ATTACHMENT M2B

2018 SEDIMENT INVESTIGATION REPORT FOR STATE PIER - THAMES RIVER, NEW LONDON, CONNECTICUT

Investigation Report for State Pier Sediment Program - Thames River New London Connecticut

Connecticut Port Authority

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Acronyms

CPA	Connecticut Port Authority
COC	Chain of Custody
ER-L	Effects Range – Low
ER-M	Effects Range – Median
I/C DEC	Industrial/Commercial Direct Exposure Criteria
MS/MSD	Matrix Spike/Matrix Spike Duplicate
HASP	Health and Safety Plan
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
RSR	Remediation Standard Regulation
SAP	Sampling and Analysis Plan
TOC	Total Organic Carbon
VOC	Volatile Organic Compound

1. State Pier New London 2018 Field Summary

The Connecticut Port Authority (CPA) requested AECOM perform sampling and analysis of the sediment adjacent to the State Pier and in the outer harbor area. AECOM prepared a Sampling and Analysis Plan (AECOM, July 2018) .The project field effort for the State Pier New London (State Pier) sediment sampling field program commenced October 9th 2018 and was completed on October 12th 2018. The field effort was led by AECOM. This program involved collecting sediment from twenty five (25) locations across the Harbor and from six (6) locations adjacent to the State Pier (**Figure 1**). Based on dredge depths, four (4) sediment samples were obtained as grab samples while all remaining sediment samples were obtained using a vibracore. All samples taken at each grab or core location were sent to Katahdin Analytical Services for immediate grain size analysis to determine a compositing plan for chemical analyses. In addition to the grain size analysis, the six (6) cores located adjacent to the State Pier were sent to GEL Laboratories and analyzed for gamma radiation (RAD) to assess the presence of cobalt-60 (CO-60)and cesium-137 (Cs-137)that had been detected in sediment samples previously collected in the vicinity of State Pier in an investigation completed in 2009 (TRC, July, 2009).

Subcontractor CR Environmental provided field support to AECOM for the collection of the core and grab samples at each of the predetermined locations. All coring activities were conducted aboard the vessel R/V Lophious.

2. Health and Safety

State Pier New London sampling activities were completed without incident. Prior to field activities AECOM prepared a site specific Health & Safety Plan (AECOM, September 2018). CR Environmental provided AECOM with its own Health & Safety Plan, AHA, Float Plan, and equipment operation plans. Each participant took part in daily safety briefings which are documented on the Daily Health & Safety Tailgate Log which can be found in **Attachment 1**. Float Plans covering the daily boating activities and safety protocols can also be found in **Attachment 1**.

3. Sediment Sample Collection

Sediments were collected using a 2.5-inch diameter vibracore at most locations. The vibracorer was fitted with rigid liners as outlined in the project Sampling and Analysis Plan (SAP) (AECOM, July, 2018) (Ref. 2). Where sample depth was projected to be 1-foot or less, sediment was collected using a Petite Ponar grab sampler to obtain the volume needed for sample analysis.

3.1 Vessel Positioning

Vessel positioning and the determination of actual core sample locations were accomplished utilizing a Hemisphere Vector V104 Submeter Differential GPS and Hypack Survey Software provided by CR Environmental. **Table 1** summarizes target sample coordinates vs actual sample coordinates. The difference in location can also be seen on **Figure 1.** Sample locations shown in blue are the actual sampling coordinates while sample locations shown in grey were the target locations; some locations were adjusted to avoid sediment surface obstructions (i.e., riprap). The numerical notation on the actual sampling location denotes the core attempt where the greatest recovery was obtained, i.e. 1 = 1st attempt.

3.2 Core Sample Handling

All cores targeted/specified in the project SAP were successfully collected during the 4-day field effort. Multiple cores were required at several stations to reach the target depth as specified in the SAP. Given the soft nature of the State Pier sediment, core penetration often went beyond the project target depth to help achieve full recovery of the targeted sediment. The excess material was not sampled, however, it was logged and descriptions can be found in the core logs in **Attachment 2**. The excess material was returned to the sampling location.

After collection, if necessary (due to overall length of the core), the core was cut into approximate 5.0-foot sections to facilitate handling. Those individual core sections were then split longitudinally using electric shears, photographed, screened for ionizing radiation (RAD) by using a Ludlum model 2221r Portable Scaler Ratemeter and volatile organic compounds (VOCs) by using a RAE Systems MiniRAE 3000 photoionization detector (PID), described/logged. Each core was screened when conditions allowed (i.e., damp weather precluded use of the MiniRAE); there were no VOC or RAD hits while screening. Recovery in cores was in excess of 84% with the exception of NLSP-RAD-A, which was 76%. Photographs of all cores can be found in **Attachment 3**.

After logging was complete and sample intervals were determined, material was homogenized in one-use aluminum trays and scooped with one-use plastic spoons to avoid cross contamination and reduce decontamination procedures/time. Sample intervals were determined by examining the lithologies of each core. For the first 6 cores collected in the vicinity of the piers to delineate potentially radioactive sediments (RAD samples), each core was divided into 3 discrete sections and samples were collected from each. The selection of horizons for sampling was based on whether multiple lithologies were identified within a core. If multiple lithologies were identified within a core, each horizon (up to 3 per location) were homogenized and sampled for analysis. This same procedure was followed for the remaining 25 cores, however, the frequency of subsampling was limited to two horizons. If only a single lithology was identified, the entire core as collected from the project target depth was homogenized and sampled for analysis.

All samples retained for analysis (e.g., grain size, gamma (if RAD), metals, poly chlorinated biphenyls (PCBs), pesticides, poly nuclear aromatic hydrocarbons (PAHs), and total organic carbon (TOC)) throughout the day were stored in the processing area on ice in coolers. Sample analysis is discussed in Section 6 of this document. At the end of each day samples were shipped overnight via UPS to the respective laboratories. Upon receipt, Katahdin logged all samples but initially only analyzed samples for rapid turnaround for grain size analysis so data could be used in developing a compositing plan for the remaining analyses. All RAD samples were overnighted via UPS to GEL Laboratories for gamma analysis.

Grain size results can be found in **Tables 2, 3, and 4**. Based on grain size analysis, a compositing plan (**Table 5**) and analytical program (**Table 6**) were determined. The objective of the compositing scheme was to combine proximal samples of like grain size for metals, PCBs, pesticides, PAHs, and TOC analyses to be both cost effective as well as generate results representative of areas around the piers and in the outer harbor. It is noted that radiological analyses were performed on individual samples collected for that purpose and not on composites.

4. Field QA/QC Procedures

An equipment blank sample was collected from the coring and processing equipment on October 9th during coring activities. Three duplicate samples were taken, as follows: (NLSP-Y(B)-100918-2, NLSP-A(A)-101018-2, and NLSP-V(A)-101218-2). In addition to the 3 duplicate samples, three MS/MSD samples were taken at NLSP-RAD-C(A)-101018-1, NLSP-U(A)-101118-1, and NLSP-M(B)-101218-1.

All samples were shipped packed in ice consistent with the procedures used for the remaining samples. Each cooler was taped shut and included two (2) custody seals signed by an AECOM employee. Each cooler contained a chain of custody (COC), signed by an AECOM employee and placed in a zip lock bag to keep dry during shipment. All COCs can be found in **Attachment 4**.

5. SAP Deviations

There were a few deviations to the State Pier New London sediment collection sampling and analysis plan (SAP) summarized as follows:

1. Due to inclement weather on several days, the PID was not used to screen samples for VOCs as humidity impacts function and response of the PID.
2. The core operations were not able to collect the full target project depth at the following locations:
    a. NLSP-B hit refusal at 9 feet.
    b. NLSP-E had poor recovery due to cobbles located in the sediment; the core operations were unable to reach the project target depth of 14.8 feet.
    c. NLSP-P target location was on a rocky slope. After the first offset refusal was encountered at 2-3 feet, a second attempt was able to achieve a penetration of 8.5 feet. The project target depth was 29.2 feet.
    d. NLSP-RAD-A hit refusal at approximately 9.5 feet; recovery was low, approximately 7.2 feet.

3. As previously noted, due to the geology at certain sampling locations, offsetting was required to achieve enough recovery for processing.

All project fieldbook entries are included as **Attachment 5.**

6. Sediment Analysis Program

A total of 53 individual samples were collected and submitted to the laboratory for rapid grain size analysis. Analysis of Co-60 and Cs-137 was performed on 12 of the individual samples. The results of the grain size analyses were used to create a compositing plan. Tier 1 Analysis was performed on the composited samples as well as two of the individual samples.

6.1 Compositing Program

Based on the results of the grain size analysis performed on the individual samples from each core, a compositing plan was created by grouping samples together with similar grain size and sample area. The compositing plan consisted of 15 composite samples, all of which were submitted to the laboratory for bulk sediment analysis. The 15 composite samples sent for analysis are as follows: NLSP-COMP-ABC, NLSP-COMP-ABC-2, NLSP-COMP-FH, NLSP-COMP-DG, NLSP-COMP-IJNOK, NLSD-COMP-RAD-AB-2, NLSP-COMP-RAD-CD-2, NLSP-COMP-AB-1, NLSP-COMP-RAD-CD-2, NLSP-COMP-RAD-EF, NLSP-COMP-LMP, NLSP-COMP-QX-1, NLSP-COMP-QX-2, NLSP-COMP-VWY, NLSP-COMP-T, and NLSP-COMP-RUS. The final compositing plan can be found in **Table 5**.

6.2 Analysis Program

All 53 individual samples were submitted for grain size analysis by Katahdin. The 15 composite samples described in Section 6.1 and two individual samples (NLSP-E(A)-101118-1 and NLSP-E(B)-101118-1) were also sent to Katahdin for analysis of TOC, Metals, Pesticides, PCBs, and PAHs.

Twelve of the individual samples were submitted for radiological analysis by GEL Laboratories. The radiological analysis tested for Cs-137 and Co-60 in the 12 near pier samples as follows: NLSP-RAD-A(A)-101018-1, NLSP-RAD-A(B)-101018-1, NLSP-RAD-A(C)-101018-1, NLSP-RAD-B(A)-101018-1, NLSP-B(B)-101018-1, NLSP-B(C)-101018-1, NLSP-D(A)-101018-1, NLSP-D(B)-101018-1, NLSP-C(A)-101018-1, NLSP-C(B)-101018-1, NLSP-E(A)-101018-1, and NLSP-F(A)-101018-1.

6.3 Results

The following section provides a summary of the analytical results. **Tables 2, 3,** and **4** summarize the grain size results for the 53 individual samples. **Table 7** provides the radiological results for the 12 individual RAD samples and **Table 8** provides the bulk sediment results for metals, PCBs, pesticides, PAHs, and TOC. To provide context for the results in **Table 8**, detected concentrations were compared against human health and ecological benchmarks. These benchmarks included Connecticut RSRs for soil (Residential Direct Exposure Criteria [RDEC] and Industrial/Commercial Direct Exposure Criteria [I/C DEC] for human health; CTDEEP, 2013 and 2015) and effects range-low (ER-L) and effects range-median (ER-M) values protective of benthic receptors (Long, et al., 1995; Buchman, 2008). It is recognized that the RSRs apply to soil exposures and sediment is not currently regulated under the RSRs.

6.3.1 Grain Size Results

As indicated in **Table 2**, all of the cores less than 3 feet long were dominated by silt with concentrations ranging from 74.66 to 91.12% silt. **Tables 3 and 4** show that silt also dominated most of the samples collected from the longer cores. However, fine or medium sand dominated six samples: NLSP-RAD-B(C)-101018-1, NLSP-RAD-C(B)-101018-1, NLSP-RAD-D(B)-101018-1, NLSP-X(B)-100918-1, NLSP-Q(B)-101018-1, and NLSP-E(B)-101118-1. Gravel did not dominate any samples and typically composed less than 10% of the grain size total. The exception was three samples from two cores: NLSP-RAD-C(B)-101018-1 with 21.11% gravel, NLSP-X(A)-100918-1 with 19.52% gravel, and NLSP-X(B)-100918-1 with 26.53% gravel.

6.3.2 Radiological Results

Cs-137 and Co-60 were analyzed in 12 individual samples collected from six near pier cores based on the presence of detectable levels of these radioisotopes measured in several sediment samples collected and analyzed in 2009.

Cs-137

The detectable concentrations of Cs-137 in the 2009 samples were low (all less than or equal to 0.1 pCi/g) Cs-137 is a fission product isotope with a half-life of just over 30 years. It was distributed world-wide as a result of atmospheric atomic weapons testing. For comparison, the average Cs-137 concentration in soil on Guam, located about 1200 miles from the Marshall Islands where many atomic tests took place, is about 0.5 pCi/g (Hamilton, 2001). Therefore the Cs-137 detected in 20089 falls within levels considered as anthropogenic background levels.

Of the sediment samples collected and analyzed is 2018, only two of 12 samples had reportable concentrations of Cs-137 above detection limits. The NLSP-RAD-A(A)-101018-1 sample had a reported Cs-137 concentration of 0.163 +/- 0.0862 pCi/g and the NLSP-RAD-C(A)-101018-1 sample had a reported concentration of 0.102 +/- 0.0444 pCi/g.

Co-60

Co-60 is also generated from atomic weapons testing. However, with a half-life of only 5.3 years, it is not readily detectable in the environment today. While the 2009 sample results may been true positive results for Co-60 (maximum reported concentration of only 0.18 pCi/g), none of the 2018 samples had reportable detections of cobalt-60.

6.3.3 TOC Results

TOC was analyzed in triplicate in all of the composite samples and two individual samples (**Table 8**). TOC in most samples ranged between about 10,000 and 40,000 mg/kg TOC (1 to 4% TOC). A few samples had well below 10,000 mg/kg (NLSP-E(B)-101118-1, NLSP-COMP-RAD-AB-2, and NLSP-COMP-RAD-CD-2) with sample NLSP-COMP-RAD-AB-2 containing unusually low TOC (less than 250 mg/kg). One sample, NLSP-COMP-VWY, had an average of approximately 77,000 mg/kg TOC (7.7%).

6.3.4 Metals

Arsenic, cadmium, chromium, copper, lead, nickel, zinc, and mercury were analyzed and detected in the 17 samples submitted for analysis (15 composites and two individual samples). Concentrations were below the RSRs with two exceptions: lead exceeded both the RDEC and I/C DEC in the NLSP-COMP-QX-1 sample at a concentration of (2260 mg/kg compared to a residential RSR of 400 mg/kg and an industrial/commercial RSR of 1000 mg/kg) and arsenic slightly exceeded the the RDEC and I/C DEC (both are 10 mg/kg) in the NLSP-COMP-VWY sample with a concentration of 11.2 mg/kg.

Cadmium and chromium did not exceed the ERL-or ER-M in any samples. Four samples had no ER-L or ER-M exceedances: NLSP-COMP-ABC, NLSP-COMP-RAD-AB-2, NLSP-COMP-RAD-CD-2, and NLSP-COMP-RUS. For the remaining metals and samples, the ER-Ls were exceeded in multiple samples. ER-Ms were only exceeded twice for lead: in the NLSP-COMP-QX-1 sample (2260 mg/kg) and the NLSP-COMP-RAD-CS-1 sample (231 mg/kg).

In general, metals concentrations were relatively similar across the samples. The exception is the lead concentration of 2260 mg/kg in the NLSP-COMP-QX-1 sample. This concentration is at least ten-fold higher than lead in the remaining samples and the other metals in this sample are not similarly elevated.

6.3.5 Organics

The following pesticides were detected at least once: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, endosulfan II, heptachlor epoxide, hexachlorobenzene, and lindane. The remaining pesticides were not detected in any samples. All detected concentrations of pesticides were below the RSRs. The ER-Ls, but not ER-Ms, were exceeded at least once for 4,4'-DDD, 4,4'-DDE, and alpha-chlordane.

With the exception of PCB18, PCB 105, and PCB 184, all of the PCBs were detected at least once. Total PCBs were calculated as the sum of the detected congeners in each sample. All individual PCBs and Total PCBs were below the

RSRs. PCB 170 and PCB 195 exceeded the ER-L for total PCBs in the NLSP-COMP-VWY sample. Total PCB concentrations in four samples (NLSP-COMP-RAD-AB-1, NLSP-COMP-RAD-CD-1, NLSP-COMP-RAD-EF, and NLSP-COMP-VWY) exceed the ER-L and no samples exceeded the ER-M.

All of the 18 individual PAHs were detected at least once. Concentrations were below the RSRs in all but the following four samples: NLSP-COMP-QX-1, NLSP-COMP-RAD-CD-1, NLSP-COMP-T, and NLSP-COMP-VWY. The R DEC, but not the I/C DEC, were exceeded for benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene in the NLSP-COMP-QX-1 sample, benzo(b)fluoranthene in the NLSP-COMP-RAD-CD-1 sample, benzo(b)fluoranthene and indeno(1,2,3-c,d)pyrene in the NLSP-COMP-T sample, and 1-methylnaphthalene in the NLSP-COMP-VWY sample. Both the RDEC and the I/C DEC were exceeded for benzo(a)pyrene (both are 1 mg/kg) in the NLSP-COMP-QX-1 and NLSP-COMP-T samples and for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene in the NLSP-COMP-VWY sample.

The ER-Ls for PAHs are considerably lower than the RSRs and were exceeded more frequently. Five samples had no ER-L exceedances: NLSP-E(B)-101118-1, NLSP-COMP-ABC, NLSP-COMP-RAD-AB-2, NLSP-COMP-RAD-CD-2, and NLSP-COMP-RUS. Three samples only had ER-L exceedances for benzo(g,h,i)perylene and indeno(1,2,3-c,d)pyrene: NLSP-E(A)-101118-1, NLSP-COMP-DG, and NLSP-COMP-FH. For the remaining samples, at least four individual PAHs exceeded the associated ER-L.

ER-Ms for at least one PAH were exceeded in the following eight samples: NLSP-COMP-QX-1, NLSP-COMP-QX-2, NLSP-COMP-RAD-AB-1, NLSP-COMP-RAD-CD-1, NLSP-COMP-RAD-EF, NLSP-COMP-RAD-LMP, NLSP-COMP-T, and NLSP-COMP-VWY. ER-Ms were exceeded for all 18 PAHs in the NLSP-COMP-VWY sample.

7. Discussion

Sediment samples were collected from twenty five (25) core locations across New London Harbor and six (6) core locations adjacent to the State Pier to characterize physical, chemical, and radiological parameters within the area. A total of 53 samples were subdivided from the cores as discussed in Section 3. Grain size was analyzed in all 53 samples collected and results were used to establish a compositing plan for bulk sediment chemistry analyses. A total of 15 composites were then prepared from the cores and two individual samples were submitted for bulk sediment chemistry analyses (metals, PCBs, pesticides, PAHs, and TOC) and 12 individual samples from the six locations near the pier were submitted for Co-60 and Cs-137 analyses.

The grain size analyses indicated that most samples were composed primarily of silt (e.g., 40 of the 53 samples contained at least 60% silt). Samples that were not dominated by silt were primarily composed of medium or fine sand. Gravel typically composed less than 10% of the grain size total, with the exception of three samples from two cores where gravel ranged from 19.52% to 26.53% (NLSP-RAD-C(B)-101018-1, NLSP-X(A)-100918-1, and NLSP-X(B)-100918-1).

In the 12 samples submitted for Co-60 and Cs-137, Co-60 was not detected and Cs-137 was only detected twice at low levels (0.163 +/- 0.0862 pCi/g and 0.102 +/- 0.0444 pCi/g), which as discussed in Section 6.3.2 falls within background ranges..

The majority of the samples submitted for bulk sediment chemistry analyses had TOC levels in to 1% to 4% range. Three samples had TOC levels below 1% (with one sample containing unusually low TOC [less than 0.025%]) and one sample had a TOC level of approximately 7.7%. The sample with the highest TOC (NLSP-COMP-VWY) also contained the highest concentrations of most other bulk sediment chemistry analytes.

Concentrations of metals, PCBs, pesticides, and PAHs were compared against available human health and ecological benchmarks to provide context for the detected levels. Most samples had no exceedances of the human health-based RSRs which are based on direct contact with soil. Only four samples had analytes with concentrations exceeding at least one RSR direct exposure criterion (NLSP-COMP-QX-1, NLSP-COMP-RAD-CD-1, NLSP-COMP-T, NLSP-COMP-VWY). The arsenic and lead RSRs were each exceeded once (NLSP-COMP-VWY and NLSP-COMP-QX-1 samples, respectively) and RSRs for six of the PAHs were exceeded at least once. Given that human exposures to the submerged sediment is not likely, the application of these RSRs to the sediments is conservative; however, these data can also assist in evaluating potential for reuse in upland areas.

The ecological benchmarks are based on potential impacts to the benthic community living within the sediment. The ER-L represents the concentration below which toxic effects are rarely observed and the ER-M indicates the level above which effects are generally or always observed (Long, et al, 1995). Concentrations of several metals exceeded the ER-L in multiple samples but not the ER-M. Only lead exceeded the ER-M in two samples. Pesticides were only detected infrequently. Detected concentrations of eight pesticides exceeded the ER-L, but not the ER-M, in at least one sample.

Total PCBs exceeded the ER-L, but not the ER-M, in four samples. Individual PAHs in multiple samples exceeded the ER-L. Nine samples had ER-L exceedances for four or more PAHs and at least one ER-M was exceeded in eight samples. PAH concentrations in the NLSP-COMP-VWY sample were at least an order of magnitude higher than the other samples. As indicated previously, this sample also contained the highest levels of TOC.

These results indicate that in some sample locations, concentrations of metals, PAHs, or PCBs are present above the ER-M. Concentrations present between the ERL and ERM also have the potential to cause toxicity under some conditions. However, it is also possible that TOC or other binding mechanisms are present that could limit toxicity from these analytes. To support off-shore disposal or in-water placement of these dredged sediments, toxicity testing could be performed to evaluate the actual potential for toxicity from the material.

8. References

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TABLE 1 Target/Actual Sample Coordinates

Table 1
Target/Actual Sample Coordinates
New London State Pier
200 State Pier Road
New London, Connecticut

	Target Sample Coordinates		Actual Sample Coordinates	
Sample ID	Easting (NAD 83)	Northing (NAD 83)	Easting (NAD 83)	Northing (NAD 83)
NLSP-A	1181432.632	692850.296	1181431.48	692850.31
NLSP-B	1181282.563	692822.48	1181283.16	692823.88
NLSP-C	1181400.293	692552.84	1181398.42	692553.34
NLSP-D	1181549.074	692263.083	1181548.29	692263.07
NLSP-E	1181066.911	692624.983	1181085.54	692620.51
NLSP-F	1181293.45	692358.043	1181297.71	692357.35
NLSP-G	1181544.672	691981.049	1181548.03	691980.83
NLSP-H	1181316.894	692065.513	1181315.48	692067.82
NLSP-I	1181749.38	691549.986	1181746.75	691549.19
NLSP-J	1181652.556	691254.413	1181649.26	691255.1
NLSP-K	1181735.747	690888.841	1181731.75	690891.35
NLSP-L	1180733.534	692272.978	1180736.88	692271.97
NLSP-M	1180869.785	692086.683	1180869.15	692086.73
NLSP-N	1181327.104	691511.533	1181328.41	691514.23
NLSP-O	1181448.781	691275.41	1181447.8	691275.68
NLSP-P	1180675.532	692114.827	1180730.94	692042.69
NLSP-Q	1181020.693	691612.081	1181029.78	691621.35
NLSP-R	1181576.721	690812.891	1181578.67	690815.32
NLSP-S	1181879.549	690446.288	1181877.5	690443.09
NLSP-T	1181044.537	691279.447	1181051.75	691273.22
NLSP-U	1181730.064	690531.549	1181731.83	690535.11
NLSP-V	1180402.401	692004.436	1180401.45	692003.49
NLSP-W	1180596.9	691732.346	1180587.44	691708.84
NLSP-X	1180826.271	691400.864	1180813.1	691396.69
NLSP-Y	1180169.333	692136.694	1180172.77	692135.4
NLSP-RAD-A	1180958.975	692495.325	1180963.72	692493.69
NLSP-RAD-B	1180990.352	692472.844	1180992.24	692474.68
NLSP-RAD-C	1181316.323	691977.9	1181317.31	691978.15
NLSP-RAD-D	1181336.884	691992.133	1181336.38	691995.56
NLSP-RAD-E	1181464.358	691762.862	1181467.5	691760.31
NLSP-RAD-F	1181461.265	691804.438	1181461.66	691805.33

Notes: Navigation Used by CR Environmental - Hemisphere Vector V104 Submeter Differential GPS and Hypack Survey Software.

TABLE 2 Grain Size Data Less Than 3 Feet

Table 2
Grain Size Analysis for Cores < 3 ft
New London State Pier
200 State Pier Road
New London, Connecticut

Sample ID	Sample Interval (ft)	Gravel (%)	Sand Coarse (%)	Sand Medium (%)	Sand Fine (%)	Silt (%)	Clay (%)	Total (%)
NLSP-RAD-F(A)-101018-1	0.0-0.5	2.36	1.31	7.35	5.51	78.80	4.67	100.00
NLSP-RAD-E(A)-101018-1	0.0-2.1	4.00	2.60	5.20	6.61	77.88	3.71	100.00
NLSP-I(A)-101118-1	0.0-0.1	0.00	0.00	13.34	3.51	74.66	8.48	99.99
NLSP-J(A)-101118-1	0.0-0.3	0.00	0.00	3.17	5.65	84.17	7.01	100.00
NLSP-N(A)-101118-1	0.0-0.1	0.00	0.00	1.39	5.57	86.41	6.63	100.00
NLSP-K(A)-101218-1	0.0-1.0	0.00	0.00	1.33	2.13	89.31	7.24	100.01
NLSP-D(A)-101218-1	0.0-1.3	0.00	0.00	0.82	1.37	92.12	5.69	100.00
NLSP-G(A)-101218-1	0.0-1.1	0.00	0.00	0.95	1.43	83.18	14.44	100.00
NLSP-O(A)-101218-1	0.0-1.1	0.00	0.00	1.08	2.58	90.58	5.77	100.01

Notes: Grain size analysis completed by Katahdin Analytical Services.

TABLE 3 Grain Size Data 3 to 7 Feet

Table 3
Grain Size Analysis for Cores 3-7 ft
New London State Pier
200 State Pier Road
New London, Connecticut

Sample ID	Sample Interval (ft)	Gravel (%)	Sand Coarse (%)	Sand Medium (%)	Sand Fine (%)	Silt (%)	Clay (%)	Total (%)
NLSP-RAD-B(A)-101018-1	0.0-2.4	0.00	0.00	0.88	2.06	92.54	4.52	100.00
NLSP-RAD-B(B)-101018-1	2.4-5.6	0.00	0.00	2.16	11.97	82.07	3.80	100.00
NLSP-RAD-B(C)-101018-1	4.6-5.75	0.00	0.00	1.86	65.05	32.00	1.09	100.00
NLSP-RAD-C(A)-101018-1*	0.0-3.8	0.00	0.00	3.01	6.56	84.91	5.52	100.00
NLSP-RAD-C(B)-101018-1	3.8-5.5	21.11	11.90	39.06	25.25	1.61	1.06	99.99
NLSP-RAD-D(A)-101018-1	0.0-2.1	0.00	0.00	0.72	8.64	85.90	4.74	100.00
NLSP-RAD-D(B)-101018-1	2.1-3.3	0.71	1.16	8.83	71.87	12.34	5.10	100.01
NLSP-T(A)-100918-1	0.0-2.0	2.53	2.76	13.10	27.12	46.87	7.63	100.01
NLSP-T(B)-100918-1	2.0-4.75	1.12	1.34	8.49	16.09	59.09	13.87	100.00
NLSP-Y(A)-100918-1	0.0-0.67	0.00	0.00	3.61	9.02	78.61	8.75	99.99
NLSP-Y(B)-100918-1	0.67-6.8	0.00	0.00	2.89	2.89	81.49	12.72	99.99
NLSP-Y(B)-100918-2	0.67-6.8	0.00	0.00	2.67	3.47	79.46	14.41	100.01
NLSP-W(A)-101018-1	0.0-6.3	1.63	4.35	2.72	2.99	82.65	5.92	100.26
NLSP-H(A)-101018-1	0.0-2.0	0.00	0.00	0.53	3.18	88.16	8.13	100.00
NLSP-H(B)-101018-1	2.0-6.8	0.00	0.00	3.93	20.53	57.69	17.85	100.00
NLSP-L(A)-101118-1	0.0-5.6	0.00	0.00	0.99	13.11	83.24	2.65	99.99
NLSP-F(A)-101118-1	0.0-4.5	0.00	0.00	0.26	1.31	94.82	3.61	100.00
NLSP-F(B)-101118-1	4.5-5.1	0.00	0.00	3.18	3.18	74.85	18.80	100.01
NLSP-C(A)-101118-1	0.0-3.2	0.00	0.00	0.69	1.15	95.01	3.15	100.00
NLSP-C(B)-101118-1	3.2-5.0	0.00	0.00	0.19	2.28	78.32	18.48	99.27
NLSP-S(A)-101218-1	0.0-3.6	0.00	0.00	0.62	2.26	84.22	12.91	100.01
NLSP-M(A)-101218-1	0.0-1.5	0.00	0.00	0.81	3.53	91.96	3.70	100.00
NLSP-M(B)-101218-1	1.5-3.9	0.00	0.00	5.39	26.43	64.14	4.04	100.00
NLSP-V(A)-101218-1	0.0-2.3	0.00	0.00	3.57	6.60	85.26	4.57	100.00
NLSP-V(A)-101218-2	0.0-2.3	0.00	0.00	4.70	6.92	84.18	4.20	100.00
NLSP-V(B)-101218-1	2.3-3.1	0.00	0.00	3.67	5.76	86.55	4.02	100.00

Notes: Grain size analysis completed by Katahdin Analytical Services. 2 Indicates sample was a duplicate. * Indicates sample was a MS/MSD.

TABLE 4 Grain Size Data Greater Than 7 Feet

Table 4
Grain Size Analysis for Cores > 7 ft
New London State Pier
200 State Pier Road
New London, Connecticut

Sample ID	Sample Interval (ft)	Gravel (%)	Sand Coarse (%)	Sand Medium (%)	Sand Fine (%)	Silt (%)	Clay (%)	Total (%)
NLSP-RAD-A(A)-101018-1	0.0-2.5	1.01	1.01	1.26	7.79	84.71	4.23	100.01
NLSP-RAD-A(B)-101018-1	2.5-5.5	0.00	0.00	4.03	20.16	70.88	4.93	100.00
NLSP-RAD-A(C)-101018-1	5.5-7.2	0.00	0.00	1.05	43.57	53.71	1.67	100.00
NLSP-X(A)-100918-1	0.0-7.0	19.52	5.09	19.73	14.43	36.39	4.84	100.00
NLSP-X(B)-100918-1	7.0-8.0	26.53	10.84	32.09	17.26	9.96	3.31	99.99
NLSP-Q(A)-101018-1	0.0-0.9	9.41	6.96	25.60	14.87	38.94	4.23	100.01
NLSP-Q(B)-101018-1	0.9-1.9	7.40	9.84	56.69	19.37	4.52	2.18	100.00
NLSP-A(A)-101018-1	0.0-8.9	0.00	0.00	1.56	3.33	80.10	15.01	100.00
NLSP-A(A)-101018-2	0.0-8.9	0.00	0.00	0.62	3.08	81.45	14.85	100.00
NLSP-P(A)-101118-1	0.0-2.0	0.00	0.00	5.35	21.81	68.00	4.83	99.99
NLSP-P(B)-101118-1	2.0-7.9	0.00	0.00	1.89	28.89	66.06	3.15	99.99
NLSP-R(A)-101118-1	0.0-0.5	0.00	0.00	0.50	2.97	84.56	11.97	100.00
NLSP-R(B)-101118-1	0.5-7.1	0.00	0.00	0.22	0.45	82.95	16.38	100.00
NLSP-U(A)-101118-1	0.0-7.4	0.00	0.00	0.67	0.90	83.17	15.25	99.99
NLSP-B(A)-101118-1	0.0-7.0	0.00	0.00	5.83	22.04	63.18	8.95	100.00
NLSP-B(B)-101118-1	7.0-7.9	0.00	0.00	2.02	5.14	77.35	15.49	100.00
NLSP-E(A)-101118-1	0.0-3.5	0.00	0.00	10.94	38.20	44.41	6.45	100.00
NLSP-E(B)-101118-1	3.5-4.8	0.00	0.00	4.69	64.00	29.78	1.54	100.01

Notes: Grain size analysis completed by Katahdin Analytical Services. 2 Indicates sample was a duplicate.

TABLE 5 Final Compositing Plan

Table 5
Final Compositing Plan
New London State Pier
200 State Pier Road
New London, Connecticut

Samples Composited	Compositing Sample ID
NLSP-A(A)-101018-1	NLSP-COMP-ABC
NLSP-B(A)-101118-1	
NLSP-B(B)-101118-1	
NLSP-C(A)-101118-1	
NLSP-C(B)-101118-1	
NLSP-A(A)-101018-1	NLSP-COMP-ABC-2
NLSP-B(A)-101118-1	
NLSP-B(B)-101118-1	
NLSP-C(A)-101118-1	
NLSP-C(B)-101118-1	
NLSP-F(A)-101118-1	NLSP-COMP-FH
NLAP-F(B)-101118-1	
NLSP-H(A)-101018-1	
NLSP-H(B)101018-1	
NLSP-D(A)-101218-1	NLSP-COMP-DG
NLSP-G(A)-101218-1	
NLSP-I(A)-101118-1	NLSP-COMP-IJNOK
NLSP-J(A)-101118-1	
NLSP-N(A)-101118-1	
NLSP-O(A)-101218-1	
NLSP-K(A)-101218-1	
NLSP-RAD-A(C)-101018-1	NLSP-COMP-RAD-AB-2
NLSP-RAD-B(C)-101018-1	
NLSP-RAD-C(A)-101018-1	NLSP-COMP-RAD-CD-1
NLSP-RAD-D(A)-101018-1	
NLSP-RAD-A(A)-101018-1	NLSP-COMP-RAD-AB-1
NLSP-RAD-A(B)-101018-1	
NLSP-RAD-B(A)-101018-1	
NLSP-RAD-B(B)-101018-1	

Samples Composited	Compositing Sample ID
NLSP-RAD-C(B)-101018-1	NLSP-COMP-RAD-CD-2
NLSP-RAD-D(B)-101018-1	
NLSP-RAD-E(A)-101018-1	NLSP-COMP-RAD-EF
NLSP-RAD-F(A)-101018-1	
NLSP-L(A)-101118-1	NLSP-COMP-LMP
NLSP-M(A)-101218-1	
NLSP-M(B)-101218-1	
NLSP-P(A)-101118-1	
NLSP-P(B)-101118-1	
NLSP-Q(A)-101018-1	NLSP-COMP-QX-1
NLSP-X(A)-100918-1	
NLSP-Q(B)-101018-1	NLSP-COMP-QX-2
NLSP-X(B)-100918-1	
NLSP-V(A)-101218-1	NLSP-COMP-VWY
NLSP-V(B)-101218-1	
NLSP-W(A)-101018-1	
NLSP-Y(A)-100918-1	
NLSP-Y(B)-100918-1	
NLSP-T(A)-100918-1	NLSP-COMP-T
NLSP-T(B)-100918-1	
NLSP-R(A)-101118-1	NLSP-COMP-RUS
NLSP-R(B)-101118-1	
NLSP-U(A)-101118-1	
NLSP-S(A)-101218-1	
NLSP-E(A)-101118-1	No Composite
NLSP-E(B)-101118-1	No Composite

Notes: NLSP-COMP-RAD-CD-1 is MS/MSD. NLSP-COMP-ABC and NLSP-COMP-VWY are Lab Duplicates.

TABLE 6 Sampling and Analytical Program

Table 6
Sampling and Analytical Program
New London State Pier
200 State Pier Road
New London , Connecticut

Compositing Sample ID	Metals	PCBs	Pesticides	PAHs	TOC	Notes
NLSP-COMP-RAD-AB-1	X	X	X	X	X	
NLSP-COMP-RAD-AB-2	X	X	X	X	X	
NLSP-COMP-RAD-CD-1	X	X	X	X	X	MS/MSD
NLSP-COMP-RAD-CD-2	X	X	X	X	X	
NLSP-COMP-RAD-EF	X	X	X	X	X	
NLSP-COMP-ABC	X	X	X	X	X	Lab Duplicate
NLSP-COMP-FH	X	X	X	X	X	
NLSP-COMP-DG	X	X	X	X	X	
NLSP-COMP-IJNOK	X	X	X	X	X	
NLSP-COMP-LMP	X	X	X	X	X	
NLSP-COMP-QX-1	X	X	X	X	X	
NLSP-COMP-QX-2	X	X	X	X	X	
NLSP-COMP-VWY	X	X	X	X	X	Lab Duplicate
NLSP-COMP-T	X	X	X	X	X	
NLSP-COMP-RUS	X	X	X	X	X	
Individual Sample ID	**Metals**	**PCBs**	**Pesticides**	**PAHs**	**TOC**	**Notes**
NLSP-E(A)-101118-1	X	X	X	X	X	
NLSP-E(B)-101118-1	X	X	X	X	X	

Notes: All non-rad samples are analyzed by Katahdin Analytical Services. See Table 5 (Compositing Plan) for composite sample details.

TABLE 7 Radiological Results for Sediment

Table 7
Radiological Results for Sediment
New London State Pier
200 State Pier Road
New London, Connecticut

Analyte	NLSP-RAD-A(A)-101018-1	NLSP-RAD-A(B)-101018-1	NLSP-RAD-A(C)-101018-1	NLSP-RAD-B(A)-101018-1	NLSP-RAD-B(B)-101018-1	NLSP-RAD-B(C)-101018-1	NLSP-RAD-D(A)-101018-1	NLSP-RAD-D(B)-101018-1	NLSP-RAD-C(A)-101018-1	NLSP-RAD-C(B)-101018-1	NLSP-RAD-F(A)-101018-1	NLSP-RAD-E(A)-101018-1
Radionuclides (pCi/g) - Test Method DOE HASL 300, 4.5.2.3/Ga-01-R												
Cesium-137	0.163 +/- 0.0862	0.126 U	-0.00488 U	0.0115 U	0.062 U	0.00448 U	0.0802 U	0.0275 U	0.102 +/- 0.0444	-0.0146 U	0.053 U	0.104 U
Cobalt-60	0.0171 U	0.0189 U	0.0262 U	0.00884 U	0.00467 U	0.0111 U	-0.0184 U	0.00477 U	0.0592 U	-0.00666 U	0.0153 U	-0.00298 U

Laboratory Data Qualifiers

U = Compound was analyzed for but was not detected (non-detect).

TABLE 8 Bulk Sediment Chemistry Results

Table 8
Bulk Sediment Chemistry Results
New London State Pier
200 State Pier Road
New London, Connecticut

Analyte	CT RSRs		Ecological Sediment Quality Benchmarks															
	Residential Criteria	Industrial/ Commercial Criteria	ER-L	ER-M	NLSP-E(A)-101118-1	NLSP-E(B)-101118-1	NLSP-COMP-ABC	NLSP-COMP-DG	NLSP-COMP-FH	NLSP-COMP-IJNOK	NLSP-COMP-QX-1	NLSP-COMP-QX-2	NLSP-COMP-RAD-AB-1	NLSP-COMP-RAD-AB-2	NLSP-COMP-RAD-CD-1	NLSP-COMP-RAD-CD-2	NLSP-COMP-RAD-EF	NLSP-COMP-RAD-LMP
Metals (mg/kg) - Test Methods 6020A / 7471B																		
Arsenic	10	10	8.2	70	7.46	0.89	7.28	7.81	**9.06**	**9.53**	7.3	2.05	**8.76**	0.95	**9.32**	1.65	6.91	7.18
Cadmium	34	1000	1.2	9.6	0.232	0.11	0.13	0.18	0.225	0.28	0.286	0.041 J	0.629	0.034 J	0.794	0.051 J	0.329	0.277
Chromium [1]	100	100	81	370	40	20.4	37.4	41	43.2	50	35.2	6.43	59.2	7.01	60	6.8	48.1	33.5
Copper	2500	76000	34	270	**43.5**	**57.8**	27.8	28.2	**40.9**	**54.6**	**61.3**	26.1	**114**	13	**121**	6.21	**77.6**	**71.1**
Lead	400	1000	46.7	218	**51**	**78**	26.3 *	28.8	**52.3**	**80.7**	***2260***	**72.7**	**125**	14.6	***231 N***	3.16	**90.4**	**101**
Nickel	1400	7500	20.9	51.6	19.4	**37.6**	20.2	**22.1**	**22.9**	**22.8**	13.1	4.34	**34.8**	8.96	**31.9 E**	4.39	**22**	16.9
Zinc	20000	610000	150	410	94	**206**	77.2	83.3	104	128	**153**	23	**247**	44.8	**202**	18.6	133	124
Mercury	20	610	0.15	0.71	**0.175**	0.05	0.0732 *	0.109	0.116	**0.27**	**0.292**	0.0632	**0.364**	0.02 U	**0.456 N**	0.019 U	**0.379**	**0.26**
Pesticides (ug/kg) - Test Method 8081B																		
4,4`-DDD [2, 6]	1800	17000	1.58	46.1	1 U	0.34 J	1.2 U	0.74 J	1.3 U	**1.9**	0.98 U	0.71 U	**14**	0.8 U	1.4 U	0.21 J	1.2 U	**1.6**
4,4`-DDE [2]	1800	17000	2.2	27	0.56 J	0.21 J	0.49 J	0.53 J	0.98 J	0.96 J	1.3 J	0.71 U	**3.4 J**	0.8 U	**2.8**	0.15 J	1.5 J	1 J
4,4`-DDT [2, 6]	1800	17000	1.58	46.1	1 J	0.8 U	1.2 U	1.2 U	1.3 U	1.4 U	0.98 U	0.71 U	1.3 U	0.8 U	1.4 U	0.74 U	1.2 U	1.1 U
Aldrin	40	340	NV	NV	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Alpha-Chlordane (cis) [3, 7]	490	2200	0.5	6	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.33 J	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
cis-Nonachlor	NV	NV	NV	NV	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Dieldrin	38	360	0.02	8	1 U	0.8 U	1.2 U	1.2 U	1.3 U	1.4 U	0.98 U	0.71 U	1.3 U	0.8 U	1.4 U	0.74 U	1.2 U	1.1 U
Endosulfan I [4]	41000	1000000	NV	NV	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Endosulfan II [4]	41000	1000000	NV	NV	1 U	0.8 U	1.2 U	1.2 U	1.3 U	1.4 U	0.98 U	0.67 J	1.3 U	0.8 U	1.4 U	0.74 U	1.2 U	0.89 J
Endrin	20000	610000	NV	NV	1 U	0.8 U	1.2 U	1.2 U	1.3 U	1.4 U	0.98 U	0.71 U	1.3 U	0.8 U	1.4 U	0.74 U	1.2 U	1.1 U
Gamma Chlordane [3, 7]	490	2200	0.5	6	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Heptachlor	140	1300	NV	NV	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Heptachlor epoxide	67	630	NV	NV	0.34 J	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.63 J
Hexachlorobenzene	1000	3600	NV	NV	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	3.6	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Lindane	20000	610000	NV	NV	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Methoxychlor	340000	10000000	NV	NV	5.2 U	4.1 U	6.3 U	6.3 U	6.7 U	7.1 U	5 U	3.6 U	6.8 U	4.1 U	7 U	3.8 U	6.2 U	5.6 U
Oxychlordane [3, 7]	490	2200	0.5	6	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Toxaphene	560	5200	NV	NV	10 U	8 U	12 U	12 U	13 U	14 U	9.8 U	7.1 U	13 U	8 U	14 U	7.4 U	12 U	11 U
trans-Nonachlor	NV	NV	NV	NV	0.52 U	0.41 U	0.63 U	0.63 U	0.67 U	0.71 U	0.5 U	0.36 U	0.68 U	0.41 U	0.7 U	0.38 U	0.62 U	0.56 U
Polychlorinated Biphenyls (ug/kg) - Test Method 8082B																		
PCB 008 [5]	1000	10000	22.7	180	2.2	0.75 J	1.8 U	3.3 J	1.6 J	2 U	1.5 U	1.1 U	1.9 U	0.42 J	2.6	1.1 U	1.5 J	2.6 J
PCB 018 [5]	1000	10000	22.7	180	4.7 U	3.5 U	5.4 U	6.1 U	5.4 U	6.1 U	4.4 U	3.4 U	5.8 U	3.4 U	5.5 U	3.3 U	5.7 U	4.9 U
PCB 028 [5]	1000	10000	22.7	180	2.1	1.4	2.7	2	1.3 J	1.8 J	1.5 U	0.3 J	3.1	1.1 U	3.4	0.35 J	1.7 J	1.2 J
PCB 044 [5]	1000	10000	22.7	180	0.93 J	0.6 J	1.3 J	0.57 J	0.33 J	0.81 J	0.83 J	1.1 U	2	1.1 U	2.4	0.19 J	1.2 J	0.69 J
PCB 049 [5]	1000	10000	22.7	180	1.5 J	1.3	2.5 J	0.74 J	0.88 J	0.83 J	1.5 U	0.54 J	2.1 J	0.36 J	2.4 J	1.1 U	1.3 J	0.78 J
PCB 052 [5]	1000	10000	22.7	180	2.1 J	1.5 J	1.7 J	0.9 J	0.43 J	1.1 J	1.5 U	0.24 J	2.9 J	0.11 J	3.5 J	0.36 J	1.5 J	0.97 J
PCB 066 [5]	1000	10000	22.7	180	1.5 J	0.71 J	1.6 J	0.84 J	0.6 J	1.5 J	2.3	1.1 U	3.3	1.1 U	3.9	1.1 U	2.1	1.2 J
PCB 087 [5]	1000	10000	22.7	180	1.6 U	1.2 U	1.8 U	2 U	1.8 U	2 U	1.5 U	1.1 U	1.9 U	0.21 J	6.6 J	0.24 J	1.4 J	0.72 J
PCB 101 [5]	1000	10000	22.7	180	1.6 U	1.2 U	1.9	2 U	1.8 U	2 U	1.5 U	1.1 U	4.5	1.1 U	4.1	1.1 U	1.9 U	1.6 U
PCB 105 [5]	1000	10000	22.7	180	3.1 U	2.3 U	3.6 U	4 U	3.6 U	4.1 U	3 U	2.3 U	3.8 U	2.3 U	3.7 U	2.2 U	3.8 U	3.3 U
PCB 118 [5]	1000	10000	22.7	180	1.2 J	0.52 J	1.8 U	0.83 J	0.61 J	1.3 J	6 J	0.48 J	2.5	1.1 U	3	0.19 J	1.6 J	0.94 J
PCB 128 [5]	1000	10000	22.7	180	1.6 U	1.2 U	1.8 U	2 U	1.8 U	2 U	1.5 U	1.1 U	1.5 J	1.1 U	1.2 J	1.1 U	1.8 J	1.3 J
PCB 138 [5]	1000	10000	22.7	180	1.8	0.96 J	1.2 J	1.1 J	0.62 J	1.6 J	1.5 U	1.1 U	3.7	1.1 U	4.4	1.1 U	2.7	1.5 J
PCB 153 [5]	1000	10000	22.7	180	2.2	0.83 J	4.1 J	1.5 J	0.97 J	1.9 J	2.6 J	0.64 J	4	1.1 U	4.8	0.26 J	3.2	1.6 J
PCB 170 [5]	1000	10000	22.7	180	1.6 U	0.34 J	1.8 U	2 U	1.8 U	2 U	1.5 U	1.3 J	1.9 U	1.1 U	2.4	1.1 U	2	1.2 J
PCB 180 [5]	1000	10000	22.7	180	1.6 U	0.47 J	2.4 J	0.66 J	1.8 U	7.8 J	1.5 U	1.1 U	11 J	1.1 U	7.9 J	1.1 U	1 J	0.58 J
PCB 183 [5]	1000	10000	22.7	180	1.6 U	1.2 U	1.8 U	2 U	1.8 U	2 U	3.8 J	1.1 U	1.9 U	1.1 U	1.8 U	1.1 U	1.9 U	1.6 U
PCB 184 [5]	1000	10000	22.7	180	1.6 U	1.2 U	1.8 U	2 U	1.8 U	2 U	1.5 U	1.1 U	1.9 U	1.1 U	1.8 U	1.1 U	1.9 U	1.6 U
PCB 187 [5]	1000	10000	22.7	180	0.82 J	0.28 J	1.8 U	0.96 J	0.74 J	1.1 J	1.5 U	1.1 U	1.7 J	1.1 U	2	1.1 U	1.4 J	0.71 J
PCB 195 [5]	1000	10000	22.7	180	0.12 J	1.2 U	1.8 U	2 U	1.8 U	2 U	2.5 J	1.1 U	0.31 J	1.1 U	0.27 J	1.1 U	0.32 J	0.19 J
PCB 206 [5]	1000	10000	22.7	180	0.94 J	0.27 J	1.8 U	0.67 J	0.5 J	1.2 J	1.5 U	1.1 U	4 J	1.1 U	2.7 J	1.1 U	2.5 J	1.7 J
PCB 209 [5]	1000	10000	22.7	180	2.3 J	0.43 J	1.8 U	2 U	1.8 U	2 U	1.5 U	1.1 U	5 J	1.1 U	5.6 J	1.1 U	6.9 J	2.5 J
Total PCBs [5, 8]	1000	10000	22.7	180	19.7	10.4	19.4	14.1	8.6	20.9	18.0	3.5	**52**	1.1	**63**	1.59	**34.1**	20.4

Table 8
Bulk Sediment Chemistry Results
New London State Pier
200 State Pier Road
New London, Connecticut

Analyte	CT RSRs Residential Criteria	CT RSRs Industrial/ Commercial Criteria	Ecological Sediment Quality Benchmarks ER-L	Ecological Sediment Quality Benchmarks ER-M	NLSP-E(A)-101118-1	NLSP-E(B)-101118-1	NLSP-COMP-ABC	NLSP-COMP-DG	NLSP-COMP-FH	NLSP-COMP-IJNOK	NLSP-COMP-QX-1	NLSP-COMP-QX-2	NLSP-COMP-RAD-AB-1	NLSP-COMP-RAD-AB-2	NLSP-COMP-RAD-CD-1	NLSP-COMP-RAD-CD-2	NLSP-COMP-RAD-EF	NLSP-COMP-RAD-LMP
Polycyclic Aromatic Hydrocarbons (ug/kg) - Test Method 8270D SIM																		
1-Methylnaphthalene (8)	21000	200000	70	670	2.9 J	2 J	11 U	12 U	13 U	5.8 J	31 J	38 U	22 J	7.9 U	28 J	7.7 U	18 J	12 J
2-Methylnaphthalene	270000	1000000	70	670	11 U	7.4 U	11 U	12 U	13 U	13 U	40 J	38 U	24 J	7.9 U	33 J	7.7 U	19 J	16 J
Acenaphthene	1000000	2500000	16	500	4.2 J	7.4 U	11 U	3.2 J	13 U	8.6 J	100 U	38 U	54	7.9 U	72	7.7 U	34	33
Acenaphthylene	1000000	2500000	44	640	16	7.4 U	11 U	16	13 U	35	240	99	61	7.9 U	63	7.7 U	40	30
Anthracene	1000000	2500000	85.3	1100	31	8.6	19	23	31	64	1400	260	230	2 J	210	2.8 J	130	88
Benzo(a)anthracene	1000	7800	261	1600	170	44	55	110	100	260	1800	750	470	8.8	690	7.5 J	440	360
Benzo(a)pyrene	1000	1000	430	1600	210	65	72	160	120	360	1400	650	540	13	800	14	480	330
Benzo(b)fluoranthene	1000	7800	600	5100	330	79	100	240	190	520	1800	730	790	10	1200	15	710	550
Benzo(g,h,i)perylene	8400	78000	63.4	260	120	32	41	85	65	200	530	330	300	4 J	460	5.7 J	260	160
Benzo(k)fluoranthene	8400	78000	600	5100	120	35	45	100	60	180	450	180	300	4.9 J	410	5.2 J	260	160
Chrysene	84000	780000	384	2800	220	56	95	170	140	390	1900	690	620	9.1	870	10	480	450
Dibenz(a,h)anthracene	1000	1000	63.4	260	51	13	14	30	22	59	140	79	89	6.3 J	140	5.4 J	86	40
Fluoranthene	1000000	2500000	600	5100	280	61	110	200	240	470	3200	590	1200	7.3 J	1300	16	680	730
Fluorene	1000000	2500000	19	540	10 J	3.9 J	11 U	7.8 J	11 J	22	73 J	20 J	85	7.9 U	110	7.7 U	52	43
Indeno(1,2,3-cd)pyrene	1000	7800	63.4	260	130	35	40	82	66	210	1100	940	530	13	670	16	380	360
Naphthalene	1000000	2500000	160	2100	7.5 J	7.4 U	11 U	12 U	13 U	8.8 J	57 J	23 J	34	7.9 U	76	7.7 U	31	28
Phenanthrene	1000000	2500000	240	1500	93	24	36	63	69	180	380	57	400	4.9 J	790	6.2 J	400	290
Pyrene	1000000	2500000	665	2600	350	82	120	200	240	450	3900	2100	1300	8	2600	27	1400	880
Percent Solids (%) - Test Method SM2540G																		
% Solids	NV	NV	NV	NV	60	80	52	47	50	45	64	87	48	82	46	85	51	53
Total Organic Carbon (ug/g) - Test Method Lloyd Kahn																		
Total organic carbon	NV	NV	NV	NV	18000	4800	21000	27000	22000	30000	32000	4300	29000	240 J	31000	2000	30000	21000
Total organic carbon	NV	NV	NV	NV	19000	3300	21000	25000	22000	31000	25000	13000	29000	250 J	37000	2200	27000	23000
Total organic carbon	NV	NV	NV	NV	20000	3600	22000	26000	22000	30000	29000	8900	29000	240 J	34000	2100	28000	22000

Notes:
ER-L = Effects Range-Low (Long, et al., 1995; Buchman, 2008).
ER-M = Effects Range-Median (Long, et al., 1995; Buchman, 2008).
NV = No screening value available.

Laboratory Data Qualifiers
U = Compound was analyzed for but was not detected (non-detect).
J = Estimated value less than reporting limit.
N = Spiked sample recovery not within control limits.
E = Reported concentration exceeds the calibration range of the instrument for that specific analysis for organics.
Reported value is estimated due to the presence of an interference for inorganics.
* = Duplicate analysis not within control limits.

Screening Value Exceedances Notes
Yellow shading indicates concentrations above residential RSR.
Red shading indicates concentrations above residential and commercial/industrial RSR.
Blue text indicates concentration above ER-L.
Purple text indicates concentration above ER-L and ER-M.
1 - RSRs are for hexavalent chromium (chromium III values are higher).
2 - RSRs apply to all forms of DDT including DDD and DDE.
3 - RSRs apply to all forms of chlordane including alpha and gamma.
4 - RSRs apply to all forms of Endosulfan including the I and II isomers and Endosulfan sulfate.
5 - RSRs, ER-L, and ER-M apply to total PCBs.
6 - ER-L and ER-M apply to total DDT.
7 - ER-L and ER-M apply to total chlordane.
8 - ER-L and ER-M for 2-methylnapthalene used as a surrogate for 1-methylnapthalene.
9 - Total PCBs calculated as the sum of the detected congeners in each sample.

Table 8
Bulk Sediment Chemistry Results
New London State Pier
200 State Pier Road
New London, Connecticut

Analyte	CT RSRs		Ecological Sediment Quality Benchmarks		NLSP-COMP-RUS	NLSP-COMP-T	NLSP-COMP-VWY
	Residential Criteria	Industrial/ Commercial Criteria	ER-L	ER-M			
Metals (mg/kg) - Test Methods 6020A / 7471B							
Arsenic	10	10	8.2	70	6.93	7.75	11.2
Cadmium	34	1000	1.2	9.6	0.13	0.326	0.559
Chromium (1)	100	100	81	370	38	55.1	58.6
Copper	2500	76000	34	270	23	70.9	117
Lead	400	1000	46.7	218	24.5	116	180
Nickel	1400	7500	20.9	51.6	20.1	19.6	27.1
Zinc	20000	610000	150	410	69.6	124	221
Mercury	20	610	0.15	0.71	0.105	0.568	0.618 E
Pesticides (ug/kg) - Test Method 8081B							
4,4`-DDD (2, 6)	1800	17000	1.58	46.1	1.3 U	1.8 J	1.4 U
4,4`-DDE (2)	1800	17000	2.2	27	1.3 U	1.4 J	1.4 U
4,4`-DDT (2, 6)	1800	17000	1.58	46.1	1.3 U	1.1 U	1.4 U
Aldrin	40	340	NV	NV	0.66 U	0.55 U	0.71 U
Alpha-Chlordane (cis) (3, 7)	490	2200	0.5	6	0.42 J	1.3 J	0.71 U
cis-Nonachlor	NV	NV	NV	NV	0.66 U	0.55 U	0.71 U
Dieldrin	38	360	0.02	8	1.3 U	1.1 U	1.4 U
Endosulfan I (4)	41000	1000000	NV	NV	0.66 U	0.55 U	0.71 U
Endosulfan II (4)	41000	1000000	NV	NV	1.3 U	1.3 J	4.1
Endrin	20000	610000	NV	NV	1.3 U	1.1 U	1.4 U
Gamma Chlordane (3, 7)	490	2200	0.5	6	0.66 U	0.55 U	0.71 U
Heptachlor	140	1300	NV	NV	0.66 U	0.55 U	0.71 U
Heptachlor epoxide	67	630	NV	NV	0.66 U	0.55 U	0.71 U
Hexachlorobenzene	1000	3600	NV	NV	0.66 U	0.55 U	0.71 U
Lindane	20000	610000	NV	NV	0.46 J	0.55 U	0.71 U
Methoxychlor	340000	10000000	NV	NV	6.6 U	5.5 U	7.1 U
Oxychlordane (3, 7)	490	2200	0.5	6	0.66 U	0.55 U	0.71 U
Toxaphene	560	5200	NV	NV	13 U	11 U	14 U
trans-Nonachlor	NV	NV	NV	NV	0.66 U	0.55 U	0.71 U
Polychlorinated Biphenyls (ug/kg) - Test Method 8082B							
PCB 008 (5)	1000	10000	22.7	180	1.7 J	1.8 U	11 U
PCB 018 (5)	1000	10000	22.7	180	5.4 U	5.3 U	33 U
PCB 028 (5)	1000	10000	22.7	180	1.1 J	1.5 J	11 U
PCB 044 (5)	1000	10000	22.7	180	0.38 J	1.2 J	3.1 J
PCB 049 (5)	1000	10000	22.7	180	0.65 J	0.86 J	11 U
PCB 052 (5)	1000	10000	22.7	180	1.1 J	1.4 J	11 U
PCB 066 (5)	1000	10000	22.7	180	0.45 J	2.1	5.3 J
PCB 087 (5)	1000	10000	22.7	180	1.8 U	0.54 J	11 U
PCB 101 (5)	1000	10000	22.7	180	1.8 U	1.8 U	11 U
PCB 105 (5)	1000	10000	22.7	180	3.6 U	3.5 U	22 U
PCB 118 (5)	1000	10000	22.7	180	0.5 J	1.5 J	11 U
PCB 128 (5)	1000	10000	22.7	180	1.8 U	1.4 J	11 U
PCB 138 (5)	1000	10000	22.7	180	0.43 J	1.9	11 U
PCB 153 (5)	1000	10000	22.7	180	0.7 J	2.1	11 U
PCB 170 (5)	1000	10000	22.7	180	1.8 U	1.8	44
PCB 180 (5)	1000	10000	22.7	180	1.8 U	1.8 U	11 U
PCB 183 (5)	1000	10000	22.7	180	1.8 U	1.8 U	11 U
PCB 184 (5)	1000	10000	22.7	180	1.8 U	1.8 U	11 U
PCB 187 (5)	1000	10000	22.7	180	0.3 J	0.89 J	20
PCB 195 (5)	1000	10000	22.7	180	1.8 U	1.8 U	37 J
PCB 206 (5)	1000	10000	22.7	180	1.8 U	1.8 U	11 U
PCB 209 (5)	1000	10000	22.7	180	1.8 U	1.8 U	11 U
Total PCBs (5, 8)	1000	10000	22.7	180	7.3	17.2	109

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1-Methylnaphthalene [8]	21000	200000	70	670	7.3 J	41 J	*160000*
2-Methylnaphthalene	270000	1000000	70	670	7.9 J	56 J	*160000*
Acenaphthene	1000000	2500000	16	500	6.7 J	52 J	*93000*
Acenaphthylene	1000000	2500000	44	640	8.8 J	120	*15000*
Anthracene	1000000	2500000	85.3	1100	21	280	*51000*
Benzo(a)anthracene	1000	7800	261	1600	95	1000	*30000*
Benzo(a)pyrene	1000	1000	430	1600	110	1200	*20000*
Benzo(b)fluoranthene	1000	7800	600	5100	140	1500	*17000*
Benzo(g,h,i)perylene	8400	78000	63.4	260	56	*980*	*8300*
Benzo(k)fluoranthene	8400	78000	600	5100	53	420	*8000*
Chrysene	84000	780000	384	2800	110	920	*31000*
Dibenz(a,h)anthracene	1000	1000	63.4	260	25	250	*1400 J*
Fluoranthene	1000000	2500000	600	5100	150	1100	*57000*
Fluorene	1000000	2500000	19	540	8.4 J	70	*60000*
Indeno(1,2,3-cd)pyrene	1000	7800	63.4	260	86	*1400*	*10000*
Naphthalene	1000000	2500000	160	2100	12 U	79	*160000*
Phenanthrene	1000000	2500000	240	1500	69	460	*160000*
Pyrene	1000000	2500000	665	2600	190	1900	*79000*
Percent Solids (%) - Test Method SM2540G							
% Solids	NV	NV	NV	NV	50	56	44
Total Organic Carbon (ug/g) - Test Method Lloyd Kahn							
Total organic carbon	NV	NV	NV	NV	24000	38000	90000
Total organic carbon	NV	NV	NV	NV	26000	40000	65000
Total organic carbon	NV	NV	NV	NV	25000	39000	77000

Notes:
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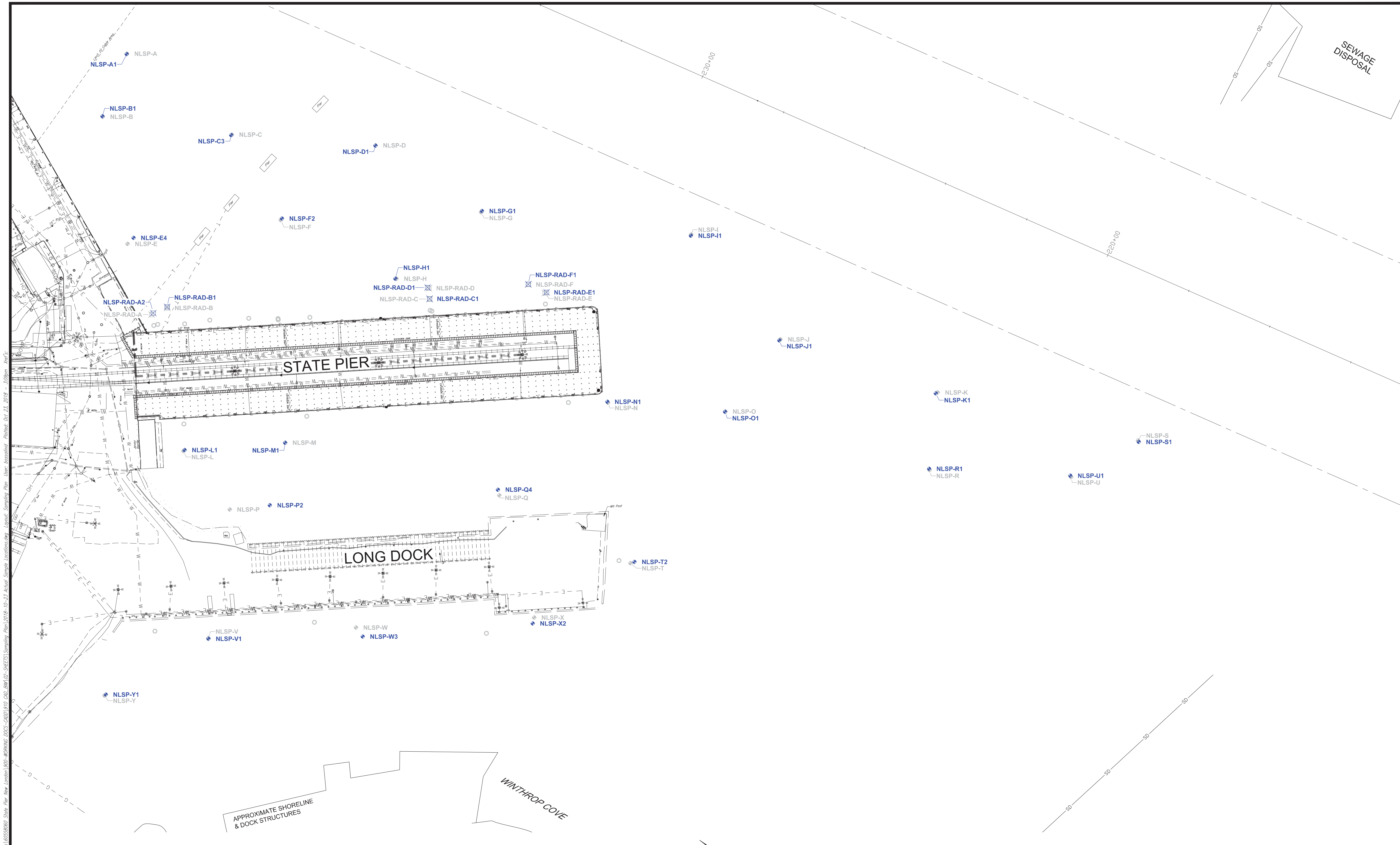
9 - Total PCBs calculated as the sum of the detected congeners in each sample.

FIGURE 1 Target/Actual Coring Locations



AECOM

LEGEND

- PROPOSED 2018 CORE LOCATION
- SURVEYED 2018 CORE LOCATION
- PROPOSED 2018 RAD CORE LOCATION
- SURVEYED 2018 RAD CORE LOCATION
- 2009 CORE LOCATION

50 0 100
GRAPHIC SCALE IN FEET

CONNECTICUT PORT AUTHORITY
STATE PIER NEW LONDON
NEW LONDON, CONNECTICUT

FIGURE 1
STATE PIER NEW LONDON
SAMPLING LOCATIONS

DATE: 10/23/2018 | DRWN: DCB | WP

ATTACHMENT 1 State Pier New London SH&E Documentation

See this Corresponding Attachment in the Preceding Sediment Sampling Field Report (JPA Attachment M2A).

ATTACHMENT 2 State Pier New London Core Logs

See this Corresponding Attachment in the Preceding Sediment Sampling Field Report (JPA Attachment M2A).

ATTACHMENT 3 State Pier New London Photograph Log

See this Corresponding Attachment in the Preceding Sediment Sampling Field Report (JPA Attachment M2A).

ATTACHMENT 4 State Pier New London Chain of Custody Forms

See this Corresponding Attachment in the Preceding Sediment Sampling Field Report (JPA Attachment M2A).

ATTACHMENT 5 State Pier New London Field Notes

See this Corresponding Attachment in the Preceding Sediment Sampling Field Report (JPA Attachment M2A).

ATTACHMENT 6 Laboratory Analytical Reports

JPA Attachment M2B. Attachment 6 – Laboratory Analytical Reports

AECOM report entitled *Investigation Report for State Pier Sediment Program -Thames River New London Connecticut* (December 2018) has been provided to DEEP and USACE electronically, under separate cover.

To limit document size, Appendix 6 of this AECOM Report (Laboratory Analytical Results: >4,100 pages) is excluded from this JPA. Report copies are available upon request.