedures. Please let us know if you have any questions or if you would like to discuss the report.

Best Regards,

Kris van Naerssen
Project Manager
AECOM
E: kris.vannaerssen@aecom.com

cc: Maura Surprenant, AECOM
Christine Archer, AECOM

Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106

Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

November 10, 2017

SPP Report

ESI

Cert# L-2340 Testing

EnviroSystems, Inc.
P.O. Box 778
Hampton, NH 03843-0778
603-926-3345

TRANSMITTAL LETTER

TO: Kris Van Naerssen, Christine Archer, Maura Surprenant, Mary O'Connell Kozik
AECOM
250 Apollo Drive
Chelmsford, Massachusetts 01824

FROM: Kirk Cram
DATE: November 9, 2017
SUBJECT: Chebeague Island Federal Navigation Project
Chebeague Island, Maine
Contract #: W912WJ-17-D-0003

Attached please find the following Adobe documents and Microsoft Word document (marked as final) revised per the comments provided by Christine Archer via email on November 6 and 9, 2017:

Suspended Particulate Phase Evaluation Report Rev. 1 (secured document)
Suspended Particulate Phase Evaluation Report Rev. 1 (unsecured document)

Pertaining to:

Samples received on: October 18, 2017
Study Number: Master 29746, SPP Study 29752
Number of Samples Received: 5 + PDS Reference Site
Number of Elutriates Analyzed: 3 Elutriates + PDS Reference Site

If you have any questions please do not hesitate to call.

Regards,

Nancy E. Roka

Digitally signed by Nancy E. Roka
DN: cn=Nancy E. Roka, o=EnviroSystems, Inc., ou, email=nroka@envirosystems.com, c=US
Date: 2017.11.09 14:44:31 -05'00'

Kirk Cram
Toxicology Laboratory Manager
EnviroSystems, Inc.
Specialists in Environmental Toxicology and Chemistry

P.O. Box 778
Hampton, NH 03843-0778
Voice: 603-926-3345 Ext. 212 / Fax: 603-926-3521

A Woman Owned Small Business (WOSB) - Celebrating 30 Years of Service

TOXICOLOGICAL EVALUATION
OF A PROPOSED DREDGE SEDIMENT:

Chebeague Island Federal Navigation Project
Tier III Sediment Evaluation
Chebeague Island, Maine

New England District Corps of Engineers
Contract No. W912WJ-17-D-0003
TO#3 Project Number 60551931

Suspended Particulate Phase Evaluation

Prepared For:

AECOM
250 Apollo Drive
Chelmsford, Massachusetts 01824

Prepared By:

EnviroSystems, Incorporated
One Lafayette Road
Hampton, New Hampshire 03842

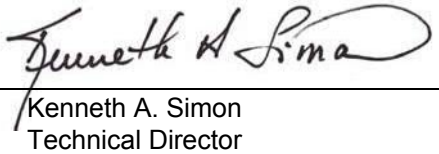
EnviroSystems, Inc. Master Reference 29746
Study Specific Reference 29752
October 2017
Revision 1

TABLE OF CONTENTS

LIST OF TABLES

LABORATORY STANDARDS STATEMENT

This study was performed by EnviroSystems, Incorporated at its facility in Hampton, New Hampshire. EnviroSystems' laboratory is accredited by the State of New Hampshire under the National Environmental Laboratory Accreditation (NELAC) program. Additionally, ESI is accredited under the Department of Defense (DoD) ELAP program, ISO/IEC 17025:2005, Certificate Number L2340. All testing conducted by EnviroSystems as part of this program was compliant with NELAC guidelines and standards. Additionally, this study was conducted in accordance with guidelines presented in the 2004 version of the New England District's Regional Implementation Manual (RIM) for Evaluation of Dredged Material Proposed for Disposal In New England Waters. Any deviations from specific elements of the RIM are detailed in the Protocol Deviation Section of this Report.

For EnviroSystems, Inc.  November 9, 2017

Kenneth A. Simon
Technical Director

Date

TOXICOLOGICAL EVALUATION
OF A PROPOSED DREDGE SEDIMENT:

Chebeague Island Federal Navigation Project
Tier III Sediment Evaluation
Chebeague Island, Maine

New England District Corps of Engineers
Contract No. W912WJ-17-D-0003
TO#3 Project Number 60551931

Suspended Particulate Phase Evaluation

1.0 INTRODUCTION

As part of a comprehensive plan to reduce adverse environmental impacts of ocean dumping, Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 specifies that all sediments to be discharged into ocean waters must be evaluated to define their potential impact on existing benthic communities. The United States Environmental Protection Agency (US EPA) has determined that the most effective means to make such an assessment is through the use of bioassay tests, which provide a relatively direct estimate of potential impact.

This project was designed to evaluate the potential toxicity of sediments from the area of dredging proposed for the Chebeague Island Federal Navigation Project (FNP) located in Chebeague Island, Maine. Testing involved conduct of Suspended Particulate Phase (SPP) assays using the mysid, *Americamysis bahia*, inland silverside minnow, *Menidia beryllina*, and larvae of the sea urchin, *Arbacia punctulata*. Testing followed procedures established by the US EPA and the US Army Corps of Engineers (US ACE) for testing of dredged material, including *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters* (US EPA, CENAE 2004), *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual* (US EPA, US ACE 1991) and *Evaluation of Dredged Material Proposed for Discharge in Waters of the US - Testing Manual* (US EPA, US ACE 1998).

2.0 MATERIALS AND METHODS

2.1 Sample Collection, Preservation and Storage

Sediment cores for toxicological analysis were collected by the US ACE New England District (CENAE) using vibracoring equipment from locations identified in the dredge footprint specified in the project Sampling and Analysis Plan (SAP) (AECOM, 2017). Site water samples were also collected by the CENAE. Samples were received from AECOM, Chelmsford, Massachusetts under chain of custody in 5 gallon polyethylene buckets for sediment and in 5 gallon cubitainers for water. Sediment samples were composited based on the compositing scheme outlined in the SAP. Reference sediment and water samples were collected by the AECOM field team (AECOM and Normandeau Associates, Bedford, New Hampshire) from the Portland Disposal Site (PDS). Upon arrival at the laboratory, all samples received an internal sample control number and were logged into the project sample control system. Prior to testing, samples were placed in a secure refrigerator and stored at a temperature of $4 \pm 2^{\circ}C$ until test initiation. Sample identification, collection and receipt information is summarized in Table 1. Sample compositing information is provided in Table 2.

Water for the internal laboratory control was obtained from the Hampton Estuary, Hampton, New Hampshire. Water from this source has been used for culture and maintenance of test organisms at ESI since 1978. Seawater is obtained through a filter system located on the bottom of the estuary at a point approximately 1 mile from the open ocean. The estuary receives no direct industrial discharges. The Hampton Estuary laboratory control was included to verify the health of the test organisms, and as a relative benchmark for reference site toxicity.

2.2 Elutriate Sample Preparation

The elutriate sample was prepared by placing one volume of test sediment and four volumes of overlying site water in a stainless steel container and mixing with a mechanical stirring device for 30 minutes. Speed of the stirring motor was set so that the sample did not cavitate, entrain air, and oxidize the sample. After mixing, the sediment and water mixture was allowed to settle for an hour. The resulting supernatant solution was then removed by siphon and centrifuged before being submitted for biological and chemical evaluation. A summary of the elutriate preparation is provided in Table 3.

Test concentrations were mixed by diluting the elutriate sample with the overlying water collected from the PDS reference site. Test concentrations for all assays were 1%, 10%, 50% and 100% (undiluted elutriate).

2.3 Test Species

A. bahia were ≤5 days old and were obtained from cultures maintained by Aquatic Research Organisms (ARO), Hampton, New Hampshire. *M. beryllina* were 9-14 days old at the start of the assay and were also obtained from ARO. Prior to use, test organisms were held for a minimum of 2 hours under temperature, salinity, and photoperiod conditions similar to those used in the assay. Organisms were transferred to test vessels using a large bore pipet to minimize the amount of water added to test solutions.

Adult *A. punctulata* were from cultures maintained by ESI. Original stock was obtained from a commercial supplier. Adult sea urchins are maintained in the laboratory for as long as they are viable. Male and female urchins are maintained in separate chambers at a temperature of approximately 12±3°C after spawning.

2.4 Suspended Particulate Phase Assays

2.4.1 SPP Evaluations - *A. bahia* and *M. beryllina*

The 96 hour static acute toxicity tests were conducted at 20±2°C with a photoperiod of 16:8 hours light:dark. Test chambers were 250 mL beakers containing 200 mL of test solution in each of 5 replicates with 10 organisms/replicate. Survival in all test replicates was recorded after 1, 24, 48, 72, and 96 hours of exposure. Dissolved oxygen, pH, temperature and salinity were measured daily in one replicate of each treatment. *A. bahia* and *M. beryllina* were fed twice daily throughout testing.

2.4.2 Embryo Survival and Development SPP Evaluation - *A. punctulata*

The *A. punctulata* embryo survival and development assays were conducted at 20±1°C with a photoperiod of 16:8 hours light:dark. Test chambers for the acute assays were 250 mL glass beakers containing 200 mL test solution in each of 5 replicates. Dissolved oxygen, pH, temperature and salinity were measured in one replicate of each treatment at the start and end of the test. Gametes were obtained by potassium chloride injection to induce spawning. Gametes were collected and diluted with filtered laboratory seawater to yield approximate stock concentrations. Measured aliquots of gamete stock solutions were combined, fertilization success was monitored 15 minutes later, and the density of embryos was calculated. Sufficient embryos were removed from the stock solution and added to each test vessel to achieve a final concentration of approximately 25 to 35 embryos/mL of solution. Prior to transferring embryos from the holding vessel to the individual test vessels, the embryo stock solution was thoroughly homogenized to ensure even distribution. Embryo counts in three surrogate vessels were conducted just after the addition of the embryos for comparison with the actual embryo concentrations in the final elutriate solutions.

Observations in surrogate vessels were used to evaluate test completion. The test is terminated when approximately 90% of the fertilized embryos have reached the pluteus larval stage in the controls (between 48 and 96 hours). On termination, 5 mL aliquots of each test replicate were preserved with 10% buffered formalin solution. All larvae in the 5 mL aliquot were counted to determine survival and normal

development. The period of assay conduct is presented in Table 4.

2.5 Data Analysis

As appropriate, statistical analysis of acute and chronic exposure data was completed using CETIS™ (Comprehensive Environmental Toxicity Information System) version 1.9.3.0 software. The program computes acute exposure endpoints based on US EPA decision tree guidelines specified in individual test methods. Statistical significance was accepted at $\propto = 0.05$.

2.6 Quality Control

As part of the laboratory quality control program, standard reference toxicant assays are conducted on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. Summaries of reference toxicant assays conducted in support of this study are provided in Table 5.

3.0 RESULTS AND DISCUSSION

A summary of endpoints for each species is provided in Table 6. Water quality characteristics are summarized in Table 7. Laboratory bench sheets, water quality data, and associated statistical support data are included in Appendix A.

3.1 SPP Evaluations - *A. bahia*

At the end of the 96 hour exposure period, *A. bahia* survival was 98% in the Hampton Estuary laboratory control and 98% in the PDS reference water treatment. This meets the minimum test acceptability criteria of ≥90% survival in the laboratory control and is an indication that the test organisms were healthy and not stressed by handling. These data are considered valid for evaluating impacts associated with elutriate samples.

Review of data collected at the end of the assay documented that the mysid LC-50s in composite elutriate solutions 1 and 2 were both >100%, and was 43% in composite elutriate solution 3.

3.2 SPP Evaluations - *M. beryllina*

At the end of the 96 hour exposure period, *M. beryllina* survival was 90% in the Hampton Estuary laboratory control and 60% in the PDS reference water treatment. Despite the poor performance in the PDS reference water, the laboratory control met the minimum test acceptability criteria of ≥90% survival indicating that the test organisms were healthy and not stressed by handling. These data are considered valid for evaluating impacts associated with elutriate samples.

Review of data collected at the end of the assay documented that the minnow LC-50s in composite elutriate solutions 1 and 2 were both >100%, and was 76% in composite elutriate solution 3.

Given the poor performance in the PDS reference water and the impacts to *M. beryllina* exposed to composite elutriate solution 3, additional data review was completed to consider whether the respective performances were attributable to sources other than the individual samples. First, adverse effects on mysids and urchins also occurred following exposure to composite elutriate solution 3, demonstrating a commonality of effects from exposure to this sample. It was noted that 60% minnow mortality was observed approximately 1 hour after exposure to composite elutriate solution 3, when reference site survival was still 100%, also demonstrating that toxicity in the elutriate solution is distinct from that in the reference site water, with ammonia being a likely source of toxicity in elutriate 3 (see section 3.5 for a discussion of elutriate ammonia content and toxicity). Additionally, impacts from the reference site water were limited to *M. beryllina* and a general inverse trend in toxicity for this species was observed in all 3 composite elutriate solutions (excluding the 100% treatment for composite elutriate solution 3), demonstrating that impairment

stemming from the reference water was consistent across treatments for this species. Water qualities obtained during testing were comparable across species and waters, demonstrating that the samples themselves were consistent and representative across all assays and species, and also indicating it's unlikely that outside contaminants influenced performance in the *M. beryllina* study. Based on this weight of evidence, observed effects to the minnow following exposure to the reference water and to composite elutriate solution 3 are considered distinct and representative for the species and samples.

3.3 SPP Evaluations - *A. punctulata*

Counts made in the Hampton Estuary laboratory surrogate test vessels at the initiation of the *A. punctulata* assay indicated an average initial embryo concentration of 157 embryos/5mL, equal to approximately 31 embryos/mL. The assay was terminated after 67 hours exposure when it was determined that the majority of the larvae (>90%) had reached the pluteus larval stage. Embryo counts in the Hampton Estuary laboratory control treatment showed 81% of the embryos survived at the end of the assay. Of the original embryos, 81% were normally developed pluteus larvae. Embryo counts in the PDS reference site water showed 80% of the embryos survived and 78% were normally developed at the end of the assay. This meets the minimum test acceptability criteria of ≥70% embryo survival and ≥70% normal development in the laboratory control sample.

Review of the data collected at the end of the assay indicate that site composite elutriate solution 1 had no significant negative impacts on embryonic survival and/or development. Composite elutriate solutions 2 and 3 both had significant negative effects on survival and development with LC-50s, based on Spearman-Kärber calculation, ranging from 3-23% for survival and with EC-50s ranging from 3-15% for development.

3.4 Protocol Deviations

Review of the data collected for these assays documented a few minor deviations from the method protocol and/or ESI's standard procedures. The protocol requires that the *A. punctulata* assay be conducted at 20±1°C. Although the assay was maintained in an incubator set at the target temperature, some temperatures recorded during the assays fell outside of the protocol range due to the ambient laboratory temperature at the time that dilutions were mixed and water quality measurements were taken. Urchins can tolerate temperatures within the ranges measured, and US EPA protocol allows temperatures of 25±2°C for this species. It is the opinion of ESI's technical director that these deviations had no adverse impact on the outcome of the assay.

In addition, the protocol requires that the assays be conducted at 30±2‰. It is not uncommon for the salinity to drift upwards during assay conduct due to evaporation and exceed the protocol requirement, but the salinities are adjusted daily as needed to account for this occurrence except at assay termination. It is the opinion of ESI's technical director that these deviations had no adverse impact on the outcome of the assay.

At 48, 72 and 96 hours, replicate A of the PDS reference water sample in the *A. bahia* assay was found to contain 11 mysids, therefore the same number of animals were presumed to have been added to the test chamber at the start of the assay for purposes of the statistical analyses. This is a reasonable assumption as technicians are checked for their ability to count live organisms and the staff on hand has documented a high degree of counting accuracy. Despite this, counting errors can occur. These impacts should be mitigated by the test design. Testing incorporated 5 replicates for each sample, thereby reducing the impact of a single replicate on the overall assessment. It is the opinion of ESI's study director that this deviation did not adversely affect the outcome of the assay.

3.5 Summary

This program utilized protocols developed by the USEPA and the CENAE to assess the potential impact of the proposed dredge material collected from Chebeague Island would have on the marine environment. Review of the data documents that there were no significant effects on any of the tested organisms following exposure to the undiluted elutriate solution from composite 1. In addition, there were no

adverse effects on mysid or minnow survival after exposure to the undiluted elutriate solutions from composite 2. However, significant adverse effects on mysid and minnow survival occurred following exposure to composite 3 elutriate solution, and composite 2 and 3 elutriate solutions had significant negative effects on urchin larval survival and development.

It was noted that total ammonia levels were elevated (≥10 mg/L) in composite 2 and 3 elutriate solutions at the start of the assays. US EPA guidance suggests ammonia, generally in the unionized form, can be a source of toxicity when total ammonia values are >5 mg/l (USEPA 2002). US EPA Ambient Water Quality Criteria (AWQC) for unionized ammonia in saltwater references LC-50 values for two of the species tested: *A. bahia* (1.04 mg/L) and *M. beryllina* (0.88 mg/L) (USEPA 1989). AWQC for unionized ammonia in saltwater are not available for *A. punctulata*, however effects levels are available in the literature for urchin species ranging from 0.06 mg/L for an EC-50 for development (Maguire Group Inc., 2003) to approximately 0.336 mg/L for a 96-hour LC-50 (Chang-Hoon Lee et al., 2013).

Calculated unionized ammonia values from the start of the assays for composites 2 and 3 ranged between 0.14 to 0.16 mg/L for all three species. However, by the end of these assays the unionized ammonia levels ranged from 0.05 to 0.15 mg/L (*A. bahia*), 0.47 to 0.51 mg/L (*M. beryllina*) and 0.58 to 1.0 mg/L (*A. punctulata*). The higher ending unionized ammonia levels in the minnow and urchin assays appear coincident with rising pH levels in those assays. While it seems unlikely that the unionized ammonia levels caused toxicity to the mysid, it is possible that the total and/or unionized ammonia content may have contributed to the observed toxicity to *M. beryllina* and to *A. punctulata*.

4.0 REFERENCES

AECOM. 2017. *Performance Sampling and Testing in Support of Dredged Material Suitability Determination: Work Plan - Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine [Sampling and Analysis Plan]*. Chelmsford, Massachusetts. October 2017.

Chang-Hoon Lee, Chan-Gyoung Sung, Seong-Dae Moon and Jong-Hyeon Lee. 2013. *Effects of Ammonia on Fertilization, Development, and Larval Survival in the Northern Pacific Asteroid, Asterias amurensis (See Urchin)*. Bulletin of Environmental Contamination and Toxicology (2013) 91:102-106.

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US EPA 2002. *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*. Fifth Edition. EPA-821-R-02-012.

Table 1. Sample Collection and Receipt Information. Suspended Particulate Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. October 2017.

Station ID	ESI Code	Sample Type	Matrix	Collection		Receipt	
				Date	Time	Date	Time
A	29746-001	Site	Solid	10/17/17	0851	10/18/17	0950
B	29746-002	Site	Solid	10/17/17	0948	10/18/17	0950
C	29746-003	Site	Solid	10/17/17	1021	10/18/17	0950
D	29746-004	Site	Solid	10/17/17	1046	10/18/17	0950
F	29746-005	Site	Solid	10/17/17	1121	10/18/17	0950
CIW-1	29746-006	Site	Water	10/17/17	1249	10/18/17	0950
CIW-2	29746-007	Site	Water	10/17/17	1249	10/18/17	0950
CIW-3	29746-008	Site	Water	10/17/17	1249	10/18/17	0950
CI-PDS	29746-009	Reference	Solid	10/17/17	1053	10/18/17	0950
CIW-PDS	29746-010	Reference	Water	10/17/17	1425	10/18/17	0950

Table 2. Summary of Sample Compositing Information. Suspended Particulate Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. October 2017.

Composite ID	ESI Code	Components		Final Amount	Composite	
		Station ID	ESI Code		Date	Time
Composite 1	29747-101	A B	29746-001 29746-002	21 gal	10/23/17	1420
Composite 2	29747-102	C D	29746-003 29746-004	22 gal	10/23/17	1515
Composite 3	29747-103	F	29746-005	21 gal	10/24/17	0840
PDS Reference Site Water	29747-105	CIW-PDS [a] (Top, Middle and Bottom)	29746-010	15 gal	10/24/17	1025

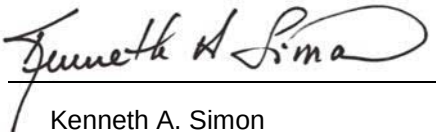
Note:
[a] This sample was homogenized only.

Table 3. Elutriate Solution Preparation. Suspended Particulate Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. October 2017.

Water		Sediment		Elutriate Preparation			
Station ID	ESI Code	Composite ID	ESI Code	Elutriate ID	ESI Code	Date	Time
CIW-1	29746-006	Composite 1	29747-101	Composite 1 Elutriate	29750-100	10/24/17	1250
CIW-2	29746-007	Composite 2	29747-102	Composite 2 Elutriate	29750-101	10/24/17	1400
CIW-3	29746-008	Composite 3	29747-103	Composite 3 Elutriate	29750-102	10/24/17	1535

LABORATORY STANDARDS STATEMENT

This study was performed by EnviroSystems, Incorporated at its facility in Hampton, New Hampshire. EnviroSystems' laboratory is accredited by the State of New Hampshire under the National Environmental Laboratory Accreditation (NELAC) program. Additionally, ESI is accredited under the Department of Defense (DoD) ELAP program, ISO/IEC 17025:2005, Certificate Number L2340. All testing conducted by EnviroSystems as part of this program was compliant with NELAC guidelines and standards. Additionally, this study was conducted in accordance with guidelines presented in the 2004 version of the New England District's Regional Implementation Manual (RIM) for Evaluation of Dredged Material Proposed for Disposal In New England Waters. Any deviations from specific elements of the RIM are detailed in the Protocol Deviation Section of this Report.

For EnviroSystems, Inc.  December 11, 2017

Kenneth A. Simon
Technical Director

Date

Table 4. Period of Assay Conduct. Suspended Particulate Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. October 2017.

Elutriate		Test Species	Assay Start		Assay End	
Comp/Elutriate ID	ESI Code		Date	Time	Date	Time
Composite 1 Elutriate	29750-100	*A. bahia*	10/24/17	1745	10/28/17	1450
Composite 2 Elutriate	29750-101	*M. beryllina*	10/24/17	1755	10/28/17	1450
Composite 3 Elutriate	29750-102	*A. punctulata*	10/24/17	1735	10/27/17	1240

Table 5. Reference Toxicant Data Summary. Suspended Particulate Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. October 2017.

Date	Organism Lot	Endpoint	Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
A. bahia						
08/31/17	03AbARO083017	96Hr LC-50	20.5	18.0	13.3 - 22.8	SDS (mg/L)
11/02/17	03AbARO110217	96Hr LC-50	53.7	53.7 [a]	[a]	NH4Cl (mg/L)
M. beryllina						
08/31/17	-	96Hr LC-50	7.2	6.2	3.6 - 8.8	SDS (mg/L)
11/02/17	10MbARO110217	96Hr LC-50	60.9	60.9 [a]	[a]	NH4Cl (mg/L)
A. punctulata						
08/30/17	99ApARO083017	EC-50	16.1	18.9	10.4 - 27.5	Copper (µg/L)
10/24/17	99ApARO082917	EC-50	1.8	1.8 [a]	[a]	NH4Cl (µg/L)

Notes: Means and Acceptable Ranges based on the most recent 20 reference toxicant assays.
[a] Values are based on the results of 1 assay, therefore an acceptable range is not available.

Table 6. Summary of Endpoints and Adverse Effects. Suspended Particulate Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. October 2017.

		A. bahia	*M. beryllina*	*A. punctulata*	
Comp/Elutriate ID	ESI Code	LC-50 (Survival)	LC-50 (Survival)	LC-50 (Survival)	EC-50 (Development)
Composite 1 Elutriate	29750-100	>100%	>100%	>100%	>100%
Composite 2 Elutriate	29750-101	>100%	>100%	23%	15%
Composite 3 Elutriate	29750-102	43%	76%	3%	3%

Table 7. Summary of Water Quality Data. Suspended Particulate Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. October 2017.

Comp/Elutriate ID	Temp (°C)		pH (SU)		Ammonia (mg/L)		Ammonia (mg/L)	
	Start	End	Start	End	Start		End	
					Total	Unionized	Total	Unionized
A. bahia								
Laboratory Control	22.00	20.00	8.12	7.65	<0.1	<0.0028	1.8	0.0313
PDS Reference Water	22.00	20.00	7.88	7.68	<0.1	<0.0017	1.6	0.0297
Composite 1 Elutriate	22.00	19.00	7.65	7.91	2.9	0.0581	3.2	0.0929
Composite 2 Elutriate	22.00	19.00	7.56	7.70	9.9	0.1618	8.02	0.1452
Composite 3 Elutriate	22.00	22.00	7.29	7.29	16	0.1415	5.2	0.0460
M. beryllina								
Laboratory Control	22.00	20.00	8.12	7.69	<0.1	<0.0028	1.7	0.0323
PDS Reference Water	22.00	20.00	7.88	7.71	<0.1	<0.0017	1.7	0.0338
Composite 1 Elutriate	22.00	19.00	7.65	7.95	2.9	0.0581	3.2	0.1016
Composite 2 Elutriate	22.00	20.00	7.56	8.27	9.9	0.1618	6.9	0.4736
Composite 3 Elutriate	22.00	20.00	7.20	8.16	16	0.1415	9.5	0.5141
A. punctulata								
Laboratory Control	22.00	20.00	8.12	8.02	<0.1	<0.0028	0.12	0.0048
PDS Reference Water	22.00	20.00	7.88	8.00	<0.1	<0.0017	0.15	0.0057
Composite 1 Elutriate	22.00	21.00	7.65	8.18	2.9	0.0581	2.9	0.1755
Composite 2 Elutriate	22.00	20.00	7.55	8.19	9.9	0.1582	10	0.5776
Composite 3 Elutriate	22.00	21.00	7.31	8.19	16	0.1481	16	0.9897

APPENDIX A:

RAW DATA & STATISTICAL SUPPORT

STUDY NUMBER RECORD

Issue and complete this form for studies that will require multiple tasks and directly associated support studies. Issue consecutive study numbers at the start of the project to cover all potential elements of the project.

CLIENT: AECOM

CONTACT(S): Kris Van Naerssen, Christine Archer, Maura Surprenant

PROJECT: Chebeague Island FNP

CONTRACT / TO #: W912WJ-17-D-0003 / #3 Project Number 60551931

	Species / Analysis Parameters:		STUDY:
Sample Receipt:			**29746**
Grain Size Analysis:			**-**
Composite Prep:			**29747**
Bulk Sediment Analysis [a]:			**-**
10 Day Assay:	***Leptocheirus plumulosus***		**29748**
	Americamysis bahia		**29749**
Elutriate Preparation:	**Type:**		**29750**
Elutriate Analysis:	**Pentachlorophenol**	**Yes / No**	**29751**
	Trace Metals	**Yes / No**	
	PCB Congeners	**Yes / No**	
	Pesticides	**Yes / No**	
SPP Assays:	***Menidia beryllina***		**29752**
	Americamysis bahia		
	Arbacia punctulata		
Bioaccumulation Study:	***Macoma nasuta***		**29753**
	Nereis virens		**29754**
Tissue Analysis [a]:	**Trace Metals**	**Yes / No**	**29755**
	PAH Compounds	**Yes / No**	
	PCB Congeners	**Yes / No**	
	Pesticides	**Yes / No**	

Notes:

[a] All bulk sediment and tissue analyses were completed by Alpha Analytical, Mansfield, Massachusetts.

Laboratory Composite Preparation Documentation

Project Number: 29746

Project Name: Chebeague

Composite Identifier: Composite 1

Composite Lab ID.: 29747-101 Composite Final Volume: ≈ 21 gallons

Composite Matrix: Solid Composite Container(s): 7 x 3 gallons

Composite Prepared Date: 10/23/17 1 x 1 gallon

Composite Prepared Time: 1420

Initials: JTP

Protocol: ESI SOP 1478

This composite was prepared according to protocols cited using the samples and amounts listed below:

Field ID	ESI Lab ID	Matrix	Liquids Excluded	Solids Excluded	Amount Added	Notes
Station Location A	29746-001	Solid	—	≈ 1L	≈ 12g	Rocks + Stick/Shells
Station Location B	29746-002	Solid	—	≈ 1L	≈ 12g	Rocks + Shells

Subsamples Removed:

Lab Number	Sample Use
29750	Elut. Prep.
29748	L.p. Solid phase
29749	A.b. Solid phase
29753	M.n. 28 day BA
29754	N.v. 28 day BA

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Laboratory Composite Preparation Documentation

Project Number: 29746

Project Name: Chebeague

Composite Identifier: Composite 2

Composite Lab ID.: 29747-102 Composite Final Volume: ≈22 gallons

Composite Matrix: Solid Composite Container(s): 7 x 3 gallons

Composite Prepared Date: 10/23/17 1 x 1 gallon

Composite Prepared Time: 1515

Initials: JTP

Protocol: ESI SOP 1478

This composite was prepared according to protocols cited using the samples and amounts listed below:

Field ID	ESI Lab ID	Matrix	Liquids Excluded	Solids Excluded	Amount Added	Notes
Station Location C	29746-003	Solid	—	≈1.5L	≈12 gal	Rocks, shells
Station Location D	29746-004	Solid	—	≈200mL	≈12gal	Rocks, few leaves

Subsamples Removed:

Lab Number	Sample Use
29750	Elut. Prep.
29748	L.p. Solid phase
29749	A.b. Solid phase
29753	M.n. 28 day BA
29754	N.v. 28 day BA

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Laboratory Composite Preparation Documentation

Project Number: 29746

Project Name: Chebeague

Composite Identifier: Composite 3

Composite Lab ID.: 29747-103 Composite Final Volume: 21 gallons

Composite Matrix: Solid Composite Container(s): 7 x 3 gallon buckets

Composite Prepared Date: 10/24/17 1 x 1 gallon

Composite Prepared Time: 0840

Initials: JTP

Protocol: ESI SOP 1478

This composite was prepared according to protocols cited using the samples and amounts listed below:

Field ID	ESI Lab ID	Matrix	Liquids Excluded	Solids Excluded	Amount Added	Notes
Station Location F	29746-005	Solid	N/A	≈1.5L	≈21 gallons	rocks and detritus excluded

Subsamples Removed:

Lab Number	Sample Use
29750	Elut. Prep.
29748	L.p. Solid phase
29749	A.b. Solid Phase
29753	M.n. 28 day BA
29754	N.v. 28 day BA

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Laboratory Homogenization Documentation

Project Number: 29746

Project Name: Chebeague

Composite Identifier: PDS Reference Site Water

Composite Lab ID.: 29747-105 Composite Final Volume: 15gallons

Composite Matrix: Water Composite Container(s): 3x5gallon cubitainers

Composite Prepared Date: 10/24/17

Composite Prepared Time: 1025

Initials: BG

Protocol: ESI SOP 1478

This composite was prepared according to protocols cited using the samples and amounts listed below:

Field ID	ESI Lab ID	Matrix	Liquids Excluded	Solids Excluded	Amount Added	Notes
CIW - PDS	Top	Water	N/A	N/A	5gal	
	Middle	Water	N/A	N/A	5gal	
	Bottom	Water	N/A	N/A	5gal	

Subsamples Removed:

Lab Number	Sample Use

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03A6ARO102417

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species AMERICAMYSIS BAHIA

Source: Lab reared ✓ Hatchery reared _____ Field collected _____

Hatch date 10-21-17 Receipt date _____

Lot number 102117MS Strain _____

Brood origination FLORIDA

II. Water Quality

Temperature 25 °C Salinity ~28 ppt D.O. — ppm

pH 7.8 su Hardness — ppm Alkalinity — ppm

III. Culture Conditions

Freshwater _____ Saltwater ✓ Other _____

Recirculating ✓ Flow through _____ Static renewal _____

DIET: Flake food ✓ Phytoplankton _____ Trout chow _____

Artemia ✓ Rotifers _____ YCT _____ Other ENCAP. SHRIMP DIET

Prophylactic treatments: _____

Comments: _____

_____

IV. Shipping Information

Client: EST # of Organisms 10000+

Carrier: _____ Date shipped 10-24-17

Biologist: Mark Voorhees

PO BOX 1271 HAMPTON NH 03843-1271 (603) 926-1650 AROFISH@AOL.COM

Americamysis 96-h Acute Survival Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:45 **Species:** Americamysis bahia **Sample Code:** 29750-100
End Date: 28 Oct-17 14:50 **Protocol:** EPA/821/R-02-012 (2002) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 12:50 **Material:** Elutriate Solution **Sample Station:** Comp 1 Elutriate (Stations A,B)

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	3	11				11	
0	D	2	9	10				10	
0	D	3	13	10				10	
0	D	4	20	10				9	
0	D	5	30	10				10	
0	L	1	1	10				9	
0	L	2	8	10				10	
0	L	3	16	10				10	
0	L	4	21	10				10	
0	L	5	26	10				10	
1		1	4	10				9	
1		2	7	10				9	
1		3	17	10				9	
1		4	24	10				10	
1		5	27	10				10	
10		1	5	10				10	
10		2	10	10				10	
10		3	15	10				10	
10		4	23	10				9	
10		5	25	10				10	
50		1	6	10				10	
50		2	12	10				10	
50		3	18	10				9	
50		4	19	10				10	
50		5	28	10				9	
100		1	2	10				8	
100		2	11	10				10	
100		3	14	10				10	
100		4	22	10				9	
100		5	29	10				10	

Americamysis 96-h Acute Survival Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:45 **Species:** Americamysis bahia **Sample Code:** 29750-101
End Date: 28 Oct-17 14:50 **Protocol:** EPA/821/R-02-012 (2002) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 14:00 **Material:** Elutriate Solution **Sample Station:** Comp 2 Elutriate (Stations C,D)

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	2	11				11	
0	D	2	10	10				10	
0	D	3	17	10				10	
0	D	4	19	10				9	
0	D	5	29	10				10	
0	L	1	6	10				9	
0	L	2	8	10				10	
0	L	3	14	10				10	
0	L	4	20	10				10	
0	L	5	25	10				10	
1		1	1	10				10	
1		2	9	10				10	
1		3	13	10				10	
1		4	22	10				10	
1		5	28	10				10	
10		1	5	10				10	
10		2	11	10				10	
10		3	15	10				10	
10		4	23	10				8	
10		5	26	10				10	
50		1	3	10				10	
50		2	7	10				10	
50		3	16	10				9	
50		4	24	10				10	
50		5	30	10				10	
100		1	4	10				10	
100		2	12	10				10	
100		3	18	10				10	
100		4	21	10				10	
100		5	27	10				9	

Americamysis 96-h Acute Survival Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:45 **Species:** Americamysis bahia **Sample Code:** 29750-102
End Date: 28 Oct-17 14:50 **Protocol:** EPA/821/R-02-012 (2002) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 15:35 **Material:** Elutriate Solution **Sample Station:** Comp 3 Elutriate (Station F)

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	3	11				11	
0	D	2	9	10				10	
0	D	3	13	10				10	
0	D	4	19	10				9	
0	D	5	27	10				10	
0	L	1	4	10				9	
0	L	2	12	10				10	
0	L	3	17	10				10	
0	L	4	20	10				10	
0	L	5	30	10				10	
1		1	2	10				10	
1		2	10	10				10	
1		3	15	10				10	
1		4	22	10				9	
1		5	26	10				10	
10		1	5	10				10	
10		2	7	10				10	
10		3	16	10				10	
10		4	21	10				9	
10		5	25	10				10	
50		1	1	10				4	
50		2	11	10				3	
50		3	14	10				6	
50		4	24	10				7	
50		5	29	10				8	
100		1	6	10				0	
100		2	8	10				0	
100		3	18	10				0	
100		4	23	10				0	
100		5	28	10				0	

Aquatic Research Organisms

10MbARO102417

DATA SHEET

I. Organism History

Species MENIDIA BERYLLINA

Source: Lab reared ✓ Hatchery reared _____ Field collected _____

Hatch date 10-14-17 Receipt date _____

Lot number 101117MB Strain _____

Brood origination CAPE COD MA

II. Water Quality

Temperature 25 °C Salinity ~28 ppt D.O. — ppm

pH 7.8 su Hardness — ppm Alkalinity — ppm

III. Culture Conditions

Freshwater _____ Saltwater ✓ Other _____

Recirculating ✓ Flow through _____ Static renewal _____

DIET: Flake food ✓ Phytoplankton _____ Trout chow _____

Artemia ✓ Rotifers ✓ YCT _____ Other Encap. Shrimp Diet

Prophylactic treatments: _____

Comments: _____

_____

IV. Shipping Information

Client: ESI # of Organisms 10000+

Carrier: _____ Date shipped 10-24-17

Biologist: Mark Dennison

PO BOX 1271 HAMPTON NH 03843-1271 (603) 926-1650 AROFISH@AOL.COM

STUDY: 29752
CLIENT: AECOM
PROJECT: Chebegue
ASSAY: MB96AD
SPECIES: *M. beryllina*
TASK: **Wet Weight Data - Balance Output File**
BALANCE: **Ohaus Discovery Balance Model DV215CD**
Serial #: **1124024313**

Date / Intials:	10/24/17 CS CS
Rep	
1	0.00268
2	0.0035
3	0.00152
4	0.00252
5	0.00318
6	0.00213
7	0.00208
8	0.00132
9	0.00322
10	0.00251
11	0.00244
12	0.00144
13	0.00132
14	0.00158
15	0.00211
16	0.00293
17	0.00228
18	0.00139
19	0.00113
20	0.00225
Mean Weight (g):	0.00218
Test Volume (L):	0.2
Loading Rate(g/L):	0.10883

Menidia beryllina 96-h Acute Survival Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:55 **Species:** Menidia beryllina **Sample Code:** 29750-100
End Date: 28 Oct-17 14:50 **Protocol:** EPA/821/R-02-012 (2002) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 12:50 **Material:** Elutriate Solution **Sample Station:** Comp 1 Elutriate (Stations A,B)

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	1	10				5	
0	D	2	11	10				8	
0	D	3	18	10				7	
0	D	4	23	10				6	
0	D	5	27	10				4	
0	L	1	4	10				10	
0	L	2	7	10				8	
0	L	3	13	10				9	
0	L	4	20	10				9	
0	L	5	26	10				9	
1		1	3	10				6	
1		2	8	10				8	
1		3	14	10				8	
1		4	22	10				8	
1		5	28	10				8	
10		1	5	10				8	
10		2	12	10				9	
10		3	16	10				8	
10		4	21	10				7	
10		5	29	10				10	
50		1	2	10				10	
50		2	10	10				8	
50		3	17	10				7	
50		4	19	10				9	
50		5	25	10				9	
100		1	6	10				9	
100		2	9	10				7	
100		3	15	10				9	
100		4	24	10				9	
100		5	30	10				9	

Menidia beryllina 96-h Acute Survival Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:55 **Species:** Menidia beryllina **Sample Code:** 29750-101
End Date: 28 Oct-17 14:50 **Protocol:** EPA/821/R-02-012 (2002) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 14:00 **Material:** Elutriate Solution **Sample Station:** Comp 2 Elutriate (Stations C,D)

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	6	10				5	
0	D	2	12	10				8	
0	D	3	13	10				7	
0	D	4	19	10				6	
0	D	5	30	10				4	
0	L	1	3	10				10	
0	L	2	7	10				8	
0	L	3	15	10				9	
0	L	4	21	10				9	
0	L	5	27	10				9	
1		1	5	10				9	
1		2	10	10				9	
1		3	17	10				10	
1		4	24	10				9	
1		5	28	10				7	
10		1	4	10				9	
10		2	8	10				8	
10		3	18	10				8	
10		4	23	10				10	
10		5	29	10				8	
50		1	2	10				10	
50		2	11	10				9	
50		3	16	10				7	
50		4	22	10				10	
50		5	26	10				10	
100		1	1	10				10	
100		2	9	10				10	
100		3	14	10				9	
100		4	20	10				8	
100		5	25	10				9	

Menidia beryllina 96-h Acute Survival Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:55 **Species:** Menidia beryllina **Sample Code:** 29750-102
End Date: 28 Oct-17 14:50 **Protocol:** EPA/821/R-02-012 (2002) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 15:35 **Material:** Elutriate Solution **Sample Station:** Comp 3 Elutriate (Station F)

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	5	10				5	
0	D	2	9	10				8	
0	D	3	18	10				7	
0	D	4	21	10				6	
0	D	5	26	10				4	
0	L	1	4	10				10	
0	L	2	8	10				8	
0	L	3	17	10				9	
0	L	4	20	10				9	
0	L	5	30	10				9	
1		1	1	10				8	
1		2	12	10				6	
1		3	13	10				10	
1		4	22	10				8	
1		5	28	10				6	
10		1	6	10				10	
10		2	7	10				9	
10		3	16	10				9	
10		4	24	10				10	
10		5	29	10				7	
50		1	3	10				10	
50		2	11	10				10	
50		3	14	10				9	
50		4	23	10				9	
50		5	27	10				9	
100		1	2	10				2	
100		2	10	10				2	
100		3	15	10				0	
100		4	19	10				2	
100		5	25	10				1	

EMBRYO WORKSHEET

DATE: 10/24/17 ESI STUDY: 29752

CLIENT: AECOM PROJECT: Chebeague

Eggs Collected @: 1535 Pre-assay fertilization check: 92% ANALYST: GRS

Sperm Collected @: 1525 *A mated subsample of egg+sperm must achieve ≥90% fertilization in order to be used in testing.*

Egg Stock Suspension Count:

Take 1mL of egg stock suspension and using a glass graduated cylinder dilute with seawater to a final volume of 100 mL. Count a subsample of the diluted suspension to get an estimate of the egg concentration. The diluted suspension should have 40 - 50 eggs/mL, (which would represent an egg concentration of 4,000 - 5,000 in the stock suspension.)

Egg Count (per mL) of diluted suspension: 60

Sperm Stock Suspension Count:

Once added to the egg stock, the final sperm concentration should be $1x10^5$ - $1x10^7$ in solution D.

1. Hemocytometer Count (D): 139
2. Hemocytometer Count (D): 135

Average Count (D): 137 X10^4 = spm solution D = 1.37×10^6

Sperm Concentrations:

Solution D X 40 = Solution A = 5.48×10^7

Solution D X 20 = Solution B = 2.74×10^7

Solution D X 5 = Solution C = 6.85×10^6

Sperm Count (per mL): 1.37×10^6

mL of Eggs to Add: 150

mL of Sperm to Add: 30 Gametes mixed @: 1620

Gametes must be mixed within 1 hour of collection.

Calculated Embryo Stock Concentration (per mL): 31

Calculated Embryo Stock (mL) needed per chamber: 1.20

The test concentration should be 15 - 30 embryos per mL.

Add calculated amount of embryo stock to a surrogate chamber, gently mix, then count a 5mL aliquot.

Embryo Concentration Check: 31

If the check concentration is acceptable, then proceed with embryo addition to the test.

Volume Embryo Stock (mL) added to test solutions: @GRS 1620 1.0

Embryos Added to Test Solutions @: 1735

INITIAL COUNTS:	Embryos/ 5 mL
SURROGATE A	156
SURROGATE B	161
SURROGATE C	154
Mean:	157

Organism Lot ID: 99AeAR008291 7

Mean per mL: 31

Arbacia Punctulata Survival / Development Assay

ESI Study: 29752 Assay Start: 10/24/17 1735

Client: AECOM Assay End: 10/27/17 1240

Count Date: 10/28-29/2017 Initials: GRS / Count KHF

Treatment	REP A Alive / Normal	REP B Alive / Normal	REP C Alive / Normal	REP D Alive / Normal	REP E Alive / Normal
Lab Control Water	131/131	124/122	128/127	118/118	134/134
PDS Reference Water	111/110	156/155	118/116	116/112	123/115
Composite 1 Elutriate	**REP A Alive / Normal**	**REP B Alive / Normal**	**REP C Alive / Normal**	**REP D Alive / Normal**	**REP E Alive / Normal**
1%	103/100	112/109	78/76	86/83	99/98
10%	101/100	108/107	107/103	131/128	111/109
50%	91/91	94/93	96/95	109/108	97/95
100%	79/68	93/89	85/84	92/86	95/90
Composite 2 Elutriate	**REP A Alive / Normal**	**REP B Alive / Normal**	**REP C Alive / Normal**	**REP D Alive / Normal**	**REP E Alive / Normal**
1%	80/80	(3) ~~105/99~~	101/97	96/~~90~~	113/108
10%	85/79	95/93	99/98	76/70	85/81
50%	33/1	43/0	11/0	35/0	37/0
100%	31/0	39/0	34/0	27/0	32/0
Composite 3 Elutriate	**REP A Alive / Normal**	**REP B Alive / Normal**	**REP C Alive / Normal**	**REP D Alive / Normal**	**REP E Alive / Normal**
1%	49/48	105/99	116/112	114/109	121/116
10%	18/16	14/10	14/10	21/15	17/12
50%	2/0	1/0	0/0	1/0	1/0
100%	0/0	0/0	0/0	0/0	0/0

REP B 93/91

Echinoid Embryo-Larval Development Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:35 **Species:** Arbacia punctulata **Sample Code:** 29750-100
End Date: 27 Oct-17 12:40 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 12:50 **Material:** Elutriate Solution **Sample Station:** Comp 1 Elutriate (Stations A,B)

Conc-%	Code	Rep	Pos	# Exposed	# Survived	# Normal	Notes
0	D	1	6	157	111	110	
0	D	2	8	157	156	155	
0	D	3	16	157	118	116	
0	D	4	22	157	116	112	
0	D	5	25	157	123	115	
0	L	1	2	157	131	131	
0	L	2	7	157	124	122	
0	L	3	13	157	128	127	
0	L	4	20	157	118	118	
0	L	5	29	157	134	134	
1		1	3	157	103	100	
1		2	11	157	112	109	
1		3	17	157	78	76	
1		4	21	157	86	83	
1		5	28	157	99	98	
10		1	4	157	101	100	
10		2	12	157	108	107	
10		3	14	157	107	103	
10		4	23	157	131	128	
10		5	26	157	111	109	
50		1	1	157	91	91	
50		2	10	157	94	93	
50		3	18	157	96	95	
50		4	19	157	109	108	
50		5	27	157	97	95	
100		1	5	157	79	68	
100		2	9	157	93	89	
100		3	15	157	85	84	
100		4	24	157	92	86	
100		5	30	157	95	90	

Echinoid Embryo-Larval Development Test — **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:35
End Date: 27 Oct-17 12:40
Sample Date: 24 Oct-17 14:00
Species: Arbacia punctulata
Protocol: EPA/600/R-95/136 (1995)
Material: Elutriate Solution
Sample Code: 29750-101
Sample Source: Chebeague Island FNP
Sample Station: Comp 2 Elutriate (Stations C,D)

Conc-%	Code	Rep	Pos	# Exposed	# Survived	# Normal	Notes
0	D	1	5	157	111	110	
0	D	2	9	157	156	155	
0	D	3	15	157	118	116	
0	D	4	22	157	116	112	
0	D	5	28	157	123	115	
0	L	1	1	157	131	131	
0	L	2	7	157	124	122	
0	L	3	16	157	128	127	
0	L	4	24	157	118	118	
0	L	5	27	157	134	134	
1		1	4	157	80	80	
1		2	10	157	93	91	
1		3	13	157	101	97	
1		4	19	157	96	90	
1		5	30	157	113	108	
10		1	2	157	85	79	
10		2	11	157	95	93	
10		3	14	157	99	98	
10		4	20	157	76	70	
10		5	29	157	85	81	
50		1	3	157	33	1	
50		2	12	157	43	0	
50		3	18	157	11	0	
50		4	23	157	35	0	
50		5	26	157	37	0	
100		1	6	157	31	0	
100		2	8	157	39	0	
100		3	17	157	34	0	
100		4	21	157	27	0	
100		5	25	157	32	0	

Echinoid Embryo-Larval Development Test **EnviroSystems, Inc.**

Start Date: 24 Oct-17 17:35 **Species:** Arbacia punctulata **Sample Code:** 29750-102
End Date: 27 Oct-17 12:40 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Chebeague Island FNP
Sample Date: 24 Oct-17 15:35 **Material:** Elutriate Solution **Sample Station:** Comp 3 Elutriate (Station F)

Conc-%	Code	Rep	Pos	# Exposed	# Survived	# Normal	Notes
0	D	1	1	157	111	110	
0	D	2	8	157	156	155	
0	D	3	14	157	118	116	
0	D	4	21	157	116	112	
0	D	5	29	157	123	115	
0	L	1	3	157	131	131	
0	L	2	12	157	124	122	
0	L	3	16	157	128	127	
0	L	4	20	157	118	118	
0	L	5	30	157	134	134	
1		1	4	157	49	48	
1		2	9	157	105	99	
1		3	18	157	116	112	
1		4	23	157	114	109	
1		5	26	157	121	116	
10		1	5	157	18	16	
10		2	11	157	14	10	
10		3	13	157	14	10	
10		4	24	157	21	15	
10		5	27	157	17	12	
50		1	2	157	2	0	
50		2	7	157	1	0	
50		3	17	157	0	0	
50		4	19	157	1	0	
50		5	25	157	1	0	
100		1	6	157	0	0	
100		2	10	157	0	0	
100		3	15	157	0	0	
100		4	22	157	0	0	
100		5	28	157	0	0	

STUDY: 29752
CLIENT: AECOM
PROJECT: Chebeague Island FNP, Contract #W912WJ-17-D-0003
ASSAY: Suspended Particulate Phase
TASK: Ammonia Summary
METHOD: SM 4500-NH3 G

Sample ID	Hour	ESI Code	Total	Ammonia Unionized	QLimit	Units	Sampled	Analyzed
Start *Americamysis bahia* and *Menidia beryllina*								
Laboratory Control	00	29752-100	ND	0.0028	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
PDS Reference Site	00	29752-101	ND	0.0017	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
Composite 1	00	29752-102	2.9	0.0581	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
Composite 2	00	29752-103	9.9	0.1618	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
Composite 3	00	29752-104	16	0.1415	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
Start *Arbacia punctulata*								
Laboratory Control	00	29752-100	ND	0.0028	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
PDS Reference Site	00	29752-101	ND	0.0017	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
Composite 1	00	29752-102	2.9	0.0581	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
Composite 2	00	29752-103	9.9	0.1582	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
Composite 3	00	29752-104	16	0.1481	0.1	mg/L as N	10/24/17 1730	10/30/17 1230
End *Americamysis bahia*								
Laboratory Control	96	29752-205	1.8	0.0313	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
PDS Reference Site	96	29752-206	1.6	0.0297	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
Composite 1	96	29752-207	3.2	0.0929	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
Composite 2	96	29752-208	8.02	0.1452	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
Composite 3 [a]	96	29752-209	5.2	0.0460	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
End *Menidia beryllina*								
Laboratory Control	96	29752-210	1.7	0.0323	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
PDS Reference Site	96	29752-211	1.7	0.0338	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
Composite 1	96	29752-212	3.2	0.1016	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
Composite 2	96	29752-213	6.9	0.4736	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
Composite 3	96	29752-214	9.5	0.5141	0.1	mg/L as N	10/28/17 1515	10/30/17 1230
End *Arbacia punctulata*								
Laboratory Control	67	29752-200	0.12	0.0048	0.1	mg/L as N	10/27/17 1300	10/30/17 1230
PDS Reference Site	67	29752-201	0.15	0.0057	0.1	mg/L as N	10/27/17 1300	10/30/17 1230
Composite 1	67	29752-202	2.9	0.1755	0.1	mg/L as N	10/27/17 1300	10/30/17 1230
Composite 2	67	29752-203	10	0.5776	0.1	mg/L as N	10/27/17 1300	10/30/17 1230
Composite 3	67	29752-204	16	0.9897	0.1	mg/L as N	10/27/17 1300	10/30/17 1230

Notes:

[a] Unionized ammonia concentrations at assay end were calculated using the last recorded temperature and pH values (Day 0).

Appendix D.2: 10-Day Whole Sediment Bioassay (10 Day Solid Phase Evaluation)

AECOM
250 Apollo Drive
Chelmsford
MA, 01824
USA
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December 11, 2017

R. Ben Loyd
Department of Army
New England District
Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: Chebeague Island 10-Day Whole Sediment Acute Toxicity Testing Report
Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106
Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

Dear Mr. Loyd:

AECOM Technical Services, Inc. (AECOM) is pleased to provide the 10-Day Whole Sediment Acute Toxicity Testing report under Delivery Order W912WJ17F0106, Task 7 of the Performance Work Statement (PWS) entitled "*Sampling and Testing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine*" dated 4 August 2017.

AECOM certifies that this submission has been subjected to AECOM's review and coordination procedures. Please let us know if you have any questions or if you would like to discuss the progress report.

Best Regards,

Kris van Naerssen
Project Manager
AECOM
E: kris.vannaerssen@aecom.com

cc: Maura Surprenant, AECOM
Christine Archer, AECOM

Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106

Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

December 11, 2017

10-Day Whole Sediment Acute Toxicity Testing Report

TOXICOLOGICAL EVALUATION
OF A PROPOSED DREDGE SEDIMENT:

Chebeague Island Federal Navigation Project
Tier III Sediment Evaluation
Chebeague Island, Maine

New England District Corps of Engineers
Contract No. W912WJ-17-D-0003
TO#3 Project Number 60551931

10 Day Solid Phase Evaluation

Prepared For:

AECOM
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Chelmsford, Massachusetts 01824

Prepared By:

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EnviroSystems, Inc. Master Reference 29746
Specific Studies 29748 & 29749
November 2017
Revision 1

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Chebeague Island Federal Navigation Project
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Chebeague Island, Maine

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10 Day Solid Phase Evaluation

1.0 INTRODUCTION

As part of a comprehensive plan to reduce adverse environmental impacts of ocean dumping, Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 specifies that all sediments to be discharged into ocean waters must be evaluated to define their potential impact on existing benthic communities. The United States Environmental Protection Agency (US EPA) has determined that the most effective means to make such an assessment is through the use of bioassay tests, which provide a relatively direct estimate of potential impact.

This project was designed to evaluate the potential toxicity of sediments from the area of dredging proposed for the Chebeague Island Federal Navigation Project (FNP) located in Chebeague Island, Maine. Testing involved conduct of acute exposure 10 day solid phase assays using the mysid, *Americamysis bahia*, and the amphipod, *Leptocheirus plumulosus*. Testing followed procedures established by the US EPA and the United States Army Corps of Engineers (US ACE) for testing of dredged material. Procedures are presented in *Evaluation of Dredged Material Proposed for Ocean Disposal* (US EPA, US ACE 1991), *Evaluation of Dredged Material Proposed for Discharge in Waters of the US - Testing Manual* (US EPA, US ACE 1998), and the *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters* (US EPA, CENAE, 2004).

2.0 MATERIALS AND METHODS

2.1 Sample Collection, Preservation and Storage

Sediment cores for toxicological analysis were collected by the US ACE New England District (CENAE) using vibracoring equipment from locations identified in the dredge footprint specified in the project Sampling and Analysis Plan (SAP) (AECOM, 2017). Samples were received from AECOM, Chelmsford, Massachusetts under chain of custody in 3 gallon polyethylene buckets. Sediment samples were composited based on the compositing scheme outlined in the SAP. Reference sediment samples were collected by the AECOM field team (AECOM and Normandeau Associates, Bedford, New Hampshire) from the Portland Disposal Site (PDS). Upon arrival at the laboratory, all samples received an internal sample control number and were logged into the project sample control system. Prior to testing, samples were placed in a secure refrigerator and stored at a temperature of $4 \pm 2^{\circ}C$ until test initiation. Sample identification, collection and receipt information is summarized in Table 1. Sample compositing information is provided in Table 2.

Sediment for the laboratory control treatment was collected from the Hampton Estuary, Hampton, New Hampshire. The area is not known to receive any direct industrial inputs and has been used as a laboratory reference sediment in the testing of marine sediments for over 25 years. Overlying seawater was obtained from the Hampton Estuary. Water from the estuary has been used for the culture and maintenance of test organisms at ESI since 1978. Seawater is obtained through a filter system located on the bottom of the estuary at a point approximately 1 mile from the open ocean. The Hampton Estuary laboratory control was included to verify the health of the test organisms.

2.2 Sediment Preparation

Before organisms were added to the test vessels, ammonia levels in the pore water were determined. If the pore water was found to contain an unionized ammonia level of ≥0.8 mg/L, then test initiation was delayed and the sediments were monitored until the ammonia levels achieved an acceptable level. Test chambers were renewed daily with 1 volume addition of overlying water during this pre-assay phase.

2.3 Bioassay Procedures

2.3.1 *A. bahia* 10 Day Solid Phase Evaluation

The 10 day exposure toxicity test was completed using *A. bahia* obtained from Aquatic Resource Organisms (ARO) of Hampton, New Hampshire. Prior to use, test organisms were held for a minimum of 2 hours under temperature, salinity, and photoperiod conditions similar to those used in the assay. *A. bahia* used in the assay were ≤5 days old at the start of the test.

The assay was conducted in a static renewal mode. Test chambers were 1 liter beakers modified for static renewal testing. Each beaker contained approximately 2 cm of sediment and was filled to the 1 liter mark with seawater. The test chambers were allowed to stabilize for a minimum of 24 hours, or until overlying water unionized ammonia levels were within acceptable limits (≤0.3 mg/L at pH 7.5, and ≤0.6 mg/L at pH 7.9-8.0) prior to the addition of the test organisms. A total of 20 organisms were randomly selected from the lot received and added to each replicate. All treatment groups included 5 replicates. Each day during the test, chambers received 1 volume of new seawater having similar salinity and temperature as the overlying water in the vessels. This results in an approximate 50% renewal of overlying water. Water temperature was 20±1°C, and the salinity regimen was established at 30±2‰. The photoperiod was set at 16:8 hours light:dark. Dissolved oxygen, pH, salinity, specific conductivity and temperature were measured daily in one replicate of each treatment and in all replicates on days 0 and 10. Ammonia levels were measured in the overlying water of a representative test chamber on days 0, 3 and 10. All test chambers were aerated throughout the assay and dissolved oxygen levels were maintained at ≥6.0 mg/L per ESI's protocol (≥40% saturation following RIM protocol). Water quality measurements were completed prior to water renewals. Test chambers were observed daily to ensure proper aeration and to note any test or treatment abnormalities. Any such observations were recorded on data sheets. Mysids were fed ≤24 hour old *Artemia* nauplii twice daily. After 10 days of exposure, the organisms were recovered for survival counts.

2.3.2 *L. plumulosus* 10 Day Solid Phase Evaluation

L. plumulosus were obtained from cultures maintained by ARO. Prior to use, test organisms were held for a minimum of 2 hours under temperature, salinity, and photoperiod conditions similar to those used in the assay. *L. plumulosus* were non-reproductive adults.

The assay was conducted in a static renewal mode. Test chambers were 1 liter beakers modified for static renewal testing. Each beaker contained approximately 2 cm of sediment and was filled to the 1 liter mark with seawater. The test chambers were allowed to stabilize for a minimum of 24 hours, or until pore water unionized ammonia levels were within acceptable limits (≤0.8 mg/L) prior to the addition of the test organisms. A total of 20 organisms were randomly selected from the lot received and added to each replicate. Each treatment group included 5 replicates and a surrogate test chamber that was used to obtain water qualities during the assay without disturbing the test animals. The surrogate chamber was treated the same as actual test chambers with the addition of animals and food, but was not used to determine endpoint data. Each day during the test, chambers received 1 volume of new seawater having similar salinity and temperature as the overlying water in the vessels. This results in an approximate 50% renewal of overlying water. Water temperature was 20±1°C, and the salinity regimen was established at 20±2‰. The photoperiod was set at 16:8 hours light:dark. Dissolved oxygen, pH, salinity, specific conductivity and temperature were measured daily in the surrogate replicate of each treatment and in all replicates on days 0 and 10. Ammonia levels were measured in the overlying and pore water of the surrogate test chamber on days 0, 3 and 10. All test chambers were aerated throughout the assay and dissolved oxygen levels were

maintained at ≥6.0 mg/L per ESI's protocol (40% saturation following RIM protocol) . Water quality measurements were completed prior to water renewals. Test chambers were observed daily to ensure proper aeration and to note any test or treatment abnormalities. Any such observations were recorded on data sheets. After 10 days of exposure, the organisms were recovered for survival counts.

2.4 Statistical Analysis

Survival data were analyzed using CETIS™(Comprehensive Environmental Toxicity Information System) v1.9.3.0 software to determine significant differences between the project sediments and the reference site. Survival data were evaluated to determine homogeneity of sample variances and normality of distribution using appropriate statistics. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance (ANOVA) statistic. Pair-wise comparisons were based on the appropriate statistical analysis. Statistical difference was evaluated at $\alpha = 0.05$.

2.5 Quality Control

As part of the laboratory quality control program, standard reference toxicant assays are conducted on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. Summaries of acute exposure reference toxicant assays conducted in support of this study are provided in Table 3.

3.0 RESULTS AND DISCUSSION

Table 4 provides a summary of assay acceptability and laboratory control performance. Tables 5 and 6 summarize the results of the statistical analysis for *Americamysis bahia* (mysid) and *Leptocheirus plumulosus* (amphipod), respectively. Tables 7 through 9 summarize water quality data collected during the *A. bahia* and *L. plumulosus* assays. Laboratory bench sheets, water quality data, and associated statistical support data are included in Appendix A.

3.1 *A. bahia* 10 Day Solid Phase Evaluation

Mean mysid survival in the laboratory control sediment was 92% with a coefficient of variation (CV) of 10%. Assay protocol requires that mean control survival be ≥90%. Based on this, the mysids were considered healthy and the overlying water was determined to have had no adverse impact on the outcome of the assay. Mean survival in the PDS reference sediment was 90% with an associated CV of 9%.

Mean mysid survival in the site composites ranged from 93% (Composites 1 and 3) to 97% (Composite 2). The statistical analyses show that there were no negative effects on mysid survival following exposure to any of the site composite samples.

Temperature data collected during the daily water quality observations documented a mean value of 19.7°C with a range of 16.8 to 21.1°C. Confirmation temperature data collected on an hourly basis from a data logger documented a mean value of 19.3°C with a range of 16.6 to 21.9°C. Salinity levels ranged from 28.1 to 31.1‰ with a mean value of 29.5‰. Test acceptability criteria requires a mean temperature of 20±1°C with maximum temporary fluctuations of 20±3°C, and salinity within a range of 30±2‰.

3.2 *L. plumulosus* 10 Day Solid Phase Evaluation

Mean amphipod survival in the laboratory control sediment was 98% with a CV of 3%. Assay protocol requires that mean control survival be ≥90%. Based on this, the amphipods were considered healthy and the overlying water was determined to have had no adverse impact on the outcome of the assay. Mean amphipod survival in the PDS reference sediment was 92% with an associated CV of 10%.

Mean amphipod survival in the site composites ranged from 91% (Composite 1) to 93% (Composites 2 and 3). The statistical analyses show that there were no negative effects on amphipod survival following exposure to any of the site composite samples.

Temperature data collected during the daily water quality observations documented a mean value of 19.8°C with a range of 17.0 to 21.1°C. Confirmation temperature data collected on an hourly basis from a data logger documented a mean value of 19.3°C with a range of 16.6 to 21.9°C. Salinity levels ranged from 18.8 to 19.9‰ with a mean value of 19.3‰. Test acceptability criteria requires a mean temperature of 20±1°C with maximum temporary fluctuations of 20±3°C, and salinity within a range of 20±2‰.

3.3 Protocol Deviations

Review of data collected as part of the biological evaluation documented only one minor deviation from ESI's Standard Operating Procedures:

ESI's protocol requires that dissolved oxygen (DO) levels are maintained at or above 6.0 mg/L. There were two respective DO measurements that fell below 6.0 mg/L: one on day 7 in the *A. bahia* assay and one on day 1 in the *L. plumulosus* assay. The assays were aerated prior to initiation to ensure the requirement was met, and mean DO levels were well above the threshold, indicating that overall the desired DO levels were maintained. Furthermore, both assays met the RIM protocol of ≥40% saturation. Therefore it is the opinion of ESI's technical director that this deviation had no adverse impact on the outcome of the assay.

4.0 SUMMARY

This program utilized protocols developed by the US EPA and the CENAE to assess the potential impact of the proposed dredge material collected from the Chebeague Island FNP on the marine environment. Review of the data presented in Tables 5 and 6 documents that no significant impacts on either *A. bahia* or *L. plumulosus* survival are anticipated following exposure to any of the site composite sediment samples.

5.0 REFERENCES

AECOM. 2017. *Sampling and Testing in Support of Dredged Material Suitability Determination: Work Plan - Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine [Sampling and Analysis Plan]*. Chelmsford, Massachusetts. October 2017.

US EPA, US ACE. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual*. EPA-503/8-91/001. 204 pages.

US EPA, US ACE. 1998. *Evaluation of Dredged Material Proposed for Discharge in Waters of the US - Testing Manual*. EPA-823-B-98-004, February 1998.

US EPA Region I, Corps of Engineers, New England District. 2004. *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters*. September 2004.

Table 1. Sample Collection and Receipt Information. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Station ID	ESI Code	Sample Type	Matrix	Collection		Receipt	
				Date	Time	Date	Time
A	29746-001	Site	Solid	10/17/17	0851	10/18/17	0950
B	29746-002	Site	Solid	10/17/17	0948	10/18/17	0950
C	29746-003	Site	Solid	10/17/17	1021	10/18/17	0950
D	29746-004	Site	Solid	10/17/17	1046	10/18/17	0950
F	29746-005	Site	Solid	10/17/17	1121	10/18/17	0950
CI-PDS	29746-009	Reference	Solid	10/17/17	1053	10/18/17	0950

Table 2. Summary of Sample Compositing Information. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Composite ID	ESI Code	Components		Final Amount	Composite	
		Station ID	ESI Code		Date	Time
Composite 1	29747-101	A B	29746-001 29746-002	21 gal	10/23/17	1420
Composite 2	29747-102	C D	29746-003 29746-004	22 gal	10/23/17	1515
Composite 3	29747-103	F	29746-005	21 gal	10/24/17	0840
PDS Reference Site	29747-104	CI-PDS [a]	29746-009	21 gal	10/25/174	1715

Note:
[a] This sample was homogenized only.

Table 3. Summary of Reference Toxicant Data. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Date	Organism Lot	Endpoint	Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
Americamysis bahia						
11/02/17	03AbARO110217	96Hr LC-50	53.7	53.7 [a]	[a]	NH4Cl (mg/L)
11/16/17	03AbARO111517	96Hr LC-50	54.6	54.2 [b]	52.9 - 55.4 [b]	NH4Cl (mg/L)
Leptocheirus plumulosus						
05/05/17	18LpARO050517	96Hr LC-50	176.0	176.0 [a]	[a]	NH4Cl (mg/L)
11/28/17	99LpARO112817	96Hr LC-50	180.0	202.6 [b]	110.1 - 295.1 [b]	NH4Cl (mg/L)

Means and Acceptable Ranges based on the most recent 20 reference toxicant assays unless otherwise noted.

[a] Values are based on the results of 1 assay. No historic range is available.

[b] Values are based on the results of 2 assays.

Table 4. Summary of Laboratory Control Performance. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Endpoint / Measurement		Protocol Criteria	Unit	*A. bahia*	*L. plumulosus*
Mean Survival		Laboratory Control ≥90%	%	92%	98%
			Protocol Met	Yes	Yes
Salinity	Minimum	*A. bahia* - 28ppt	ppt	28.1	18.8
		L. plumulosus - 18ppt	Protocol Met	Yes	Yes
	Maximum	*A. bahia* - 32ppt	ppt	31.1	19.9
		L. plumulosus - 22ppt	Protocol Met	Yes	Yes
Temperature		Mean: 20±1°C	Daily / Hourly °C	19.7 / 19.3	19.8 / 19.3
		Minimum: 17°C	Daily / Hourly °C	16.8 [a] / 16.6 [a]	17.0 / 16.6 [a]
		Maximum: 23°C	Daily / Hourly °C	21.1 / 21.9	21.1 / 21.9
			Protocol Met	Yes / Yes	Yes / Yes

Notes:

[a] The value meets the protocol requirement when rounded to the whole number precision reflected in the method, therefore is not considered a protocol deviation.

Table 5. Summary of Survival Data: *A. bahia*. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Day 10 Proportion Survived Summary - Mean Mysid Survival

Sample ID	ESI Code	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	29749-000	5	92%	80%	100%	10%
PDS Reference Site	29747-104	5	90%	80%	100%	9%
Composite 1	29747-101	5	93%	80%	100%	9%
Composite 2	29747-102	5	97%	85%	100%	7%
Composite 3	29747-103	5	93%	85%	95%	5%

Day 10 Survival Statistical Analysis

Sample ID	ESI Code	Mean	Significantly "<" as Compared to: PDS (29747-104)	Difference in Survival >20% as Compared to: PDS (29747-104)	
PDS Reference Site	29747-104	90%	-	-	-
Composite 1	29747-101	93%	No	No	-3%
Composite 2	29747-102	97%	No	No	-7%
Composite 3	29747-103	93%	No	No	-3%

Table 6. Summary of Survival Data: *L. plumulosus*. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Day 10 Proportion Survived Summary - Mean Amphipod Survival

Sample ID	ESI Code	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	29748-000	5	98%	95%	100%	3%
PDS Reference Site	29747-104	5	92%	80%	100%	10%
Composite 1	29747-101	5	91%	80%	100%	9%
Composite 2	29747-102	5	93%	85%	95%	5%
Composite 3	29747-103	5	93%	80%	100%	9%

Day 10 Survival Statistical Analysis

Sample ID	ESI Code	Mean	Significantly "<" as Compared to: PDS (29747-104)	Difference in Survival >20% as Compared to: PDS (29747-104)	
PDS Reference Site	29747-104	92%	-	-	-
Composite 1	29747-101	91%	No	No	0%
Composite 2	29747-102	93%	No	No	-1%
Composite 3	29747-103	93%	No	No	-1%

Table 7. Summary of Overlying Water Quality Data: *A. bahia*. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Sample ID	Day	Temperature (°C)	pH (SU)	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)
Laboratory Control	00	21.0	7.94	0.14	0.0050
PDS Reference Site	00	21.0	7.94	<0.1	<0.0018
Composite 1	00	21.0	7.95	<0.1	<0.0018
Composite 2	00	20.9	7.95	0.54	0.0196
Composite 3	00	20.9	7.92	0.45	0.0153
Laboratory Control	03	21.0	7.88	0.28	0.0088
PDS Reference Site	03	21.1	7.84	0.21	0.0061
Composite 1	03	21.1	7.86	0.19	0.0057
Composite 2	03	21.0	7.92	0.65	0.0222
Composite 3	03	21.0	7.87	0.53	0.0162
Laboratory Control	10	19.3	7.68	<0.1	<0.0009
PDS Reference Site	10	19.3	7.76	<0.1	<0.0011
Composite 1	10	19.3	7.74	<0.1	<0.0010
Composite 2	10	19.2	7.77	<0.1	<0.0011
Composite 3	10	19.1	7.73	0.45	0.0088

Note: Data in summary obtained from the “A” replicate of each treatment.

Table 8. Summary of Overlying Water Quality Data: *L. plumulosus*. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Sample ID	Day	Temperature (°C)	pH (SU)	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)
Laboratory Control	00	20.9	7.86	<0.1	<0.0015
PDS Reference Site	00	20.9	7.86	<0.1	<0.0015
Composite 1	00	20.9	7.82	0.64	0.0174
Composite 2	00	20.9	7.81	<0.1	<0.0013
Composite 3	00	20.9	7.81	0.9	0.0239
Laboratory Control	03	21.1	7.86	0.19	0.0057
PDS Reference Site	03	21.1	7.83	<0.1	<0.0014
Composite 1	03	21.1	7.81	<0.1	<0.0013
Composite 2	03	21.1	7.82	0.72	0.0198
Composite 3	03	21.0	7.81	1	0.0268
Laboratory Control	10	19.4	7.55	<0.1	<0.0007
PDS Reference Site	10	19.3	7.61	<0.1	<0.0008
Composite 1	10	19.4	7.66	<0.1	<0.0009
Composite 2	10	19.4	7.68	<0.1	<0.0009
Composite 3	10	19.3	7.72	0.11	0.0021

Note: Data in summary are obtained from the “Surrogate” replicate of each treatment.

Table 9. Summary of Pore Water Quality Data: *L. plumulosus*. 10 Day Solid Phase Evaluation. Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Sample ID	Day	Temperature (°C)	pH (SU)	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)
Pre-Assay Pore Water Monitoring					
Laboratory Control	-03	23	7.11	3.3	0.0208
CLDS Reference Site	-03	23	7.61	0.61	0.0120
Composite 1	-03	23	7.68	0.37	0.0085
Composite 2	-03	23	7.43	5.3	0.0692
Composite 3	-03	23	7.48	3.8	0.0556
In-Life Assay Pore Water Monitoring					
Laboratory Control	00	23	6.99	3.2	0.0153
CLDS Reference Site	00	23	7.28	1.3	0.0121
Composite 1	00	23	7.49	0.41	0.0061
Composite 2	00	23	7.27	3.2	0.0290
Composite 3	00	23	7.28	4.7	0.0436
Laboratory Control	03	23	7.12	2.6	0.0167
CLDS Reference Site	03	23	7.32	0.72	0.0073
Composite 1	03	23	7.53	0.28	0.0046
Composite 2	03	23	7.23	2.2	0.0182
Composite 3	03	23	7.32	1.9	0.0193
Laboratory Control	10	22	7.01	1.9	0.0089
CLDS Reference Site	10	22	7.27	0.38	0.0032
Composite 1	10	22	7.48	<0.1	<0.0007
Composite 2	10	22	6.98	0.53	0.0023
Composite 3	10	22	7.13	0.3	0.0018

Note: Data in summary are obtained from the “Surrogate” replicate of each treatment.

APPENDIX A:

RAW DATA & STATISTICAL SUPPORT

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STUDY NUMBER RECORD

Issue and complete this form for studies that will require multiple tasks and directly associated support studies. Issue consecutive study numbers at the start of the project to cover all potential elements of the project.

CLIENT: AECOM

CONTACT(S): Kris Van Naerssen, Christine Archer, Maura Surprenant

PROJECT: Chebeague Island FNP

CONTRACT / TO #: W912WJ-17-D-0003 / #3 Project Number 60551931

	Species / Analysis Parameters:		STUDY:
Sample Receipt:			**29746**
Grain Size Analysis:			**-**
Composite Prep:			**29747**
Bulk Sediment Analysis [a]:			**-**
10 Day Assay:	***Leptocheirus plumulosus***		**29748**
	Americamysis bahia		**29749**
Elutriate Preparation:	**Type:**		**29750**
Elutriate Analysis:	**Pentachlorophenol**	**Yes / No**	**29751**
	Trace Metals	**Yes / No**	
	PCB Congeners	**Yes / No**	
	Pesticides	**Yes / No**	
SPP Assays:	***Menidia beryllina***		**29752**
	Americamysis bahia		
	Arbacia punctulata		
Bioaccumulation Study:	***Macoma nasuta***		**29753**
	Nereis virens		**29754**
Tissue Analysis [a]:	**Trace Metals**	**Yes / No**	**29755**
	PAH Compounds	**Yes / No**	
	PCB Congeners	**Yes / No**	
	Pesticides	**Yes / No**	

Notes:

[a] All bulk sediment and tissue analyses were completed by Alpha Analytical, Mansfield, Massachusetts.

P:\General Projects\RPT-Active\DSE 29746 AECOM Chebeague FNP\Study Number Log - Chebeague.wpd

Table A-1 Chebeague Island (NAE Sampling Locations) – Coordinates / Estimated Penetration / Sample Quantities

Sample ID	Composite ID	Latitude	Longitude	Survey Depth (ft MLLW)	Project Depth + Overdepth (ft MLLW)	Estimated Core Length (ft)	Estimated Volume per Core (gallons) *	Minimum Sample Volume per Location (gallons) **	Estimated Number of Cores/Containers Required ***
A	1	43.753393	-70.109779	-9.3	-11.0	1.7	0.6	11.5	19 / 4
B	1	43.752688	-70.109211	-6.3	-11.0	4.7	1.7	11.5	7 / 4
C	2	43.751983	-70.108908	-4.0	-11.0	7.0	2.6	11.5	5 / 4
D	2	43.752111	-70.108587	-7.3	-11.0	3.7	1.4	11.5	9 / 4
F	3	43.751509	-70.108103	-5.3	-11.0	5.7	2.1	23.0	11 / 7

* Volume estimated assuming 3" inner diameter core liners for dredge area sediment samples.
** Assumes 23 gallons of sediment per composite for testing and archiving.
*** Sample containers for dredge area sediments shall be 3.5 gallon food grade high density polyethylene pails with locking lids.

23 gallons of dredge site water will be collected from a central location in the vicinity of each composite grou. Sample containers for dredge water shall be 5 gallon food grade collapsible carboys.

From AECOM's Sampling and Analysis Plan (October 2017)

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	29746		
SDG No:			
Project:	Chebeague Harbor		
Delivered via:	Client		
Date and Time Received:	10/18/17 0950	Date and TIme Logged into Lab:	10/25/17 0925
Received By:	LB	Logged into Lab by:	JTP (JTP)
Air bill / Way bill:	No	Air bill included in folder if received?	N/A
Cooler on ice/packs:	N/A	Custody Seals present?	N/A
Cooler Blank Temp (C) at arrival:	See Notes	Custody Seals intact?	N/A
Number of COC Pages:	1		
COC Serial Number(s):	N/A		
COC Complete:	Yes	Does the info on the COC match the samples?	Yes
Sampled Date:	Yes	Were samples received within holding time?	Yes
Field ID complete:	Yes	Were all samples properly labeled?	Yes
Sampled Time:	Yes	Were proper sample containers used?	Yes
Analysis request:	Yes	Were samples received intact? (none broken or leaking)	Yes
COC Signed and dated:	Yes	Were sample volumes sufficient for requested analysis?	Yes
Were all samples received?	Yes	Were VOC vials free of headspace?	N/A
Client notification/authorization:	Not required	pH Test strip ID number:	N/A

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n
Station A	29746-001	S	Hold: Composite	4 x 3 gallon	4C	Yes
Station B	29746-002	S	Hold: Composite	4 x 3 gallon	4C	Yes
Station C	29746-003	S	Hold: Composite	4 x 3 gallon	4C	Yes
Station D	29746-004	S	Hold: Composite	4 x 3 gallon	4C	Yes
Station F	29746-005	S	Hold: Composite	7 x 3 gallon	4C	Yes
CIW-1	29746-006	W	Hold: Elutriate Prep	5 x 5 gallon	4C	Yes
CIW-2	29746-007	W	Hold: Elutriate Prep	5 x 5 gallon	4C	Yes
CIW-3	29746-008	W	Hold: Elutriate Prep	5 x 5 gallon	4C	Yes
CI-PDS	29746-009	S	Subsample: 10 Day Solid Phase Assays, 28 Day Bioaccur	7 x 3 gallon	4C	Yes
CIW-PDS	29746-010	W	Hold: Composite, Subsample for SPP Assays	5 x 5 gallon	4C	Yes

Notes and qualifications:

Samples recieved from refrigerated van and immediately placed in 4C storage. JTP

Americamysis bahia 10-Day Survival Sediment Test **EnviroSystems, Inc.**

Start Date: 03 Nov-17
End Date: 13 Nov-17
Sample Date: 23 Oct-17
Species: Americamysis bahia
Protocol: EPA/600/R-94/025 (1994)
Material: Laboratory Control Sediment
Sample Code: 29749-000
Sample Source: Chebeague Island FNP
Sample Station: Laboratory Control (A.bahia)

Sample	Rep	Pos	# Exposed	# Survived	Notes
29749-000	1	2	20	16	
29749-000	2	6	20	17	
29749-000	3	12	20	19	
29749-000	4	20	20	20	
29749-000	5	25	20	20	
29747-104	1	4	20	16	
29747-104	2	8	20	17	
29747-104	3	14	20	18	
29747-104	4	16	20	20	
29747-104	5	21	20	19	
29747-101	1	3	20	16	
29747-101	2	10	20	20	
29747-101	3	13	20	19	
29747-101	4	19	20	18	
29747-101	5	23	20	20	
29747-102	1	5	20	20	
29747-102	2	7	20	20	
29747-102	3	15	20	17	
29747-102	4	17	20	20	
29747-102	5	24	20	20	
29747-103	1	1	20	19	
29747-103	2	9	20	19	
29747-103	3	11	20	19	
29747-103	4	18	20	17	
29747-103	5	22	20	19	

STUDY: 29749
CLIENT: AECOM
PROJECT: Chebeague Island FNP
ASSAY: *Americamysis bahia* 10 Day Solid Phase Sediment Assay

TASK: Overlying Water Ammonia Summary
METHOD: SM 4500-NH3 G

			Ammonia						
Sample ID	Day	ESI Code	Total	Qual	Unionized	QLimit	Units	Sampled	Analyzed
Laboratory Control	00	29749-100	0.14		0.0050	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
PDS Reference Site	00	29749-101	ND		0.0018	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 1	00	29749-102	ND		0.0018	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 2	00	29749-103	0.54		0.0196	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 3	00	29749-104	0.45		0.0153	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Laboratory Control	03	29749-200	0.28		0.0088	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
PDS Reference Site	03	29749-201	0.21		0.0061	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 1	03	29749-202	0.19		0.0057	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 2	03	29749-203	0.65		0.0222	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 3	03	29749-204	0.53		0.0162	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Laboratory Control	10	29749-300	ND		0.0009	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
PDS Reference Site	10	29749-301	ND		0.0011	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 1	10	29749-302	ND		0.0010	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 2	10	29749-303	ND		0.0011	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 3	10	29749-304	0.45		0.0088	0.1	mg/L as N	11/13/17 1100	11/20/17 1140

Leptocheirus 10-d Survival and Reburial Sediment Test **EnviroSystems, Inc.**

Start Date: 03 Nov-17 **Species:** Leptocheirus plumulosus **Sample Code:** 29748-000
End Date: 13 Nov-17 **Protocol:** EPA/600/R-94/025 (1994) **Sample Source:** Chebeague Island FNP
Sample Date: 23 Oct-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (L.plumulosus)

Sample	Rep	Pos	# Exposed	# Survived	# Reburied	Notes
29748-000	1	3	20	20		
29748-000	2	9	20	19		
29748-000	3	12	20	20		
29748-000	4	17	20	19		
29748-000	5	22	20	20		
29747-104	1	5	20	20		
29747-104	2	10	20	16		
29747-104	3	11	20	20		
29747-104	4	20	20	17		
29747-104	5	25	20	19		
29747-101	1	1	20	20		
29747-101	2	8	20	16		
29747-101	3	15	20	17		
29747-101	4	18	20	19		
29747-101	5	21	20	19		
29747-102	1	4	20	19		
29747-102	2	6	20	19		
29747-102	3	14	20	19		
29747-102	4	16	20	17		
29747-102	5	24	20	19		
29747-103	1	2	20	20		
29747-103	2	7	20	18		
29747-103	3	13	20	16		
29747-103	4	19	20	20		
29747-103	5	23	20	19		

STUDY: 29748
CLIENT: AECOM
PROJECT: Chebeague Island FNP
ASSAY: *Leptocheirus plumulosus* 10 Day Solid Phase Sediment Assay

TASK: Overlying Water Ammonia Summary
METHOD: SM 4500-NH3 G

			Ammonia						
Sample ID	Day	ESI Code	Total	Qual	Unionized [a]	QLimit	Units	Sampled	Analyzed
Laboratory Control	00	29748-100	ND		0.0015	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
PDS Reference Site	00	29748-101	ND		0.0015	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 1	00	29748-102	0.64		0.0174	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 2	00	29748-103	ND		0.0013	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 3	00	29748-104	0.9		0.0239	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Laboratory Control	03	29748-200	0.19		0.0057	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
PDS Reference Site	03	29748-201	ND		0.0014	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 1	03	29748-202	ND		0.0013	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 2	03	29748-203	0.72		0.0198	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 3	03	29748-204	1		0.0268	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Laboratory Control	10	29748-300	ND		0.0007	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
PDS Reference Site	10	29748-301	ND		0.0008	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 1	10	29748-302	ND		0.0009	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 2	10	29748-303	ND		0.0009	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 3	10	29748-304	0.11		0.0021	0.1	mg/L as N	11/13/17 1100	11/20/17 1140

STUDY: 29748
CLIENT: AECOM
PROJECT: Chebeague Island FNP
ASSAY: *Leptocheirus plumulosus* 10 Day Solid Phase Sediment Assay

TASK: Pore Water Ammonia Summary
METHOD: SM 4500-NH3 G

			Ammonia						
Sample ID	Day	ESI Code	Total	Qual	Unionized	QLimit	Units	Sampled	Analyzed
Laboratory Control	-03	29748-400	3.3		0.0208	0.1	mg/L as N	10/31/17 1500	11/01/17 1215
PDS Reference Site	-03	29748-401	0.61	B	0.0120	0.1	mg/L as N	10/31/17 1500	11/01/17 1215
Composite 1	-03	29748-402	0.37	B	0.0085	0.1	mg/L as N	10/31/17 1500	11/01/17 1215
Composite 2	-03	29748-403	5.3		0.0692	0.1	mg/L as N	10/31/17 1500	11/01/17 1215
Composite 3	-03	29748-404	3.8		0.0556	0.1	mg/L as N	10/31/17 1500	11/01/17 1215
Laboratory Control	00	29748-106	3.2		0.0153	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
PDS Reference Site	00	29748-107	1.3		0.0121	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 1	00	29748-108	0.41		0.0061	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 2	00	29748-109	3.2		0.0290	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Composite 3	00	29748-110	4.7		0.0436	0.1	mg/L as N	11/03/17 1100	11/06/17 1000
Laboratory Control	03	29748-206	2.6		0.0167	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
PDS Reference Site	03	29748-207	0.72		0.0073	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 1	03	29748-208	0.28		0.0046	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 2	03	29748-209	2.2		0.0182	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Composite 3	03	29748-210	1.9		0.0193	0.1	mg/L as N	11/06/17 1100	11/20/17 1140
Laboratory Control	10	29748-306	1.9		0.0089	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
PDS Reference Site	10	29748-307	0.38		0.0032	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 1	10	29748-308	ND		0.0007	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 2	10	29748-309	0.53		0.0023	0.1	mg/L as N	11/13/17 1100	11/20/17 1140
Composite 3	10	29748-310	0.3		0.0018	0.1	mg/L as N	11/13/17 1100	11/20/17 1140

Notes:
B = Analyte detected in the corresponding laboratory blank at 0.15 mg/L as N.

Appendix D.3: 28-Day Sediment Toxicity and Bioaccumulation Evaluation

AECOM
250 Apollo Drive
Chelmsford
MA, 01824
USA
aecom.com

January 31, 2018

R. Ben Loyd
Department of Army
New England District
Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: Chebeague Island 28-Day Bioassay and Tissue Analysis Report
Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106
Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

Dear Mr. Loyd:

AECOM Technical Services, Inc. (AECOM) is pleased to provide the enclosed 28-Day Bioassay and Tissue Analysis report under Delivery Order W912WJ17F0106, Tasks 8 and 9 of the Performance Work Statement (PWS) entitled "*Sampling and Testing in Support of Dredged Material Suitability Determination Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine*" dated 4 August 2017.

A report is attached with the 28-day bioassay and tissue results for *Nereis virens* and *Macoma nasuta*. Please let us know if you have any questions or would like anything further.

AECOM certifies that this submission has been subjected to AECOM's review and coordination procedures. Please let us know if you have any questions or if you would like to discuss the report.

Best Regards,

Kris van Naerssen
Project Manager
AECOM
T: 484.678.1876
E: kris.vannaerssen@aecom.com

cc: Maura Surprenant, AECOM
Christine Archer, AECOM

Contract: W912WJ-17-D-0003
Delivery Order: W912WJ17F0106

Sampling and Environmental Testing in Support of Dredged Material Suitability Determination
Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine

January 31, 2018

28-Day Bioassay and Tissue Analysis Report

TOXICOLOGICAL EVALUATION
OF A PROPOSED DREDGE SEDIMENT:

Chebeague Island Federal Navigation Project
Tier III Sediment Evaluation
Great Chebeague Island, Maine

New England District Corps of Engineers
Contract No. W912WJ-17-D-0003
TO#3 Project Number 60551931

28 Day Sediment Toxicity and Bioaccumulation Evaluation

Prepared for:

AECOM
250 Apollo Drive
Chelmsford, Massachusetts 01824

Prepared by:

EnviroSystems, Incorporated
One Lafayette Road
Hampton, New Hampshire 03842

EnviroSystems, Inc. Master Reference 29746
Study Specific Reference 29753 / 29754
November 2017
Revision 1

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LABORATORY STANDARDS STATEMENT

This study was performed by EnviroSystems, Incorporated at its facility in Hampton, New Hampshire. EnviroSystems' laboratory is accredited by the State of New Hampshire under the National Environmental Laboratory Accreditation (NELAC) program. Additionally, ESI is accredited under the Department of Defense (DoD) ELAP program, ISO/IEC 17025:2005, Certificate Number L2340. ESI also has an approved Laboratory Quality Assurance Plan (LQAP) covering all portions of this project. All testing conducted by EnviroSystems as part of this program was compliant with NELAC guidelines and standards. Additionally, this study was conducted in accordance with guidelines presented in the 2004 version of the New England District's Regional Implementation Manual (RIM) for Evaluation of Dredged Material Proposed for Disposal In New England Waters. Any deviations from specific elements of the RIM are detailed in the Protocol Deviation Section of this Report.

For EnviroSystems, Inc.  January 31, 2018

Kenneth A. Simon
Technical Director

Date

TOXICOLOGICAL EVALUATION OF A PROPOSED DREDGE SEDIMENT:

Chebeague Island Federal Navigation Project
Tier III Sediment Evaluation
Great Chebeague Island, Maine

New England District Corps of Engineers
Contract No. W912WJ-17-D-0003
TO#3 Project Number 60551931

28 Day Sediment Toxicity and Bioaccumulation Evaluation

1.0 INTRODUCTION

As part of a comprehensive plan to reduce adverse environmental impacts of ocean dumping, Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, specifies that all sediments to be discharged into ocean waters must be evaluated to define their potential impact on existing benthic communities. The United States Environmental Protection Agency (US EPA) has determined that the most effective means to make such an assessment is through the use of bioassay tests that provide a relatively direct estimate of potential impact.

This project was designed to evaluate the potential toxicity of sediments from the area of dredging proposed for the Chebeague Island Federal Navigation Project (FNP) located in Great Chebeague Island, Maine. Testing involved conduct of 28-day bioaccumulation evaluations using *Nereis virens* (polychaete worm) and *Macoma nasuta* (bivalve clam). Testing followed procedures established by the US EPA, US Army Corps of Engineers and the New England District Army Corps of Engineers (CENAE) for testing of dredged material. Procedures are presented in *Evaluation of Dredged Material Proposed for Ocean Disposal* (US EPA, US ACE 1991), *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual* (US EPA, US ACE 1998), and the *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters* (US EPA, CENAE, 2004), (RIM document).

2.0 METHODS AND MATERIALS

2.1 Sample Collection, Preservation and Storage

Sediment cores for toxicological analysis were collected by the US ACE New England District (CENAE) using vibracoring equipment from locations identified in the dredge footprint specified in the project Work Plan (AECOM, 2017). Samples were received from AECOM, Chelmsford, Massachusetts under chain of custody in 3 gallon polyethylene buckets. Sediment samples were composited based on the compositing scheme outlined in the Work Plan. Reference sediment samples were collected by the AECOM field team (AECOM and Normandeau Associates, Bedford, New Hampshire) from the Portland Disposal Site (PDS). Upon arrival at the laboratory, all samples received an internal sample control number and were logged into the project sample control system. Prior to testing, samples were placed in a secure refrigerator and stored at a temperature of $4 \pm 2^{\circ}C$ until test initiation. Sample identification, collection and receipt information is summarized in Table 1. Sample compositing information is provided in Table 2.

Sediment for the laboratory control treatment was collected from the Hampton Estuary, Hampton, New Hampshire. The area is not known to receive any direct industrial inputs and has been used as a laboratory reference sediment in the testing of marine sediments for more than 25 years. Overlying seawater was obtained from the Hampton Estuary. Water from the estuary has been used for the culture and maintenance of test organisms at ESI since 1978. Seawater is obtained through a filter system located on the bottom of the estuary at a point approximately 1 mile from the open ocean.

2.2 Test Organisms

M. nasuta were obtained from Aquatic Research Organisms (ARO), Hampton, New Hampshire. Organisms were field collected along the Washington coast and shipped to ARO via overnight delivery. At ESI, the clams were placed in clean holding sediment with flowing seawater and monitored for at least 24 hours prior to use. Damaged bivalves and those that would not close when prodded or that did not burrow into

sediment were not used for testing. Clams used for the assay were approximately 28-45 mm total length.

Adult *N. virens* were also obtained from ARO. Worms were collected in the field from the Damariscotta River in Boothbay Harbor, Maine and delivered to ARO. If not used the same day, worms were refridgerated overnight in seaweed. Damaged and inactive worms were not used in the assay.

2.3 Bioaccumulation Evaluation

The assay was started by placing a 5-7 cm layer of sediment (control, reference or site sediment) into 10 gallon aquaria designed for flow-through testing. Overlying water was then added to each aquarium. The volume of the overlying water in these chambers was approximately 6 gallons. Water flow was adjusted to provide approximately 6 volume additions of water/day to each aquarium. Flow into each aquarium was set so that incoming water mixed throughout the tank and did not stratify as a surface layer.

M. nasuta and *N. virens* were indiscriminately selected from the pool of organisms and randomly added to the aquaria. A total of 20 worms and 20 clams were added to each of 5 replicates; species were tested in separate test chambers. Temperature was maintained at 12-16°C with no readings exceeding ±3°C. Salinity was maintained at 30±2‰. The photoperiod was set at 16:8 hours light:dark. Dissolved oxygen, pH, temperature, specific conductance and salinity were measured daily in all tanks. Dissolved oxygen levels were maintained at a minimum level of ≥60% saturation by providing aeration to all tanks from the start of the assay. Organisms were not fed during the exposure period.

After 28 days exposure, *M. nasuta* and *N. virens* were recovered from the test sediments and counted. Survival counts were used for statistical analysis. All living organisms were transferred to clean test vessels and maintained in clean seawater for 24 hours to allow for removal of sediment from the animals' digestive tract. After the depuration period, organisms were transferred to plastic bags and frozen for subsequent delivery to Alpha Analytical, Mansfield, Massachusetts for tissue analysis.

2.4 Tissue Analysis

Methods used by Alpha Analytical in the analyses of tissues generated from the bioaccumulation tests followed protocols recommended in Table 8 of the New England District RIM document with appropriate updates related to current methods. Trace metals were evaluated using EPA Method 6020A, Inductively Coupled Plasma - Mass Spectrometry (ICP-MS), and mercury was evaluated using EPA Method 7474. PCB congeners and PAH compounds were evaluated by SW 846 8270D-SIM/EPA 680(M). Reporting Limits and Method Detection Limits met RIM requirements with the exception of PCB congeners. The complete analytical chemistry and quality assurance data package was provided under separate cover and in appropriate Electronic Data Deliverable (EDD) files by Alpha Analytical.

2.5 Data Analysis

Tissue chemistry data were provided by Alpha Analytical. The statistical analyses of survival and body burden data were completed at ESI using CETIS™ ver. 1.9.3.0 (Comprehensive Environmental Toxicity Information System) software to determine significant differences between the reference sediment and each site composite sample. Data were evaluated to determine homogeneity of sample variances and normality of distribution using appropriate statistics. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance (ANOVA) statistic. Statistical difference was evaluated at $\alpha = 0.05$. Per RIM guidelines, the MDL is used in instances when a compound of concern (COC) is not detected for purposes of calculating a mean concentration. MDLs used in statistical computations are adjusted for differences in tissue mass and final extract volumes used in the analysis for each sample.

Following CENAE protocol, the statistical analyses were completed for all COCs identified in the Work Plan and are included in Appendix A, however the findings of significance presented in the report focus only on those COCs detected in the reference sample.

2.6 Reference Toxicant Evaluation

As part of the laboratory quality control program, standard reference toxicant assays are conducted on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. Summaries of acute exposure reference toxicant assays

conducted in support of this study are provided in Table 3.

3.0 RESULTS

Table 4 provides a summary of test acceptability criteria and laboratory control performance. Tables 5 and 6 provide a summary of *M. nasuta* and *N. virens* survival data and statistical analyses. Tables 7 and 8 provide summaries of body burden data and findings of significance for *M. nasuta* and *N. virens*, respectively. Laboratory bench sheets, detailed summaries of survival, body burden data and associated support data are included in Appendix A.

3.1 *Macoma nasuta*

3.1.1 Survival

Mean *M. nasuta* survival in the laboratory control sediment was 95% with a coefficient of variation (CV) of 9%. Mean survival in the PDS reference sediment was 95% with a CV of 0%. Surviving organisms from the control and reference site provided sufficient tissue for preparation and analysis of body burdens. The endpoints met and/or exceeded requirements specified in the current version of the RIM.

After 28 days exposure, mean survival of the bivalves in the site composite sediments ranged from 96 to 100%. The statistical evaluation of the data showed no significant reduction in survival for bivalves maintained in the site composites when compared to the PDS reference sediment.

3.1.2 Water Quality Summary

Daily water quality data collected during the assay documented a mean temperature of 12.7°C with a range of 12.4 to 13.4°C. Confirmation temperature data were not collected on an hourly basis. Additional daily water quality data documented salinity levels during the assay varied from 19.1 to 31.4‰ with a mean value of 29.8‰. Dissolved oxygen levels ranged from 80% to 110% with a mean level of 101% while pH ranged from 7.58 to 7.90 SU. Review of temperature and salinity data documented that all temperature values fell within limits specified by the RIM and ESI's protocol, however salinity fell outside of the range. See Section 3.3 for a discussion of the salinity deviation and the missing hourly temperature data.

3.1.3 Body Burden Analysis

Based on CENAE criteria, there were significant increases in cadmium and zinc body burdens for clams reared in all three site composites as compared to PDS reference tissue. In addition, mercury body burdens for clams reared in site composite 1 sediment were also significantly higher than clam tissue from the PDS reference sediment.

Review of body burden data showed that there were no additional COCs detected in site composite tissues that were not also detected in PDS reference tissue.

3.2 *Nereis virens*

3.2.1 Survival

Mean *N. virens* survival in the laboratory control sediment was 95% with a coefficient of variation (CV) of 5%. Mean survival in the PDS reference sediment was 98% with a CV of 5%. Surviving organisms from the control and reference site provided sufficient tissue for preparation and analysis of body burdens. The endpoints met and/or exceeded requirements specified in the current version of the RIM.

After 28 days exposure, mean survival of the polychaetes in the site composite sediments ranged from 94 to 99%. The statistical evaluation of the data showed no significant reduction in survival for polychaetes maintained in the site composites when compared to the PDS reference sediment.

3.2.2 Water Quality Summary

Daily water quality data collected during the assay documented a mean temperature of 12.6°C with a range of 12.1 to 13.7°C. Confirmation temperature data were not collected on an hourly basis. Additional daily water quality data documented salinity levels during the assay varied from 28.0 to 31.3‰ with a mean

value of 29.9‰. Dissolved oxygen levels ranged from 74% to 107% with a mean level of 97% while pH ranged from 7.46 to 7.89 SU. Review of temperature and salinity data documented that all values fell within limits specified by the RIM and ESI's protocol.

3.2.3 Body Burden Analysis

Based on CENAE criteria, there were no significant increases in polychaete body burdens for any COCs as compared to PDS reference tissue. Review of body burden data showed that only one COC (acenaphthene) was also detected in site composite tissue, but no further analysis was required because the COC was not detected in reference tissue

3.3 Protocol Deviations

Review of the assay data revealed two deviations from the method and/or ESI's protocol. Due to an oversight, no hourly temperature logger was activated for these assays, therefore no hourly temperature measurements were collected. There were no temperature abnormalities observed in the daily water quality measurements that were collected. This represents a deviation from ESI's SOP and a data gap, however it is the opinion of ESI's study director that this deviation did not adversely affect the outcome of the assay.

In addition, protocol requires that the assays be conducted at 30±2‰ for the *M. nasuta* and *N. virens* assays, and as a practice salt or water are added to bring low or high salinity levels back within range (as needed). Some salinity values recorded on day 16 of the *M. nasuta* assay in replicates from the laboratory control and PDS reference (and not in any aquaria containing site composite samples) were lower than the protocol range (19.1‰), however there were no notations on the daily observation log about the low salinity measurement or that any corrective action was taken. It was surmised later by a laboratory technician that the low readings may have been caused by some sediment that could have been lodged in the tip of the probe, and that subsequent readings fell within the acceptable range after the sediment was flushed out. While the reason for these low readings remains unclear, it is the opinion of ESI's technical director that this deviation had no adverse impact on the outcome of the assay.

3.4 Summary

This program utilized protocols developed by the US EPA and the CENAE to assess the potential impact of the proposed dredge material collected from Chebeague Island on the marine environment. Results of the 28-day toxicity evaluation indicate that long term exposure to all 3 Composites had no negative impacts on *M. nasuta* (clam) or *N. virens* (polychaete worm) survival.

Results of body burden data generated from recovered *M. nasuta* tissue showed significant uptake of two COCs (cadmium and zinc) from all 3 site composites, and significant uptake of mercury from Composite 1. There was no significant uptake of any COCs in polychaete tissue following long-term exposure to any of the site composite samples as compared to PDS reference worm tissue.

4.0 REFERENCES

AECOM. 2017. *Sampling and Testing in Support of Dredged Material Suitability Determination: Work Plan - Chebeague Island Navigation Improvement Project, Great Chebeague Island, Maine [Work Plan]*. Chelmsford, Massachusetts. October 2017.

US EPA, US ACE. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual*. EPA-503/8-91/001. 204 pages.

US EPA, US ACE. 1998. *Evaluation of Dredged Material Proposed for Discharge in Waters of the US - Testing Manual*. EPA-823-B-98-004, February 1998.

US EPA Region I, Corps of Engineers, New England District. 2004. *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters*. September 2004.

Table 1. Sample Collection and Receipt Information. Sediment Bioaccumulation Evaluation. Chebeague Island FNP. Great Chebeague Island, Maine. November 2017.

				Collection		Receipt	
Station ID	ESI Code	Sample Type	Matrix	Date	Time	Date	Time
A	29746-001	Site	Solid	10/17/17	0851	10/18/17	0950
B	29746-002	Site	Solid	10/17/17	0948	10/18/17	0950
C	29746-003	Site	Solid	10/17/17	1021	10/18/17	0950
D	29746-004	Site	Solid	10/17/17	1046	10/18/17	0950
F	29746-005	Site	Solid	10/17/17	1121	10/18/17	0950
CI-PDS	29746-009	Reference	Solid	10/17/17	1053	10/18/17	0950

Table 2. Summary of Sample Compositing Schedule. Sediment Bioaccumulation Evaluation. Chebeague Island FNP. Great Chebeague Island, Maine. November 2017.

Composite ID	ESI Code	Components		Final Amount	Composite	
		Station ID	ESI Code		Date	Time
Composite 1	29747-101	A B	29746-001 29746-002	21 gal	10/23/17	1420
Composite 2	29747-102	C D	29746-003 29746-004	22 gal	10/23/17	1515
Composite 3	29747-103	F	29746-005	21 gal	10/24/17	0840
PDS Reference Site	29747-104	CI-PDS [a]	29746-009	21 gal	10/25/17	1715

Note:
[a] This sample was homogenized only.

Table 3. Summary of Reference Toxicant Data. Sediment Bioaccumulation Evaluation. Chebeague Island FNP. Great Chebeague Island, Maine. November 2017.

Date	Endpoint		Value	Historic Mean	Acceptable Range	Reference Toxicant
Macoma nasuta						
11/07/17	Survival	LC-50	6.8	9.0	1.3 - 16.8	Copper (mg/L)
Nereis virens						
11/07/17	Survival	LC-50	4.2	3.6	1.5 - 5.8	Copper (mg/L)

Note: Means and Acceptable Ranges based on the past 20 reference toxicant assays. Acceptable range is defined as ± 2 standard deviations of historic mean.

Table 4. Summary of Assay Acceptability and Laboratory Control Performance. Sediment Bioaccumulation Evaluation. Chebeague Island FNP. Great Chebeague Island, Maine. November 2017.

Endpoint / Measurement		Protocol Criteria	Unit	*M. nasuta*	*N. virens*
Mean Survival		laboratory Control ≥ 90%	%	95%	95%
			Protocol Met	Yes	Yes
Tissue Mass		Sufficient for analysis	Protocol Met	Yes	Yes
Salinity	Minimum:	28‰	ppt	19.1	28.0
			Protocol Met	No [a]	Yes
	Maximum:	32‰	ppt	31.4	31.3
			Protocol Met	Yes	Yes
Temperature		Mean: 12-16°C	Daily / Hourly	12.7 / [a]	12.6 / [a]
		Minimum: 9°C	Daily / Hourly	12.4 / [a]	12.1 / [a]
		Maximum: 15°C	Daily / Hourly	13.4 / [a]	13.7 / [a]
			Protocol Met	Yes / [a]	Yes / [a]

Notes:
[a] See Section 3.3 for a discussion of the protocol deviation.

Table 5. *Macoma nasuta* Day 28 Survival Data. Sediment Bioaccumulation Evaluation. Chebeague Island FNP. Great Chebeague Island, Maine. November 2017.

Day 28 Proportion Survived Summary - Mean *Macoma nasuta* Survival

Sample ID	ESI Code	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	29753-000	5	95%	80%	100%	9%
PDS Reference	29747-104	5	95%	95%	95%	0%
Composite 1	29747-101	5	100%	100%	100%	0%
Composite 2	29747-102	5	96%	90%	100%	4%
Composite 3	29747-103	5	97%	95%	100%	3%

Day 28 Survival Statistical Analysis			Statistically Significant Difference, "<" as Compared to:	Difference in Survival as Compared to:
Sample ID	ESI Code	Mean	PDS Reference	PDS Reference >10% (% Difference)
PDS Reference	29747-104	95%	-	-
Composite 1	29747-101	100%	No	No
Composite 2	29747-102	96%	No	No
Composite 3	29747-103	97%	No	No

Table 6. *Nereis virens* Day 28 Survival Data. Sediment Bioaccumulation Evaluation. Chebeague Island FNP. Great Chebeague Island, Maine. November 2017.

Day 28 Proportion Survived Summary - Mean *Nereis virens* Survival

Sample ID	ESI Code	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	29754-000	5	95%	90%	100%	5%
PDS Reference	29747-104	5	98%	90%	100%	5%
Composite 1	29747-101	5	99%	95%	100%	2%
Composite 2	29747-102	5	96%	90%	100%	6%
Composite 3	29747-103	5	94%	85%	100%	7%

Day 28 Survival Statistical Analysis			Statistically Significant Difference, "<" as Compared to:	Difference in Survival as Compared to:
Sample ID	ESI Code	Mean	PDS Reference	PDS Reference >10% (% Difference)
PDS Reference	29747-104	98%	-	-
Composite 1	29747-101	99%	No	No
Composite 2	29747-102	96%	No	No
Composite 3	29747-103	94%	No	No

Table 7. Statistical Comparisons of *Macoma nasuta* Body Burdens vs. PDS Reference Site. Sediment Bioaccumulation Evaluation. Great Chebeague Island FNP. Chebeague Island, Maine. November 2017.

Compound	Units	PDS		Comp 1		Comp 2		Comp 3	
		Mean	Qual	Mean	Qual	Mean	Qual	Mean	Qual
Trace Metals									
Arsenic, total	mg/kg	2.2		2.2	NS	1.8	NS	2.0	NS
Cadmium, total	mg/kg	0.036	b	0.046	bS	0.047	S	0.044	bS
Chromium, total	mg/kg	0.38	b	0.37	bNS	0.35	bNS	0.32	bNS
Copper, total	mg/kg	1.7		2.0	NS	1.5	NS	1.7	NS
Lead, total	mg/kg	0.36		0.23	NS	0.26	NS	0.32	NS
Mercury, total	mg/kg	0.011	b	0.013	bS	0.011	bNS	0.011	bNS
Nickel, total	mg/kg	0.44		0.44	NS	0.41	NS	0.40	NS
Zinc, total	mg/kg	9.64		15.8	S	14.3	S	15.3	S
PAH Compounds									
Acenaphthene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Acenaphthylene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Anthracene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Benzo(a)anthracene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Benzo(a)pyrene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Benzo(b)fluoranthene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Benzo(k)fluoranthene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Benzo(g,h,i)perylene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Chrysene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Dibenz(a,h)anthracene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Fluoranthene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Fluorene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Indeno(1,2,3-c,d)pyrene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Naphthalene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Phenanthrene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Pyrene	µg/kg	9.1	a	8.9	ac	9.0	ac	9.1	ac
Total PAHs	µg/kg	145		143		144		146	
PCB Congeners									
PCB 008	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 018	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 028	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 044	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 052	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 066	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 101	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 105	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 118	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 128	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 138	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 153	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac

Compound	Units	PDS		Comp 1		Comp 2		Comp 3	
		Mean	Qual	Mean	Qual	Mean	Qual	Mean	Qual
PCB 170	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 180	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 187	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 195	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 206	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
PCB 209	µg/kg	0.91	a	0.89	ac	0.90	ac	0.91	ac
Total PCBs	µg/kg	32.6		32.2		32.5		32.7	

Notes:
a = Analyte not detected (below MDL) in at least one replicate; mean value was calculated using the project specific MDL for non-detected values.
b = Analyte estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = Analyte was detected in the treatment tissue sample replicates at an equal or higher mean concentration than in the associated reference site tissue, however statistical analysis is not required as the analyte was not detected in any of the reference site replicates.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.
S = Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05

Table 8. Statistical Comparisons of *Nereis virens* Body Burdens vs. PDS Reference Site. Sediment Bioaccumulation Evaluation. Chebeague Island FNP. Great Chebeague Island, Maine. November 2017.

Compound	Units	PDS		Comp 1		Comp 2		Comp 3	
		Mean	Qual	Mean	Qual	Mean	Qual	Mean	Qual
Trace Metals									
Arsenic, total	mg/kg	2.0		1.6	NS	1.6	NS	1.6	NS
Cadmium, total	mg/kg	0.055		0.043	bNS	0.037	bNS	0.042	bNS
Chromium, total	mg/kg	0.053	b	0.069	bNS	0.089	bNS	0.047	bNS
Copper, total	mg/kg	1.2		0.92	NS	1.1	NS	1.1	NS
Lead, total	mg/kg	0.35		0.26	NS	0.21	NS	0.21	NS
Mercury, total	mg/kg	0.0080	b	0.0032	aNS	0.0036	aNS	0.0038	aNS
Nickel, total	mg/kg	0.18		0.089	bNS	0.093	bNS	0.074	bNS
Zinc, total	mg/kg	14.3		11.6	NS	16.7	NS	14.2	NS
PAH Compounds									
Acenaphthene	µg/kg	9.0	a	9.1	ac	8.9	abc	9.2	ac
Acenaphthylene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Anthracene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Benzo(a)anthracene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Benzo(a)pyrene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Benzo(b)fluoranthene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Benzo(k)fluoranthene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Benzo(g,h,i)perylene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Chrysene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Dibenz(a,h)anthracene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Fluoranthene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Fluorene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Indeno(1,2,3-c,d)pyrene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Naphthalene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Phenanthrene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Pyrene	µg/kg	9.0	a	9.1	ac	8.9	ac	9.2	ac
Total PAHs	µg/kg	144.2		145.6		141.9		146.8	
PCB Congeners									
PCB 008	µg/kg	1.2	a	1.1	aNS	0.89	aNS	0.92	aNS
PCB 018	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 028	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 044	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 052	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 066	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 101	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 105	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 118	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 128	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 138	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 153	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac

Compound	Units	PDS		Comp 1		Comp 2		Comp 3	
		Mean	Qual	Mean	Qual	Mean	Qual	Mean	Qual
PCB 170	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 180	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 187	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 195	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 206	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
PCB 209	µg/kg	0.90	a	0.91	ac	0.89	ac	0.92	ac
Total PCBs	µg/kg	33.0		33.2		31.9		33.0	

Notes:

a = Analyte not detected (below MDL) in at least one replicate; mean value was calculated using the project specific MDL for non-detected values.
b = Analyte estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = Analyte was detected in the treatment tissue sample replicates at an equal or higher mean concentration than in the associated reference site tissue, however statistical analysis is not required as the analyte was not detected in any of the reference site replicates.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.

APPENDIX A:

RAW DATA & STATISTICAL SUPPORT

STUDY NUMBER RECORD

Issue and complete this form for studies that will require multiple tasks and directly associated support studies. Issue consecutive study numbers at the start of the project to cover all potential elements of the project.

CLIENT: AECOM

CONTACT(S): Kris Van Naerssen, Christine Archer, Maura Surprenant

PROJECT: Chebeague Island FNP

CONTRACT / TO #: W912WJ-17-D-0003 / #3 Project Number 60551931

	Species / Analysis Parameters:		STUDY:
Sample Receipt:			**29746**
Grain Size Analysis:			**-**
Composite Prep:			**29747**
Bulk Sediment Analysis [a]:			**-**
10 Day Assay:	***Leptocheirus plumulosus***		**29748**
	Americamysis bahia		**29749**
Elutriate Preparation:	**Type:**		**29750**
Elutriate Analysis:	**Pentachlorophenol**	**Yes / No**	**29751**
	Trace Metals	**Yes / No**	
	PCB Congeners	**Yes / No**	
	Pesticides	**Yes / No**	
SPP Assays:	***Menidia beryllina***		**29752**
	Americamysis bahia		
	Arbacia punctulata		
Bioaccumulation Study:	***Macoma nasuta***		**29753**
	Nereis virens		**29754**
Tissue Analysis [a]:	**Trace Metals**	**Yes / No**	**29755**
	PAH Compounds	**Yes / No**	
	PCB Congeners	**Yes / No**	
	Pesticides	**Yes / No**	

Notes:

[a] All bulk sediment and tissue analyses were completed by Alpha Analytical, Mansfield, Massachusetts.

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Table A-1 Chebeague Island (NAE Sampling Locations) – Coordinates / Estimated Penetration / Sample Quantities

Sample ID	Composite ID	Latitude	Longitude	Survey Depth (ft MLLW)	Project Depth + Overdepth (ft MLLW)	Estimated Core Length (ft)	Estimated Volume per Core (gallons) *	Minimum Sample Volume per Location (gallons) **	Estimated Number of Cores/Containers Required ***
A	1	43.753393	-70.109779	-9.3	-11.0	1.7	0.6	11.5	19 / 4
B	1	43.752688	-70.109211	-6.3	-11.0	4.7	1.7	11.5	7 / 4
C	2	43.751983	-70.108908	-4.0	-11.0	7.0	2.6	11.5	5 / 4
D	2	43.752111	-70.108587	-7.3	-11.0	3.7	1.4	11.5	9 / 4
F	3	43.751509	-70.108103	-5.3	-11.0	5.7	2.1	23.0	11 / 7

* Volume estimated assuming 3" inner diameter core liners for dredge area sediment samples.
** Assumes 23 gallons of sediment per composite for testing and archiving.
*** Sample containers for dredge area sediments shall be 3.5 gallon food grade high density polyethylene pails with locking lids.

23 gallons of dredge site water will be collected from a central location in the vicinity of each composite grou. Sample containers for dredge water shall be 5 gallon food grade collapsible carboys.

Information from AECOM's Work Plan (2017)

28 day *Macoma nasuta*
Sediment Bioaccumulation Evaluation

Statistical Analysis Reports

Survival

Bioaccumulation Evaluation - Survival Endpoint **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Macoma nasuta **Sample Code:** 29753-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (M.nasuta)

Sample	Rep	Pos	# Exposed	# Survived	Notes
29753-000	1	5	20	20	
29753-000	2	7	20	20	
29753-000	3	13	20	20	
29753-000	4	19	20	16	
29753-000	5	21	20	19	
29747-104	1	4	20	19	
29747-104	2	6	20	19	
29747-104	3	14	20	19	
29747-104	4	16	20	19	
29747-104	5	22	20	19	
29747-101	1	2	20	20	
29747-101	2	10	20	20	
29747-101	3	15	20	20	
29747-101	4	17	20	20	
29747-101	5	23	20	20	
29747-102	1	1	20	20	
29747-102	2	8	20	20	
29747-102	3	12	20	19	
29747-102	4	18	20	19	
29747-102	5	24	20	18	
29747-103	1	3	20	19	
29747-103	2	9	20	20	
29747-103	3	11	20	19	
29747-103	4	20	20	20	
29747-103	5	25	20	19	

Bioaccumulation Evaluation - Survival Endpoint **EnviroSystems, Inc.**

Batch ID:	13-1895-2640	**Test Type:**	Survival	**Analyst:**	Kirk Cram
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
11-3906-7910	Proportion Survived	Wilcoxon Rank Sum Two-Sample Test	1.0000	29747-101 passed proportion survived
00-5290-5525	Proportion Survived	Equal Variance t Two-Sample Test	0.7354	29747-102 passed proportion survived
21-2518-6765	Proportion Survived	Equal Variance t Two-Sample Test	0.9294	29747-103 passed proportion survived

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29753-000	LC	5	0.950	0.842	1.000	0.800	1.000	0.039	0.087	9.12%	0.00%
29747-104	RS	5	0.950	0.950	0.950	0.950	0.950	0.000	0.000	0.00%	0.00%
29747-101		5	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.00%	-5.26%
29747-102		5	0.960	0.908	1.000	0.900	1.000	0.019	0.042	4.36%	-1.05%
29747-103		5	0.970	0.936	1.000	0.950	1.000	0.012	0.027	2.82%	-2.11%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29753-000	LC	1.000	1.000	1.000	0.800	0.950
29747-104	RS	0.950	0.950	0.950	0.950	0.950
29747-101		1.000	1.000	1.000	1.000	1.000
29747-102		1.000	1.000	0.950	0.950	0.900
29747-103		0.950	1.000	0.950	1.000	0.950

Bioaccumulation Evaluation - Survival Endpoint — **EnviroSystems, Inc.**

Analysis ID: 11-3906-7910 **Endpoint:** Proportion Survived **CETIS Version:** CETISv1.9.3
Analyzed: 23 Jan-18 12:38 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	

Wilcoxon Rank Sum Two-Sample Test

Sample I	vs	Sample II	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Reference Sed		29747-101	40	n/a	0	8	Exact	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0321919	0.0321919	1	-7.3E+13	<1.0E-37	Significant Effect
Error	-3.55E-15	-4.44E-16	8			
Total	0.0321919		9			

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	0.950	0.950	0.950	0.950	0.950	0.950	0.000	0.00%	0.00%
29747-101		5	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.00%	-5.26%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	1.35	1.35	1.35	1.35	1.35	1.35	0	0.00%	0.00%
29747-101		5	1.46	1.46	1.46	1.46	1.46	1.46	0	0.00%	-8.44%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.950	0.950	0.950	0.950	0.950
29747-101		1.000	1.000	1.000	1.000	1.000

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.35	1.35	1.35	1.35	1.35
29747-101		1.46	1.46	1.46	1.46	1.46

Bioaccumulation Evaluation - Survival Endpoint — **EnviroSystems, Inc.**

Analysis ID: 12-5776-0525 **Endpoint:** Proportion Survived **CETIS Version:** CETISv1.9.3
Analyzed: 12 Dec-17 13:26 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0321919	0.0321919	1	-7.3E+13	<1.0E-37	Significant Effect
Error	-3.55E-15	-4.44E-16	8			
Total	0.0321919		9			

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	0.950	0.950	0.950	0.950	0.950	0.950	0.000	0.00%	0.00%
29747-101		5	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.00%	-5.26%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	1.35	1.35	1.35	1.35	1.35	1.35	0	0.00%	0.00%
29747-101		5	1.46	1.46	1.46	1.46	1.46	1.46	0	0.00%	-8.44%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.950	0.950	0.950	0.950	0.950
29747-101		1.000	1.000	1.000	1.000	1.000

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.35	1.35	1.35	1.35	1.35
29747-101		1.46	1.46	1.46	1.46	1.46

Bioaccumulation Evaluation - Survival Endpoint — **EnviroSystems, Inc.**

Analysis ID: 00-5290-5525 **Endpoint:** Proportion Survived **CETIS Version:** CETISv1.9.3
Analyzed: 12 Dec-17 13:26 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	29747-102 passed proportion survived	3.90%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Reference Sed		29747-102	-0.658	1.86	0.074	8	CDF	0.7354	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0017086	0.0017086	1	0.433	0.5292	Non-Significant Effect
Error	0.0315978	0.0039497	8			
Total	0.0333065		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	13.6	11.3	0.0062	Unequal Variances
Variances	Mod Levene Equality of Variance Test	8.8	13.7	0.0251	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.843	0.741	0.0485	Normal Distribution

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	0.950	0.950	0.950	0.950	0.950	0.950	0.000	0.00%	0.00%
29747-102		5	0.960	0.908	1.000	0.950	0.900	1.000	0.019	4.36%	-1.05%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	1.35	1.35	1.35	1.35	1.35	1.35	0	0.00%	0.00%
29747-102		5	1.37	1.26	1.48	1.35	1.25	1.46	0.0397	6.48%	-1.94%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.950	0.950	0.950	0.950	0.950
29747-102		1.000	1.000	0.950	0.950	0.900

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.35	1.35	1.35	1.35	1.35
29747-102		1.46	1.46	1.35	1.35	1.25

Bioaccumulation Evaluation - Survival Endpoint — **EnviroSystems, Inc.**

Analysis ID: 21-2518-6765 **Endpoint:** Proportion Survived **CETIS Version:** CETISv1.9.3
Analyzed: 12 Dec-17 13:26 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	29747-103 passed proportion survived	2.62%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Reference Sed		29747-103	-1.63	1.86	0.052	8	CDF	0.9294	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0051507	0.0051507	1	2.67	0.1411	Non-Significant Effect
Error	0.0154521	0.0019315	8			
Total	0.0206028		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	96	11.3	9.9E-06	Unequal Variances
Variances	Mod Levene Equality of Variance Test	3	13.7	0.1340	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.814	0.741	0.0215	Normal Distribution

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	0.950	0.950	0.950	0.950	0.950	0.950	0.000	0.00%	0.00%
29747-103		5	0.970	0.936	1.000	0.950	0.950	1.000	0.012	2.82%	-2.11%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	1.35	1.35	1.35	1.35	1.35	1.35	0	0.00%	0.00%
29747-103		5	1.39	1.31	1.47	1.35	1.35	1.46	0.0278	4.47%	-3.37%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.950	0.950	0.950	0.950	0.950
29747-103		0.950	1.000	0.950	1.000	0.950

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.35	1.35	1.35	1.35	1.35
29747-103		1.35	1.46	1.35	1.46	1.35

28 day *Nereis virens*
Sediment Bioaccumulation Evaluation

Statistical Analysis Reports

Survival

Bioaccumulation Evaluation - Survival Endpoint **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Nereis virens **Sample Code:** 29754-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (N.virens)

Sample	Rep	Pos	# Exposed	# Survived	Notes
29754-000	1	4	20	18	
29754-000	2	7	20	19	
29754-000	3	12	20	20	
29754-000	4	17	20	18	
29754-000	5	21	20	20	
29747-104	1	1	20	20	
29747-104	2	10	20	20	
29747-104	3	15	20	20	
29747-104	4	19	20	18	
29747-104	5	23	20	20	
29747-101	1	2	20	20	
29747-101	2	9	20	20	
29747-101	3	11	20	20	
29747-101	4	16	20	20	
29747-101	5	22	20	19	
29747-102	1	3	20	20	
29747-102	2	8	20	18	
29747-102	3	14	20	20	
29747-102	4	18	20	18	
29747-102	5	25	20	20	
29747-103	1	5	20	18	
29747-103	2	6	20	20	
29747-103	3	13	20	19	
29747-103	4	20	20	20	
29747-103	5	24	20	17	

Bioaccumulation Evaluation - Survival Endpoint **EnviroSystems, Inc.**

Batch ID:	05-1969-5271	**Test Type:**	Survival	**Analyst:**	Kirk Cram
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Nereis virens	**Brine:**	Generic commercial salts
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
18-6074-7598	Proportion Survived	Wilcoxon Rank Sum Two-Sample Test	0.7778	29747-101 passed proportion survived
03-1972-7963	Proportion Survived	Wilcoxon Rank Sum Two-Sample Test	0.5000	29747-102 passed proportion survived
09-9669-9900	Proportion Survived	Equal Variance t Two-Sample Test	0.1453	29747-103 passed proportion survived

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29754-000	LC	5	0.950	0.888	1.000	0.900	1.000	0.022	0.050	5.26%	0.00%
29747-104	RS	5	0.980	0.924	1.000	0.900	1.000	0.020	0.045	4.56%	-3.16%
29747-101		5	0.990	0.962	1.000	0.950	1.000	0.010	0.022	2.26%	-4.21%
29747-102		5	0.960	0.892	1.000	0.900	1.000	0.025	0.055	5.71%	-1.05%
29747-103		5	0.940	0.859	1.000	0.850	1.000	0.029	0.065	6.94%	1.05%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29754-000	LC	0.900	0.950	1.000	0.900	1.000
29747-104	RS	1.000	1.000	1.000	0.900	1.000
29747-101		1.000	1.000	1.000	1.000	0.950
29747-102		1.000	0.900	1.000	0.900	1.000
29747-103		0.900	1.000	0.950	1.000	0.850

Bioaccumulation Evaluation - Survival Endpoint — **EnviroSystems, Inc.**

Analysis ID: 18-6074-7598 **Endpoint:** Proportion Survived **CETIS Version:** CETISv1.9.3
Analyzed: 12 Dec-17 13:25 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	29747-101 passed proportion survived	3.85%

Wilcoxon Rank Sum Two-Sample Test

Sample I	vs	Sample II	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Reference Sed		29747-101	28	n/a	1	8	Exact	0.7778	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0009262	0.0009262	1	0.163	0.6971	Non-Significant Effect
Error	0.045485	0.0056856	8			
Total	0.0464112		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	3.42	23.2	0.2613	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.639	0.741	1.6E-04	Non-Normal Distribution

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	0.980	0.924	1.000	1.000	0.900	1.000	0.020	4.56%	0.00%
29747-101		5	0.990	0.962	1.000	1.000	0.950	1.000	0.010	2.26%	-1.02%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	1.42	1.3	1.53	1.46	1.25	1.46	0.0419	6.62%	0.00%
29747-101		5	1.44	1.37	1.5	1.46	1.35	1.46	0.0227	3.53%	-1.36%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.000	1.000	1.000	0.900	1.000
29747-101		1.000	1.000	1.000	1.000	0.950

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.46	1.46	1.46	1.25	1.46
29747-101		1.46	1.46	1.46	1.46	1.35

Bioaccumulation Evaluation - Survival Endpoint — **EnviroSystems, Inc.**

Analysis ID: 03-1972-7963 **Endpoint:** Proportion Survived **CETIS Version:** CETISv1.9.3
Analyzed: 12 Dec-17 13:25 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	29747-102 passed proportion survived	5.61%

Wilcoxon Rank Sum Two-Sample Test

Sample I	vs	Sample II	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Reference Sed		29747-102	25	n/a	2	8	Exact	0.5000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004398	0.004398	1	0.4	0.5447	Non-Significant Effect
Error	0.087959	0.0109949	8			
Total	0.092357		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.5	23.2	0.7040	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.759	0.741	0.0045	Non-Normal Distribution

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	0.980	0.924	1.000	1.000	0.900	1.000	0.020	4.56%	0.00%
29747-102		5	0.960	0.892	1.000	1.000	0.900	1.000	0.025	5.71%	2.04%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	1.42	1.3	1.53	1.46	1.25	1.46	0.0419	6.62%	0.00%
29747-102		5	1.37	1.23	1.52	1.46	1.25	1.46	0.0514	8.35%	2.96%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.000	1.000	1.000	0.900	1.000
29747-102		1.000	0.900	1.000	0.900	1.000

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.46	1.46	1.46	1.25	1.46
29747-102		1.46	1.25	1.46	1.25	1.46

Bioaccumulation Evaluation - Survival Endpoint — **EnviroSystems, Inc.**

Analysis ID: 09-9669-9900 **Endpoint:** Proportion Survived **CETIS Version:** CETISv1.9.3
Analyzed: 12 Dec-17 13:25 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	29747-103 passed proportion survived	6.03%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Reference Sed		29747-103	1.13	1.86	0.131	8	CDF	0.1453	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0159311	0.0159311	1	1.28	0.2905	Non-Significant Effect
Error	0.0995027	0.0124378	8			
Total	0.115434		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1.83	23.2	0.5733	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.857	0.741	0.0708	Normal Distribution

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	0.980	0.924	1.000	1.000	0.900	1.000	0.020	4.56%	0.00%
29747-103		5	0.940	0.859	1.000	0.950	0.850	1.000	0.029	6.94%	4.08%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
29747-104	RS	5	1.42	1.3	1.53	1.46	1.25	1.46	0.0419	6.62%	0.00%
29747-103		5	1.34	1.18	1.49	1.35	1.17	1.46	0.0567	9.48%	5.63%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.000	1.000	1.000	0.900	1.000
29747-103		0.900	1.000	0.950	1.000	0.850

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.46	1.46	1.46	1.25	1.46
29747-103		1.25	1.46	1.35	1.46	1.17

28 day *Macoma nasuta*
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APPENDIX TABLE. REPLICATE CONCENTRATIONS IN THE CLAM (*Macoma nasuta*)

	PDS Reference Site									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	2.09		2.16		2.45		2.42		1.82	
Cadmium	0.042		0.034	J	0.031	J	0.038		0.033	J
Chromium	0.392		0.227	J	0.497		0.306	J	0.479	
Copper	1.48		1.98		2.51		1.41		1.22	
Lead	0.330		0.302		0.395		0.456		0.312	
Mercury	0.012	J	0.012	J	0.010	J	0.009	J	0.012	
Nickel	0.457		0.369		0.433		0.480		0.474	
Zinc	9.22		11.10		8.68		10.60		8.60	

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 1									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	1.76		1.99		2.55		2.18		2.33	
Cadmium	0.056		0.033	J	0.054		0.049		0.040	
Chromium	0.264	J	0.627		0.287	J	0.334	J	0.318	J
Copper	1.21		3.51		1.39		1.68		2.03	
Lead	0.249		0.227		0.225		0.247		0.215	
Mercury	0.014		0.011	J	0.012	J	0.014		0.013	
Nickel	0.475		0.391		0.482		0.435		0.415	
Zinc	15.20		12.30		20.40		15.40		15.70	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 2									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	2.38		2.00		1.55		1.71		1.43	
Cadmium	0.052		0.045		0.042		0.051		0.043	
Chromium	0.400		0.329	J	0.263	J	0.318	J	0.421	
Copper	1.40		1.42		1.07		1.24		2.14	
Lead	0.294		0.295		0.238		0.254		0.224	
Mercury	0.010	J	0.011	J	0.011	J	0.011	J	0.010	J
Nickel	0.448		0.427		0.366		0.406		0.386	
Zinc	17.20		13.40		13.30		14.30		13.30	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 3									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	1.58		2.01		2.26		2.11		1.91	
Cadmium	0.045		0.050		0.047		0.035	J	0.045	
Chromium	0.226	J	0.327	J	0.432		0.250	J	0.364	J
Copper	1.30		2.72		1.43		1.44		1.71	
Lead	0.286		0.366		0.325		0.284		0.334	
Mercury	0.012	J	0.012		0.012	J	0.010	J	0.012	J
Nickel	0.340		0.373		0.445		0.408		0.410	
Zinc	14.80		17.10		17.70		12.40		14.50	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

Bioaccumulation Evaluation - Metals - Macoma **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Macoma nasuta **Sample Code:** 29753-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (M.nasuta)

Sample	Rep	Pos	Body Burden	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
29747-104	1	2		2.09	0.042	0.392	1.48	0.33	0.012	0.457	9.22
29747-104	2	8		2.16	0.034	0.227	1.98	0.302	0.012	0.369	11.1
29747-104	3	12		2.45	0.031	0.497	2.51	0.395	0.01	0.433	8.68
29747-104	4	15		2.42	0.038	0.306	1.41	0.456	0.009	0.48	10.6
29747-104	5	19		1.82	0.033	0.479	1.22	0.312	0.012	0.474	8.6
29747-101	1	4		1.76	0.056	0.264	1.21	0.249	0.014	0.475	15.2
29747-101	2	6		1.99	0.033	0.627	3.51	0.227	0.011	0.391	12.3
29747-101	3	10		2.55	0.054	0.287	1.39	0.225	0.012	0.482	20.4
29747-101	4	13		2.18	0.049	0.334	1.68	0.247	0.014	0.435	15.4
29747-101	5	18		2.33	0.04	0.318	2.03	0.215	0.013	0.415	15.7
29747-102	1	1		2.38	0.052	0.4	1.4	0.294	0.01	0.448	17.2
29747-102	2	5		2	0.045	0.329	1.42	0.295	0.011	0.427	13.4
29747-102	3	9		1.55	0.042	0.263	1.07	0.238	0.011	0.366	13.3
29747-102	4	14		1.71	0.051	0.318	1.24	0.254	0.011	0.406	14.3
29747-102	5	20		1.43	0.043	0.421	2.14	0.224	0.01	0.386	13.3
29747-103	1	3		1.58	0.045	0.226	1.3	0.286	0.012	0.34	14.8
29747-103	2	7		2.01	0.05	0.327	2.72	0.366	0.012	0.373	17.1
29747-103	3	11		2.26	0.047	0.432	1.43	0.325	0.012	0.445	17.7
29747-103	4	16		2.11	0.035	0.25	1.44	0.284	0.01	0.408	12.4
29747-103	5	17		1.91	0.045	0.364	1.71	0.334	0.012	0.41	14.5

Bioaccumulation Evaluation - Metals - Macoma **EnviroSystems, Inc.**

Batch ID:	17-8957-5671	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
12-4181-4840	Arsenic	Equal Variance t Two-Sample Test	0.5560	29747-101 passed arsenic
18-1056-2762	Arsenic	Equal Variance t Two-Sample Test	0.9463	29747-102 passed arsenic
08-4806-8840	Arsenic	Equal Variance t Two-Sample Test	0.8876	29747-103 passed arsenic
02-3724-1033	Cadmium	Equal Variance t Two-Sample Test	0.0266	29747-101 failed cadmium
04-5509-1211	Cadmium	Equal Variance t Two-Sample Test	0.0024	29747-102 failed cadmium
04-7304-4480	Cadmium	Equal Variance t Two-Sample Test	0.0125	29747-103 failed cadmium
03-2844-7768	Chromium	Equal Variance t Two-Sample Test	0.5651	29747-101 passed chromium
17-3426-7316	Chromium	Equal Variance t Two-Sample Test	0.7107	29747-102 passed chromium
15-3795-6597	Chromium	Equal Variance t Two-Sample Test	0.8151	29747-103 passed chromium
03-9801-1213	Copper	Equal Variance t Two-Sample Test	0.3098	29747-101 passed copper
02-2685-1120	Copper	Equal Variance t Two-Sample Test	0.8018	29747-102 passed copper
01-8192-7029	Copper	Equal Variance t Two-Sample Test	0.5000	29747-103 passed copper
03-1680-6051	Lead	Equal Variance t Two-Sample Test	0.9986	29747-101 passed lead
08-3592-6799	Lead	Equal Variance t Two-Sample Test	0.9916	29747-102 passed lead
01-3314-2191	Lead	Equal Variance t Two-Sample Test	0.8699	29747-103 passed lead
08-3034-2576	Mercury	Equal Variance t Two-Sample Test	0.0349	29747-101 failed mercury
21-3111-9989	Mercury	Equal Variance t Two-Sample Test	0.7142	29747-102 passed mercury
01-5044-3503	Mercury	Equal Variance t Two-Sample Test	0.2229	29747-103 passed mercury
05-3428-0569	Nickel	Equal Variance t Two-Sample Test	0.5435	29747-101 passed nickel
05-3250-5340	Nickel	Equal Variance t Two-Sample Test	0.9076	29747-102 passed nickel
17-0786-2876	Nickel	Equal Variance t Two-Sample Test	0.9418	29747-103 passed nickel
17-3216-2745	Zinc	Equal Variance t Two-Sample Test	0.0011	29747-101 failed zinc
08-1641-7349	Zinc	Equal Variance t Two-Sample Test	4.4E-04	29747-102 failed zinc
18-9719-0223	Zinc	Equal Variance t Two-Sample Test	4.0E-04	29747-103 failed zinc

Bioaccumulation Evaluation - Metals - Macoma **EnviroSystems, Inc.**

Arsenic Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	2.19	1.87	2.51	1.82	2.45	0.116	0.259	11.84%	0.00%
29747-101		5	2.16	1.78	2.54	1.76	2.55	0.136	0.304	14.07%	1.19%
29747-102		5	1.81	1.34	2.29	1.43	2.38	0.171	0.382	21.04%	17.09%
29747-103		5	1.97	1.66	2.29	1.58	2.26	0.114	0.255	12.94%	9.78%

Cadmium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.0356	0.0301	0.0411	0.031	0.042	0.00196	0.00439	12.34%	0.00%
29747-101		5	0.0464	0.0343	0.0585	0.033	0.056	0.00434	0.00971	20.93%	-30.34%
29747-102		5	0.0466	0.0409	0.0523	0.042	0.052	0.00206	0.00462	9.90%	-30.90%
29747-103		5	0.0444	0.0374	0.0514	0.035	0.05	0.00252	0.00564	12.70%	-24.72%

Chromium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.38	0.238	0.522	0.227	0.497	0.0512	0.115	30.14%	0.00%
29747-101		5	0.366	0.182	0.55	0.264	0.627	0.0664	0.148	40.55%	3.73%
29747-102		5	0.346	0.266	0.426	0.263	0.421	0.0287	0.0642	18.55%	8.94%
29747-103		5	0.32	0.215	0.424	0.226	0.432	0.0376	0.0841	26.29%	15.89%

Copper Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	1.72	1.07	2.37	1.22	2.51	0.234	0.523	30.42%	0.00%
29747-101		5	1.96	0.824	3.1	1.21	3.51	0.411	0.918	46.76%	-14.19%
29747-102		5	1.45	0.947	1.96	1.07	2.14	0.183	0.409	28.10%	15.47%
29747-103		5	1.72	1	2.44	1.3	2.72	0.259	0.579	33.64%	0.00%

Lead Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.359	0.278	0.44	0.302	0.456	0.0292	0.0652	18.16%	0.00%
29747-101		5	0.233	0.214	0.251	0.215	0.249	0.00662	0.0148	6.36%	35.21%
29747-102		5	0.261	0.221	0.301	0.224	0.295	0.0145	0.0324	12.40%	27.30%
29747-103		5	0.319	0.276	0.362	0.284	0.366	0.0155	0.0346	10.84%	11.14%

Mercury Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.011	0.00924	0.0128	0.009	0.012	0.000632	0.00141	12.86%	0.00%
29747-101		5	0.0128	0.0112	0.0144	0.011	0.014	0.000583	0.0013	10.19%	-16.36%
29747-102		5	0.0106	0.00992	0.0113	0.01	0.011	0.000245	0.000548	5.17%	3.64%
29747-103		5	0.0116	0.0105	0.0127	0.01	0.012	0.0004	0.000894	7.71%	-5.45%

Nickel Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.443	0.387	0.498	0.369	0.48	0.0201	0.045	10.17%	0.00%
29747-101		5	0.44	0.391	0.488	0.391	0.482	0.0174	0.0389	8.84%	0.68%
29747-102		5	0.407	0.366	0.447	0.366	0.448	0.0145	0.0324	7.97%	8.13%
29747-103		5	0.395	0.346	0.445	0.34	0.445	0.0179	0.04	10.12%	10.71%

Zinc Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.64	8.22	11.1	8.6	11.1	0.512	1.14	11.86%	0.00%
29747-101		5	15.8	12.2	19.4	12.3	20.4	1.3	2.91	18.44%	-63.90%
29747-102		5	14.3	12.2	16.4	13.3	17.2	0.749	1.67	11.71%	-48.34%
29747-103		5	15.3	12.6	18	12.4	17.7	0.957	2.14	13.98%	-58.71%

Bioaccumulation Evaluation - Metals - Macoma **EnviroSystems, Inc.**

Arsenic Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	2.09	2.16	2.45	2.42	1.82
29747-101		1.76	1.99	2.55	2.18	2.33
29747-102		2.38	2	1.55	1.71	1.43
29747-103		1.58	2.01	2.26	2.11	1.91

Cadmium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.042	0.034	0.031	0.038	0.033
29747-101		0.056	0.033	0.054	0.049	0.04
29747-102		0.052	0.045	0.042	0.051	0.043
29747-103		0.045	0.05	0.047	0.035	0.045

Chromium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.392	0.227	0.497	0.306	0.479
29747-101		0.264	0.627	0.287	0.334	0.318
29747-102		0.4	0.329	0.263	0.318	0.421
29747-103		0.226	0.327	0.432	0.25	0.364

Copper Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.48	1.98	2.51	1.41	1.22
29747-101		1.21	3.51	1.39	1.68	2.03
29747-102		1.4	1.42	1.07	1.24	2.14
29747-103		1.3	2.72	1.43	1.44	1.71

Lead Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.33	0.302	0.395	0.456	0.312
29747-101		0.249	0.227	0.225	0.247	0.215
29747-102		0.294	0.295	0.238	0.254	0.224
29747-103		0.286	0.366	0.325	0.284	0.334

Mercury Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.012	0.012	0.01	0.009	0.012
29747-101		0.014	0.011	0.012	0.014	0.013
29747-102		0.01	0.011	0.011	0.011	0.01
29747-103		0.012	0.012	0.012	0.01	0.012

Nickel Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.457	0.369	0.433	0.48	0.474
29747-101		0.475	0.391	0.482	0.435	0.415
29747-102		0.448	0.427	0.366	0.406	0.386
29747-103		0.34	0.373	0.445	0.408	0.41

Zinc Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.22	11.1	8.68	10.6	8.6
29747-101		15.2	12.3	20.4	15.4	15.7
29747-102		17.2	13.4	13.3	14.3	13.3
29747-103		14.8	17.1	17.7	12.4	14.5

28 day *Nereis virens*
Sediment Bioaccumulation Evaluation

Body Burden Data and Statistical Analysis Reports

Trace Metals

APPENDIX TABLE. REPLICATE CONCENTRATIONS IN THE WORM (*Nereis virens*)

	PDS Reference Site									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	1.96		2.14		1.91		2.11		1.76	
Cadmium	0.057		0.056		0.052		0.067		0.041	
Chromium	0.057	J	0.057	J	0.047	J	0.056	J	0.051	J
Copper	1.27		1.20		1.12		1.18		1.03	
Lead	0.382		0.382		0.312		0.406		0.273	
Mercury	0.006	J	0.008	J	0.009	J	0.009	J	0.009	J
Nickel	0.199		0.122		0.152		0.259		0.158	
Zinc	30.90		17.30		7.90		7.64		7.78	

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 1									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	1.59		1.79		1.71		1.65		1.45	
Cadmium	0.043		0.062		0.043		0.029	J	0.036	J
Chromium	0.058	J	0.037	J	0.085	J	0.103	J	0.064	J
Copper	0.87		0.98		0.90		0.99		0.88	
Lead	0.309		0.399		0.203		0.173		0.200	
Mercury	0.003	U	0.004	U	0.003	U	0.003	U	0.003	U
Nickel	0.092	J	0.094	J	0.075	J	0.095		0.092	J
Zinc	6.14		6.98		6.00		31.40		7.61	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 2									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	1.60		1.56		1.70		1.72		1.59	
Cadmium	0.038		0.031	J	0.046		0.033	J	0.038	
Chromium	0.046	J	0.099	J	0.067	J	0.186	J	0.045	J
Copper	1.04		1.26		1.16		1.21		1.05	
Lead	0.202		0.188		0.257		0.210		0.193	
Mercury	0.003	U	0.004	U	0.004	U	0.004	U	0.003	U
Nickel	0.054	J	0.138		0.083	J	0.128		0.062	J
Zinc	15.30		8.75		32.10		6.30		21.20	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 3									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
Metals (ug/g wet weight)										
Arsenic	1.61		1.58		1.46		1.69		1.70	
Cadmium	0.037	J	0.033	J	0.039	J	0.048		0.053	
Chromium	0.040	J	0.055	J	0.043	J	0.050	J	0.046	J
Copper	1.12		1.20		1.08		1.22		1.10	
Lead	0.190		0.194		0.191		0.276		0.213	
Mercury	0.004	U	0.004	U	0.004	U	0.004	U	0.003	U
Nickel	0.090	J	0.068	J	0.055	J	0.078	J	0.080	J
Zinc	6.17		6.39		27.20		24.40		7.04	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

Bioaccumulation Evaluation - Metals - Nereis virens **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Nereis virens **Sample Code:** 29754-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (N.virens)

Sample	Rep	Pos	Body Burden	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
29747-104	1	1		1.96	0.057	0.057	1.27	0.382	0.006	0.199	30.9
29747-104	2	7		2.14	0.056	0.057	1.2	0.382	0.008	0.122	17.3
29747-104	3	12		1.91	0.052	0.047	1.12	0.312	0.009	0.152	7.9
29747-104	4	13		2.11	0.067	0.056	1.18	0.406	0.009	0.259	7.64
29747-104	5	17		1.76	0.041	0.051	1.03	0.273	0.009	0.158	7.78
29747-101	1	3		1.59	0.043	0.058	0.871	0.309	0.003	0.092	6.14
29747-101	2	6		1.79	0.062	0.037	0.98	0.399	0.004	0.094	6.98
29747-101	3	9		1.71	0.043	0.085	0.903	0.203	0.003	0.075	6
29747-101	4	16		1.65	0.029	0.103	0.985	0.173	0.003	0.095	31.4
29747-101	5	19		1.45	0.036	0.064	0.884	0.2	0.003	0.092	7.61
29747-102	1	2		1.6	0.038	0.046	1.04	0.202	0.003	0.054	15.3
29747-102	2	5		1.56	0.031	0.099	1.26	0.188	0.004	0.138	8.75
29747-102	3	11		1.7	0.046	0.067	1.16	0.257	0.004	0.083	32.1
29747-102	4	15		1.72	0.033	0.186	1.21	0.21	0.004	0.128	6.3
29747-102	5	20		1.59	0.038	0.045	1.05	0.193	0.003	0.062	21.2
29747-103	1	4		1.61	0.037	0.04	1.12	0.19	0.004	0.09	6.17
29747-103	2	8		1.58	0.033	0.055	1.2	0.194	0.004	0.068	6.39
29747-103	3	10		1.46	0.039	0.043	1.08	0.191	0.004	0.055	27.2
29747-103	4	14		1.69	0.048	0.05	1.22	0.276	0.004	0.078	24.4
29747-103	5	18		1.7	0.053	0.046	1.1	0.213	0.003	0.08	7.04

Bioaccumulation Evaluation - Metals - Nereis virens **EnviroSystems, Inc.**

Batch ID:	13-1955-3607	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Nereis virens	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
19-0374-2492	Arsenic	Equal Variance t Two-Sample Test	0.9972	29747-101 passed arsenic
16-4093-2829	Arsenic	Equal Variance t Two-Sample Test	0.9990	29747-102 passed arsenic
20-8718-9108	Arsenic	Equal Variance t Two-Sample Test	0.9990	29747-103 passed arsenic
06-3734-9956	Cadmium	Equal Variance t Two-Sample Test	0.9394	29747-101 passed cadmium
08-9692-9909	Cadmium	Equal Variance t Two-Sample Test	0.9961	29747-102 passed cadmium
00-3153-8640	Cadmium	Equal Variance t Two-Sample Test	0.9729	29747-103 passed cadmium
12-9420-3449	Chromium	Unequal Variance t Two-Sample Test	0.1213	29747-101 passed chromium
03-2825-6424	Chromium	Unequal Variance t Two-Sample Test	0.2332	29747-102 passed chromium
06-8767-3081	Chromium	Unequal Variance t Two-Sample Test	0.1272	29747-102 passed chromium
11-3734-9781	Chromium	Equal Variance t Two-Sample Test	0.9633	29747-103 passed chromium
16-7219-5342	Copper	Equal Variance t Two-Sample Test	0.9995	29747-101 passed copper
09-3831-8315	Copper	Equal Variance t Two-Sample Test	0.6029	29747-102 passed copper
20-5789-5624	Copper	Equal Variance t Two-Sample Test	0.6237	29747-103 passed copper
05-6383-3821	Lead	Equal Variance t Two-Sample Test	0.9537	29747-101 passed lead
01-0101-6398	Lead	Equal Variance t Two-Sample Test	0.9995	29747-102 passed lead
18-0720-3044	Lead	Equal Variance t Two-Sample Test	0.9991	29747-103 passed lead
17-8027-5434	Mercury	Equal Variance t Two-Sample Test	1.0000	29747-101 passed mercury
07-5156-1906	Mercury	Wilcoxon Rank Sum Two-Sample Test	1.0000	29747-101 passed mercury
10-2864-6667	Mercury	Equal Variance t Two-Sample Test	1.0000	29747-102 passed mercury
10-3948-7517	Mercury	Wilcoxon Rank Sum Two-Sample Test	1.0000	29747-102 passed mercury
07-7584-2486	Mercury	Equal Variance t Two-Sample Test	1.0000	29747-103 passed mercury
11-7558-0737	Mercury	Wilcoxon Rank Sum Two-Sample Test	1.0000	29747-103 passed mercury
10-5495-9373	Nickel	Unequal Variance t Two-Sample Test	0.9895	29747-101 passed nickel
18-3584-4900	Nickel	Equal Variance t Two-Sample Test	0.9902	29747-102 passed nickel
17-5446-8554	Nickel	Equal Variance t Two-Sample Test	0.9986	29747-103 passed nickel
06-0312-0114	Zinc	Wilcoxon Rank Sum Two-Sample Test	0.9524	29747-101 passed zinc
08-6245-7510	Zinc	Equal Variance t Two-Sample Test	0.3592	29747-102 passed zinc
16-6462-5818	Zinc	Wilcoxon Rank Sum Two-Sample Test	0.8452	29747-103 passed zinc

Bioaccumulation Evaluation - Metals - Nereis virens **EnviroSystems, Inc.**

Arsenic Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	1.98	1.78	2.17	1.76	2.14	0.0693	0.155	7.84%	0.00%
29747-101		5	1.64	1.48	1.8	1.45	1.79	0.0575	0.129	7.85%	17.11%
29747-102		5	1.63	1.55	1.72	1.56	1.72	0.0319	0.0713	4.36%	17.31%
29747-103		5	1.61	1.49	1.73	1.46	1.7	0.0435	0.0973	6.05%	18.62%

Cadmium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.0546	0.0429	0.0663	0.041	0.067	0.0042	0.0094	17.21%	0.00%
29747-101		5	0.0426	0.0273	0.0579	0.029	0.062	0.0055	0.0123	28.87%	21.98%
29747-102		5	0.0372	0.03	0.0444	0.031	0.046	0.0026	0.00581	15.61%	31.87%
29747-103		5	0.042	0.0318	0.0522	0.033	0.053	0.00369	0.00825	19.63%	23.08%

Chromium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.0536	0.0481	0.0591	0.047	0.057	0.00199	0.00445	8.30%	0.00%
29747-101		5	0.0694	0.0379	0.101	0.037	0.103	0.0114	0.0254	36.60%	-29.48%
29747-102		5	0.0886	0.0157	0.161	0.045	0.186	0.0262	0.0587	66.24%	-65.30%
29747-103		5	0.0468	0.0395	0.0541	0.04	0.055	0.00263	0.00589	12.59%	12.69%

Copper Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	1.16	1.05	1.27	1.03	1.27	0.0404	0.0903	7.78%	0.00%
29747-101		5	0.925	0.857	0.992	0.871	0.985	0.0242	0.0541	5.85%	20.29%
29747-102		5	1.14	1.02	1.26	1.04	1.26	0.0434	0.0971	8.49%	1.38%
29747-103		5	1.14	1.07	1.22	1.08	1.22	0.0279	0.0623	5.44%	1.38%

Lead Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.351	0.281	0.421	0.273	0.406	0.0251	0.056	15.96%	0.00%
29747-101		5	0.257	0.139	0.375	0.173	0.399	0.0425	0.095	36.99%	26.84%
29747-102		5	0.21	0.176	0.244	0.188	0.257	0.0123	0.0276	13.14%	40.17%
29747-103		5	0.213	0.167	0.258	0.19	0.276	0.0163	0.0365	17.17%	39.37%

Mercury Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.0082	0.00658	0.00982	0.006	0.009	0.000583	0.0013	15.90%	0.00%
29747-101		5	0.0032	0.00264	0.00376	0.003	0.004	0.0002	0.000447	13.98%	60.98%
29747-102		5	0.0036	0.00292	0.00428	0.003	0.004	0.000245	0.000548	15.21%	56.10%
29747-103		5	0.0038	0.00324	0.00436	0.003	0.004	0.0002	0.000447	11.77%	53.66%

Nickel Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.178	0.112	0.244	0.122	0.259	0.0237	0.0529	29.75%	0.00%
29747-101		5	0.0896	0.0793	0.0999	0.075	0.095	0.0037	0.00826	9.22%	49.66%
29747-102		5	0.093	0.0456	0.14	0.054	0.138	0.0171	0.0382	41.06%	47.75%
29747-103		5	0.0742	0.0577	0.0907	0.055	0.09	0.00594	0.0133	17.89%	58.31%

Zinc Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	14.3	1.7	26.9	7.64	30.9	4.54	10.2	70.98%	0.00%
29747-101		5	11.6	-2.12	25.4	6	31.4	4.95	11.1	95.25%	18.72%
29747-102		5	16.7	3.85	29.6	6.3	32.1	4.64	10.4	62.03%	-16.96%
29747-103		5	14.2	1.07	27.4	6.17	27.2	4.74	10.6	74.47%	0.45%

Bioaccumulation Evaluation - Metals - Nereis virens **EnviroSystems, Inc.**

Arsenic Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.96	2.14	1.91	2.11	1.76
29747-101		1.59	1.79	1.71	1.65	1.45
29747-102		1.6	1.56	1.7	1.72	1.59
29747-103		1.61	1.58	1.46	1.69	1.7

Cadmium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.057	0.056	0.052	0.067	0.041
29747-101		0.043	0.062	0.043	0.029	0.036
29747-102		0.038	0.031	0.046	0.033	0.038
29747-103		0.037	0.033	0.039	0.048	0.053

Chromium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.057	0.057	0.047	0.056	0.051
29747-101		0.058	0.037	0.085	0.103	0.064
29747-102		0.046	0.099	0.067	0.186	0.045
29747-103		0.04	0.055	0.043	0.05	0.046

Copper Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	1.27	1.2	1.12	1.18	1.03
29747-101		0.871	0.98	0.903	0.985	0.884
29747-102		1.04	1.26	1.16	1.21	1.05
29747-103		1.12	1.2	1.08	1.22	1.1

Lead Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.382	0.382	0.312	0.406	0.273
29747-101		0.309	0.399	0.203	0.173	0.2
29747-102		0.202	0.188	0.257	0.21	0.193
29747-103		0.19	0.194	0.191	0.276	0.213

Mercury Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.006	0.008	0.009	0.009	0.009
29747-101		0.003	0.004	0.003	0.003	0.003
29747-102		0.003	0.004	0.004	0.004	0.003
29747-103		0.004	0.004	0.004	0.004	0.003

Nickel Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.199	0.122	0.152	0.259	0.158
29747-101		0.092	0.094	0.075	0.095	0.092
29747-102		0.054	0.138	0.083	0.128	0.062
29747-103		0.09	0.068	0.055	0.078	0.08

Zinc Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	30.9	17.3	7.9	7.64	7.78
29747-101		6.14	6.98	6	31.4	7.61
29747-102		15.3	8.75	32.1	6.3	21.2
29747-103		6.17	6.39	27.2	24.4	7.04

28 day *Macoma nasuta*
Sediment Bioaccumulation Evaluation

Body Burden Data and Statistical Analysis Reports

PCB Congeners

APPENDIX TABLE. REPLICATE CONCENTRATIONS IN THE CLAM (*Macoma nasuta*)

	PDS Reference Site									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 18	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 28	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 44	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 52	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 66	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 87	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 101	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 105	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 118	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 128	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 138	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 153	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 170	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 180	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 187	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 195	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 206	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
PCB 209	0.942	U	0.922	U	0.909	U	0.866	U	0.888	U
Total PCBs	35.80		35.04		34.54		32.91		33.74	

* = Qualifiers

U Analyte not detected; below Method Detection Limit; value is Method Detection Limit

J Analyte estimated; detection below Reporting Limit but above Method Detection Limit

NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 1									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 18	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 28	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 44	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 52	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 66	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 87	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 101	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 105	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 118	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 128	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 138	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 153	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 170	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 180	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 187	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 195	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 206	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
PCB 209	0.86	U	0.954	U	0.929	U	0.882	U	0.844	U
Total PCBs	32.68		36.25		35.30		33.52		32.07	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 2									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 18	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 28	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 44	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 52	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 66	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 87	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 101	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 105	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 118	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 128	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 138	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 153	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 170	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 180	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 187	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 195	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 206	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
PCB 209	0.882	U	0.924	U	0.852	U	0.921	U	0.928	U
Total PCBs	33.52		35.11		32.38		35.00		35.26	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 3									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 18	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 28	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 44	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 52	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 66	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 87	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 101	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 105	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 118	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 128	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 138	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 153	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 170	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 180	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 187	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 195	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 206	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
PCB 209	0.906	U	0.924	U	0.891	U	0.938	U	0.888	U
Total PCBs	34.43		35.11		33.86		35.64		33.74	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Macoma nasuta **Sample Code:** 29753-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (M.nasuta)

Sample	Rep	Pos	PBC 008	PCB 018	PCB 028	PCB 044	PCB 052	PCB 066	PCB 101	PCB 105	PCB 118	PCB 128	PCB 138	PCB 153	PCB 170	PCB 180	PCB 187	PCB 195	PCB 206	PCB 209	PCB 087
29747-104	1	2	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942
29747-104	2	8	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922	0.922
29747-104	3	10	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909
29747-104	4	13	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866
29747-104	5	19	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888
29747-101	1	3	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
29747-101	2	5	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954
29747-101	3	11	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929	0.929
29747-101	4	16	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882
29747-101	5	18	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844
29747-102	1	4	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882
29747-102	2	7	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924
29747-102	3	12	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852
29747-102	4	15	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921
29747-102	5	20	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928	0.928
29747-103	1	1	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906
29747-103	2	6	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924	0.924
29747-103	3	9	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891
29747-103	4	14	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938
29747-103	5	17	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

Batch ID:	16-6633-8226	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
15-4134-5199	PCB 008	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 008
19-9786-3228	PCB 008	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 008
19-1025-1492	PCB 008	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 008
18-5598-9475	PCB 018	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 018
11-5677-2692	PCB 018	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 018
11-5311-5937	PCB 018	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 018
20-4352-8728	PCB 028	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 028
10-6087-7542	PCB 028	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 028
02-4051-1606	PCB 028	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 028
18-5867-8719	PCB 044	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 044
05-6703-7506	PCB 044	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 044
12-4232-5094	PCB 044	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 044
04-9354-2727	PCB 052	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 052
19-0480-9798	PCB 052	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 052
19-7754-2384	PCB 052	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 052
21-1159-5352	PCB 066	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 066
02-2094-7664	PCB 066	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 066
19-2865-9970	PCB 066	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 066
18-7295-0993	PCB 087	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 087
14-0286-3274	PCB 087	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 087
03-7719-9454	PCB 087	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 087
05-0843-9357	PCB 101	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 101
06-9911-7614	PCB 101	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 101
08-3872-7726	PCB 101	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 101
05-8521-4292	PCB 105	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 105
13-3140-8462	PCB 105	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 105
11-3770-9045	PCB 105	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 105
13-9667-2016	PCB 118	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 118
00-7686-6055	PCB 118	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 118
19-7048-6013	PCB 118	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 118
01-0652-7990	PCB 128	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 128
15-5823-2637	PCB 128	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 128
20-9018-8079	PCB 128	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 128
05-0514-6664	PCB 138	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 138
17-4291-9874	PCB 138	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 138
06-8417-0767	PCB 138	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 138
00-8074-3800	PCB 153	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 153

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
14-5317-1734	PCB 153	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 153
08-3584-0258	PCB 153	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 153
02-6857-0936	PCB 170	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 170
15-3285-6836	PCB 170	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 170
18-8033-7494	PCB 170	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 170
07-1498-1503	PCB 180	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 180
10-0073-9098	PCB 180	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 180
16-7159-4192	PCB 180	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 180
16-0946-9423	PCB 187	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 187
02-9485-9083	PCB 187	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 187
13-3483-8333	PCB 187	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 187
07-3176-7276	PCB 195	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 195
18-4891-5412	PCB 195	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 195
14-4927-8910	PCB 195	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 195
15-0079-7870	PCB 206	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 206
11-7289-2452	PCB 206	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 206
07-5653-7730	PCB 206	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 206
10-1062-4636	PCB 209	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pcb 209
11-6451-4976	PCB 209	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pcb 209
10-6069-2513	PCB 209	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pcb 209

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

PCB 008 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 018 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 028 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 044 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 052 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 066 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 087 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 101 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

PCB 105 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 118 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 128 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 138 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 153 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 170 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 180 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 187 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

PCB 195 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 206 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

PCB 209 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.905	0.869	0.942	0.866	0.942	0.0132	0.0295	3.26%	0.00%
29747-101		5	0.894	0.836	0.951	0.844	0.954	0.0208	0.0464	5.20%	1.28%
29747-102		5	0.901	0.86	0.943	0.852	0.928	0.0149	0.0332	3.69%	0.44%
29747-103		5	0.909	0.883	0.936	0.888	0.938	0.00959	0.0214	2.36%	-0.44%

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

PCB 008 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 018 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 028 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 044 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 052 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 066 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 087 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 101 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

PCB 105 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 118 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 128 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 138 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 153 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 170 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 180 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 187 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

Bioaccumulation Evaluation - PCB Congeners - Macoma **EnviroSystems, Inc.**

PCB 195 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 206 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

PCB 209 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.942	0.922	0.909	0.866	0.888
29747-101		0.86	0.954	0.929	0.882	0.844
29747-102		0.882	0.924	0.852	0.921	0.928
29747-103		0.906	0.924	0.891	0.938	0.888

28 day *Nereis virens*
Sediment Bioaccumulation Evaluation

Body Burden Data and Statistical Analysis Reports

PCB Congeners

APPENDIX TABLE. REPLICATE CONCENTRATIONS IN THE WORM (*Nereis virens*)

	PDS Reference Site									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.994	U	0.858	U	0.89	U	0.921	U	2.16	
PCB 18	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 28	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 44	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 52	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 66	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 87	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 101	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 105	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 118	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 128	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 138	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 153	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 170	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 180	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 187	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 195	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 206	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
PCB 209	0.994	U	0.858	U	0.89	U	0.921	U	0.843	U
Total PCBs	37.77		32.60		33.82		35.00		34.67	

* = Qualifiers

U Analyte not detected; below Method Detection Limit; value is Method Detection Limit

J Analyte estimated; detection below Reporting Limit but above Method Detection Limit

NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 1									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.899	U	0.904	U	1.9		0.907	U	0.975	U
PCB 18	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 28	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 44	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 52	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 66	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 87	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 101	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 105	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 118	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 128	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 138	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 153	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 170	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 180	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 187	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 195	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 206	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
PCB 209	0.899	U	0.904	U	0.865	U	0.907	U	0.975	U
Total PCBs	34.16		34.35		34.94		34.47		37.05	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 2									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 18	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 28	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 44	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 52	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 66	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 87	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 101	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 105	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 118	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 128	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 138	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 153	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 170	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 180	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 187	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 195	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 206	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
PCB 209	0.866	U	0.873	U	0.938	U	0.885	U	0.871	U
Total PCBs	32.91		33.17		35.64		33.63		33.10	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

CONTAMINANT	Composite 3 REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PCB Congeners (ng/g wet wt.)										
PCB 8	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 18	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 28	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 44	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 52	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 66	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 87	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 101	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 105	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 118	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 128	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 138	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 153	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 170	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 180	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 187	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 195	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 206	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
PCB 209	0.882	U	0.926	U	0.865	U	0.942	U	0.971	U
Total PCBs	33.52		35.19		32.87		35.80		36.90	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Nereis virens **Sample Code:** 29754-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (N.virens)

Sample	Rep	Pos	PCB 008	PCB 018	PCB 028	PCB 044	PCB 052	PCB 066	PCB 101	PCB 105	PCB 118	PCB 128	PCB 138	PCB 153	PCB 170	PCB 180	PCB 187	PCB 195	PCB 206	PCB 209	PCB 087
29747-104	1	1	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994
29747-104	2	7	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858	0.858
29747-104	3	9	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
29747-104	4	14	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921
29747-104	5	18	2.16	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843
29747-101	1	3	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899
29747-101	2	8	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904	0.904
29747-101	3	11	1.9	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865
29747-101	4	16	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
29747-101	5	19	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975
29747-102	1	4	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866
29747-102	2	6	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873
29747-102	3	12	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938
29747-102	4	13	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885	0.885
29747-102	5	20	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871	0.871
29747-103	1	2	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882
29747-103	2	5	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926	0.926
29747-103	3	10	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865
29747-103	4	15	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942	0.942
29747-103	5	17	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

Batch ID:	04-2958-1512	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Nereis virens	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
18-9420-1415	PCB 008	Wilcoxon Rank Sum Two-Sample Test	0.5000	29747-101 passed pcb 008
16-1367-8070	PCB 008	Equal Variance t Two-Sample Test	0.8211	29747-102 passed pcb 008
05-1455-6255	PCB 008	Wilcoxon Rank Sum Two-Sample Test	0.8889	29747-102 passed pcb 008
04-9245-4827	PCB 008	Equal Variance t Two-Sample Test	0.4835	29747-103 passed pcb 008
11-5214-3201	PCB 008	Wilcoxon Rank Sum Two-Sample Test	0.6548	29747-103 passed pcb 008
03-5509-2612	PCB 018	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 018
01-0650-2417	PCB 018	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 018
14-0527-5109	PCB 018	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 018
15-8537-2316	PCB 028	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 028
01-2058-9853	PCB 028	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 028
15-8187-9135	PCB 028	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 028
14-1584-6916	PCB 044	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 044
02-3973-5213	PCB 044	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 044
06-8430-7172	PCB 044	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 044
08-0196-2933	PCB 052	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 052
17-4671-5348	PCB 052	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 052
19-3332-7917	PCB 052	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 052
13-4446-6240	PCB 066	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 066
14-5804-8906	PCB 066	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 066
20-6577-5784	PCB 066	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 066
06-5168-1027	PCB 087	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 087
04-0406-7075	PCB 087	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 087
11-5628-5359	PCB 087	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 087
15-9927-4996	PCB 101	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 101
00-3173-8434	PCB 101	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 101
16-0665-5019	PCB 101	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 101
11-3911-6736	PCB 105	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 105
17-8667-3276	PCB 105	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 105
08-7983-6396	PCB 105	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 105
20-5749-5974	PCB 118	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 118
16-5121-5230	PCB 118	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 118
11-6611-0836	PCB 118	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 118
01-7122-7863	PCB 128	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 128
09-2813-1130	PCB 128	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 128
14-7833-4211	PCB 128	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 128
11-5002-5815	PCB 138	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 138
19-4705-3018	PCB 138	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 138

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
17-1892-2195	PCB 138	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 138
17-0525-7289	PCB 153	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 153
07-7916-8410	PCB 153	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 153
11-5851-9673	PCB 153	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 153
21-3542-4854	PCB 170	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 170
06-6034-9384	PCB 170	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 170
09-2683-4830	PCB 170	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 170
08-2421-9752	PCB 180	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 180
01-2773-2214	PCB 180	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 180
07-3655-4284	PCB 180	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 180
10-8103-6499	PCB 187	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 187
05-3223-1752	PCB 187	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 187
09-1344-7697	PCB 187	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 187
17-7262-8945	PCB 195	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 195
04-7710-5766	PCB 195	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 195
04-7677-8016	PCB 195	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 195
09-0933-3063	PCB 206	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 206
15-8515-4600	PCB 206	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 206
08-8000-3689	PCB 206	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 206
09-2082-7824	PCB 209	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pcb 209
15-3536-3891	PCB 209	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pcb 209
08-3485-7341	PCB 209	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pcb 209

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

PCB 008 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	1.16	0.471	1.86	0.858	2.16	0.25	0.559	47.98%	0.00%
29747-101		5	1.12	0.572	1.66	0.899	1.9	0.196	0.439	39.29%	4.09%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	23.87%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	21.24%

PCB 018 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 028 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 044 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 052 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 066 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 087 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 101 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

PCB 105 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 118 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 128 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 138 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 153 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 170 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 180 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 187 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

PCB 195 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 206 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

PCB 209 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	0.901	0.827	0.976	0.843	0.994	0.0268	0.06	6.65%	0.00%
29747-101		5	0.91	0.86	0.96	0.865	0.975	0.0179	0.04	4.40%	-0.98%
29747-102		5	0.887	0.85	0.923	0.866	0.938	0.0132	0.0296	3.34%	1.62%
29747-103		5	0.917	0.863	0.971	0.865	0.971	0.0194	0.0434	4.74%	-1.78%

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

PCB 008 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	2.16
29747-101		0.899	0.904	1.9	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 018 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 028 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 044 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 052 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 066 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 087 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 101 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

PCB 105 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 118 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 128 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 138 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 153 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 170 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 180 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 187 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

Bioaccumulation Evaluation - PCB Congeners - Nereis **EnviroSystems, Inc.**

PCB 195 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 206 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

PCB 209 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	0.994	0.858	0.89	0.921	0.843
29747-101		0.899	0.904	0.865	0.907	0.975
29747-102		0.866	0.873	0.938	0.885	0.871
29747-103		0.882	0.926	0.865	0.942	0.971

28 day *Macoma nasuta* Sediment Bioaccumulation Evaluation

Body Burden Data and Statistical Analysis Reports

PAHs

APPENDIX TABLE. REPLICATE CONCENTRATIONS IN THE CLAM (*Macoma nasuta*)

	PDS Reference Site									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Acenaphthylene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Anthracene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Benzo(a)anthracene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Benzo(a)pyrene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Benzo(b)fluoranthene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Benzo(k)fluoranthene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Benzo(g,h,i)perylene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Chrysene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Dibenzo(a,h)anthracene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Fluoranthene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Fluorene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Indeno(1,2,3-c,d)pyrene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Naphthalene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Phenanthrene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
Pyrene	9.42	U	9.22	U	9.09	U	8.66	U	8.88	U
PAH Total	150.72		147.52		145.44		138.56		142.08	

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 1									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Acenaphthylene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Anthracene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Benzo(a)anthracene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Benzo(a)pyrene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Benzo(b)fluoranthene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Benzo(k)fluoranthene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Benzo(g,h,i)perylene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Chrysene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Dibenzo(a,h)anthracene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Fluoranthene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Fluorene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Indeno(1,2,3-c,d)pyrene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Naphthalene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Phenanthrene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
Pyrene	8.60	U	9.54	U	9.29	U	8.82	U	8.44	U
PAH Total	137.60		152.64		148.64		141.12		135.04	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

			Composite 2							
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Acenaphthylene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Anthracene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Benzo(a)anthracene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Benzo(a)pyrene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Benzo(b)fluoranthene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Benzo(k)fluoranthene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Benzo(g,h,i)perylene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Chrysene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Dibenzo(a,h)anthracene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Fluoranthene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Fluorene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Indeno(1,2,3-c,d)pyrene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Naphthalene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Phenanthrene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
Pyrene	8.82	U	9.24	U	8.52	U	9.21	U	9.28	U
PAH Total	141.12		147.84		136.32		147.36		148.48	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

CONTAMINANT	Composite 3 REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Acenaphthylene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Anthracene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Benzo(a)anthracene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Benzo(a)pyrene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Benzo(b)fluoranthene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Benzo(k)fluoranthene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Benzo(g,h,i)perylene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Chrysene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Dibenzo(a,h)anthracene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Fluoranthene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Fluorene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Indeno(1,2,3-c,d)pyrene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Naphthalene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Phenanthrene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
Pyrene	9.06	U	9.24	U	8.91	U	9.38	U	8.88	U
PAH Total	144.96		147.84		142.56		150.08		142.08	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

Bioaccumulation Evaluation - PAHs - Macoma **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Macoma nasuta **Sample Code:** 29753-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (M.nasuta)

Sample	Rep	Pos	Aceneaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
29747-104	1	4	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42
29747-104	2	5	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22
29747-104	3	10	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09	9.09
29747-104	4	14	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66
29747-104	5	17	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88
29747-101	1	3	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
29747-101	2	8	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54
29747-101	3	11	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29
29747-101	4	15	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82
29747-101	5	20	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44
29747-102	1	1	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82
29747-102	2	7	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24
29747-102	3	12	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52
29747-102	4	13	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21
29747-102	5	18	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28
29747-103	1	2	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06
29747-103	2	6	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24	9.24
29747-103	3	9	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91	8.91
29747-103	4	16	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
29747-103	5	19	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88	8.88

Bioaccumulation Evaluation - PAHs - Macoma **EnviroSystems, Inc.**

Batch ID:	12-5697-6254	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
06-6812-8138	Acenaphthene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed acenaphthene
19-2302-6219	Acenaphthene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed acenaphthene
13-2973-4965	Acenaphthene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed acenaphthene
12-0661-3141	Acenaphthylene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed acenaphthylene
20-6936-8692	Acenaphthylene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed acenaphthylene
05-0607-5254	Acenaphthylene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed acenaphthylene
04-5581-3802	Anthracene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed anthracene
02-8867-8298	Anthracene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed anthracene
07-2295-0568	Anthracene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed anthracene
04-9530-7702	Benzo(a)anthracene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed benzo(a)anthracene
17-0165-9474	Benzo(a)anthracene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed benzo(a)anthracene
03-3496-7528	Benzo(a)anthracene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed benzo(a)anthracene
13-9026-5426	Benzo(a)pyrene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed benzo(a)pyrene
10-6948-2084	Benzo(a)pyrene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed benzo(a)pyrene
16-5832-4780	Benzo(a)pyrene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed benzo(a)pyrene
08-4528-6592	Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed benzo(b)fluoranthene
18-6892-1499	Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed benzo(b)fluoranthene
05-3035-6444	Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed benzo(b)fluoranthene
12-8186-9200	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed benzo(g,h,i)perylene
19-0428-3465	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed benzo(g,h,i)perylene
03-6409-2197	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed benzo(g,h,i)perylene
20-1372-5488	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed benzo(k)fluoranthene
08-8815-0821	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed benzo(k)fluoranthene
17-8913-8279	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed benzo(k)fluoranthene
14-8919-6335	Chrysene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed chrysene
03-4358-1179	Chrysene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed chrysene
15-8147-5232	Chrysene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed chrysene
13-2160-7504	Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed dibenz(a,h)anthracene
20-1282-9556	Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed dibenz(a,h)anthracene
16-0984-2910	Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed dibenz(a,h)anthracene
02-2120-9953	Fluoranthene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed fluoranthene
00-4407-7947	Fluoranthene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed fluoranthene
06-8813-2260	Fluoranthene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed fluoranthene
06-7726-1013	Fluorene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed fluorene
07-6531-7598	Fluorene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed fluorene
00-9127-9643	Fluorene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed fluorene
19-2090-3583	Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed indeno(1,2,3-cd)pyrene

Bioaccumulation Evaluation - PAHs - Macoma **EnviroSystems, Inc.**

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
05-1971-6164	Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed indeno(1,2,3-cd)pyrene
14-3462-1079	Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed indeno(1,2,3-cd)pyrene
17-5637-5558	Naphthalene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed naphthalene
08-4441-8374	Naphthalene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed naphthalene
01-9365-0903	Naphthalene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed naphthalene
09-6468-1541	Phenanthrene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed phenanthrene
06-7112-2520	Phenanthrene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed phenanthrene
05-2990-3479	Phenanthrene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed phenanthrene
08-0112-7574	Pyrene	Equal Variance t Two-Sample Test	0.6750	29747-101 passed pyrene
02-5966-2299	Pyrene	Equal Variance t Two-Sample Test	0.5772	29747-102 passed pyrene
19-2627-5346	Pyrene	Equal Variance t Two-Sample Test	0.4062	29747-103 passed pyrene

Bioaccumulation Evaluation - PAHs - Macoma **EnviroSystems, Inc.**

Acenaphthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Acenaphthylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Benzo(a)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Benzo(a)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Benzo(b)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Benzo(g,h,i)perylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Benzo(k)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Bioaccumulation Evaluation - PAHs - Macoma **EnviroSystems, Inc.**

Chrysene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Dibenz(a,h)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Fluorene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Indeno(1,2,3-cd)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Naphthalene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Phenanthrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.05	8.69	9.42	8.66	9.42	0.132	0.295	3.26%	0.00%
29747-101		5	8.94	8.36	9.51	8.44	9.54	0.208	0.464	5.20%	1.28%
29747-102		5	9.01	8.6	9.43	8.52	9.28	0.149	0.332	3.69%	0.44%
29747-103		5	9.09	8.83	9.36	8.88	9.38	0.0959	0.214	2.36%	-0.44%

Bioaccumulation Evaluation - PAHs - Macoma **EnviroSystems, Inc.**

Acenaphthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Acenaphthylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Benzo(a)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Benzo(a)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Benzo(b)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Benzo(g,h,i)perylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Benzo(k)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Bioaccumulation Evaluation - PAHs - Macoma **EnviroSystems, Inc.**

Chrysene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Dibenz(a,h)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Fluorene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Indeno(1,2,3-cd)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Naphthalene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Phenanthrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

Pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.42	9.22	9.09	8.66	8.88
29747-101		8.6	9.54	9.29	8.82	8.44
29747-102		8.82	9.24	8.52	9.21	9.28
29747-103		9.06	9.24	8.91	9.38	8.88

28 day *Nereis virens*
Sediment Bioaccumulation Evaluation

Body Burden Data and Statistical Analysis Reports

PAHs

APPENDIX TABLE. REPLICATE CONCENTRATIONS IN THE WORM (*Nereis virens*)

	PDS Reference Site									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Acenaphthylene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Anthracene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Benzo(a)anthracene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Benzo(a)pyrene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Benzo(b)fluoranthene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Benzo(k)fluoranthene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Benzo(g,h,i)perylene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Chrysene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Dibenzo(a,h)anthracene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Fluoranthene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Fluorene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Indeno(1,2,3-c,d)pyrene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Naphthalene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Phenanthrene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
Pyrene	9.94	U	8.58	U	8.90	U	9.21	U	8.43	U
PAH Total	159.04		137.28		142.40		147.36		134.88	

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 1									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Acenaphthylene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Anthracene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Benzo(a)anthracene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Benzo(a)pyrene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Benzo(b)fluoranthene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Benzo(k)fluoranthene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Benzo(g,h,i)perylene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Chrysene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Dibenzo(a,h)anthracene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Fluoranthene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Fluorene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Indeno(1,2,3-c,d)pyrene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Naphthalene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Phenanthrene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
Pyrene	8.99	U	9.04	U	8.65	U	9.07	U	9.75	U
PAH Total	143.84		144.64		138.40		145.12		156.00	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 2									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	8.66	U	8.73	U	9.38	U	8.85	U	8.82	J
Acenaphthylene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Anthracene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Benzo(a)anthracene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Benzo(a)pyrene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Benzo(b)fluoranthene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Benzo(k)fluoranthene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Benzo(g,h,i)perylene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Chrysene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Dibenzo(a,h)anthracene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Fluoranthene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Fluorene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Indeno(1,2,3-c,d)pyrene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Naphthalene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Phenanthrene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
Pyrene	8.66	U	8.73	U	9.38	U	8.85	U	8.71	U
PAH Total	138.56		139.68		150.08		141.60		139.47	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

APPENDIX TABLE. REPLICATE C

	Composite 3									
CONTAMINANT	REP1	*	REP2	*	REP3	*	REP4	*	REP5	*
PAHs (ng/g wet weight)										
Acenaphthene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Acenaphthylene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Anthracene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Benzo(a)anthracene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Benzo(a)pyrene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Benzo(b)fluoranthene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Benzo(k)fluoranthene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Benzo(g,h,i)perylene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Chrysene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Dibenzo(a,h)anthracene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Fluoranthene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Fluorene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Indeno(1,2,3-c,d)pyrene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Naphthalene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Phenanthrene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
Pyrene	8.82	U	9.26	U	8.65	U	9.42	U	9.71	U
PAH Total	141.12		148.16		138.40		150.72		155.36	

* = Qualifiers
U Analyte not detected; below Me
J Analyte estimated; detection be
NA Not Analyzed

Bioaccumulation Evaluation - PAHs - Nereis **EnviroSystems, Inc.**

Start Date: 07 Nov-17 **Species:** Nereis virens **Sample Code:** 29754-000
End Date: 05 Dec-17 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Chebeague Island FNP
Sample Date: 01 Nov-17 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control (N.virens)

Sample	Rep	Pos	Aceneaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
29747-104	1	1	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94
29747-104	2	5	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58
29747-104	3	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
29747-104	4	15	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21	9.21
29747-104	5	19	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43
29747-101	1	3	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99
29747-101	2	8	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04
29747-101	3	10	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65
29747-101	4	16	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07
29747-101	5	17	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
29747-102	1	2	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66	8.66
29747-102	2	7	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73
29747-102	3	11	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
29747-102	4	14	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85
29747-102	5	18	8.82	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71
29747-103	1	4	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82
29747-103	2	6	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26	9.26
29747-103	3	12	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65	8.65
29747-103	4	13	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42
29747-103	5	20	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71

Bioaccumulation Evaluation - PAHs - Nereis **EnviroSystems, Inc.**

Batch ID:	14-1043-2963	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	07 Nov-17	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Dec-17	**Species:**	Nereis virens	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
29747-104	10-1465-6781	25 Oct-17 17:15	25 Oct-17 17:15	12d 7h	AECOM	Dredged Sediment Evalu
29747-101	15-2994-4617	23 Oct-17 14:20	23 Oct-17 14:20	14d 10h		
29747-102	04-2219-8070	23 Oct-17 15:15	23 Oct-17 15:15	14d 9h		
29747-103	19-9795-0106	24 Oct-17 08:40	24 Oct-17 08:40	13d 15h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
29747-104	Reference sediment	Chebeague Island FNP	PDS Reference Sediment (	
29747-101	Marine Sediment	Chebeague Island FNP	Composite 1 (Stations A,B)	
29747-102	Marine Sediment	Chebeague Island FNP	Composite 2 (Stations C,D)	
29747-103	Marine Sediment	Chebeague Island FNP	Composite 3 (Station F)	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
16-2611-2917	Acenaphthene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed acenaphthene
15-6039-0967	Acenaphthene	Equal Variance t Two-Sample Test	0.6564	29747-102 passed acenaphthene
20-9284-5757	Acenaphthene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed acenaphthene
00-7056-6487	Acenaphthylene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed acenaphthylene
05-0848-7898	Acenaphthylene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed acenaphthylene
00-3044-6600	Acenaphthylene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed acenaphthylene
02-2082-9033	Anthracene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed anthracene
05-0845-4887	Anthracene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed anthracene
11-3503-9077	Anthracene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed anthracene
12-5467-0530	Benzo(a)anthracene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed benzo(a)anthracene
01-5706-6304	Benzo(a)anthracene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed benzo(a)anthracene
16-5037-8720	Benzo(a)anthracene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed benzo(a)anthracene
19-6613-0386	Benzo(a)pyrene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed benzo(a)pyrene
13-4515-2457	Benzo(a)pyrene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed benzo(a)pyrene
18-3990-1709	Benzo(a)pyrene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed benzo(a)pyrene
15-0723-9334	Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed benzo(b)fluoranthene
21-0074-7972	Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed benzo(b)fluoranthene
03-6145-1070	Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed benzo(b)fluoranthene
04-7507-6384	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed benzo(g,h,i)perylene
04-3693-8556	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed benzo(g,h,i)perylene
15-2520-3711	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed benzo(g,h,i)perylene
01-7751-6211	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed benzo(k)fluoranthene
11-4864-1724	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed benzo(k)fluoranthene
18-0137-5822	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed benzo(k)fluoranthene
19-8519-9724	Chrysene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed chrysene
00-8184-1825	Chrysene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed chrysene
10-2009-7097	Chrysene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed chrysene
06-2253-7716	Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed dibenz(a,h)anthracene
02-8218-8961	Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed dibenz(a,h)anthracene
13-7956-6164	Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed dibenz(a,h)anthracene
04-6475-7280	Fluoranthene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed fluoranthene
01-1997-6474	Fluoranthene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed fluoranthene
01-3462-4762	Fluoranthene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed fluoranthene
03-1247-7944	Fluorene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed fluorene
11-3484-1714	Fluorene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed fluorene
17-9941-2668	Fluorene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed fluorene
08-4919-3881	Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed indeno(1,2,3-cd)pyrene

Bioaccumulation Evaluation - PAHs - Nereis **EnviroSystems, Inc.**

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
09-8623-5434	Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed indeno(1,2,3-cd)pyrene
12-9455-7067	Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed indeno(1,2,3-cd)pyrene
09-9572-6794	Naphthalene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed naphthalene
11-3914-0883	Naphthalene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed naphthalene
10-2953-3428	Naphthalene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed naphthalene
03-8266-4054	Phenanthrene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed phenanthrene
09-7369-4127	Phenanthrene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed phenanthrene
05-3928-9257	Phenanthrene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed phenanthrene
12-6796-4705	Pyrene	Equal Variance t Two-Sample Test	0.3959	29747-101 passed pyrene
18-6125-4330	Pyrene	Equal Variance t Two-Sample Test	0.6808	29747-102 passed pyrene
06-0690-5804	Pyrene	Equal Variance t Two-Sample Test	0.3210	29747-103 passed pyrene

Bioaccumulation Evaluation - PAHs - Nereis **EnviroSystems, Inc.**

Acenaphthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.89	8.53	9.24	8.66	9.38	0.127	0.285	3.21%	1.38%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Acenaphthylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Benzo(a)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Benzo(a)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Benzo(b)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Benzo(g,h,i)perylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Benzo(k)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Bioaccumulation Evaluation - PAHs - Nereis **EnviroSystems, Inc.**

Chrysene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Dibenz(a,h)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Fluorene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Indeno(1,2,3-cd)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Naphthalene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Phenanthrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
29747-104	RS	5	9.01	8.27	9.76	8.43	9.94	0.268	0.6	6.65%	0.00%
29747-101		5	9.1	8.6	9.6	8.65	9.75	0.179	0.4	4.40%	-0.98%
29747-102		5	8.87	8.5	9.23	8.66	9.38	0.132	0.296	3.34%	1.62%
29747-103		5	9.17	8.63	9.71	8.65	9.71	0.194	0.434	4.74%	-1.78%

Bioaccumulation Evaluation - PAHs - Nereis **EnviroSystems, Inc.**

Acenaphthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.82
29747-103		8.82	9.26	8.65	9.42	9.71

Acenaphthylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Benzo(a)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Benzo(a)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Benzo(b)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Benzo(g,h,i)perylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Benzo(k)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Bioaccumulation Evaluation - PAHs - Nereis **EnviroSystems, Inc.**

Chrysene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Dibenz(a,h)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Fluorene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Indeno(1,2,3-cd)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Naphthalene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Phenanthrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71

Pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
29747-104	RS	9.94	8.58	8.9	9.21	8.43
29747-101		8.99	9.04	8.65	9.07	9.75
29747-102		8.66	8.73	9.38	8.85	8.71
29747-103		8.82	9.26	8.65	9.42	9.71