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Evaluation of Dredged Material Proposed for Ocean Disposal from Eastchester Project Area, New York

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Sequim, Washington

July 1996

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Pacific Northwest National Laboratory
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Summary

The objective of the Eastchester project (Federal Project [FP] No. 6) was to evaluate proposed dredged material from the Eastchester project area in the Hutchinson River to determine its suitability for unconfined ocean disposal at the Mud Dump Site. Eastchester was one of seven waterways that the U. S. Army Corps of Engineers-New York District (USACE-NYD) requested the Battelle/Marine Sciences Laboratory (MSL) to sample and evaluate for dredging and disposal in March 1994. Sediment samples were collected from the Eastchester project area, as well as from the Buttermilk Channel, Hudson River, Gravesend Bay Anchorage, South Brother Island, Port Chester, and Brown's Creek, during a survey conducted from March 7 through 14, 1994. Combining sample collection and evaluation of multiple dredged material projects was more cost-effective for the USACE-NYD, because the expense of reference site testing and quality control analyses could be shared among projects.

Tests and analyses were conducted according to the manual developed by the USACE and the U.S. Environmental Protection Agency (EPA), *Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual)*, commonly referred to as the "Green Book," and the regional manual developed by the USACE-NYD and EPA Region II, *Guidance for Performing Tests on Dredged Material to be Disposed of in Ocean Waters.*

The evaluation of proposed dredged material from the Eastchester project area consisted of bulk sediment chemical analyses, chemical analyses of dredging site water and elutriate, water-column and benthic acute toxicity tests, and bioaccumulation studies. Eighteen individual sediment core samples collected from the Eastchester project area were analyzed for grain size, moisture content, and total organic carbon (TOC). Two composite sediment samples, representing the upstream and lower reaches of the area proposed for dredging, were analyzed for bulk density, specific gravity, metals, chlorinated pesticides, polychlorinated biphenyl (PCB) congeners, polynuclear aromatic hydrocarbons (PAHs), and 1,4-dichlorobenzene. Dredging site water and elutriate water, which is prepared from the suspended-particulate phase (SPP) of the two Eastchester sediment composites, were analyzed for metals, pesticides, and PCBs. An additional 11 composite samples were created for the USACE-New England Division (USACE-NED) using the same 18 Eastchester core samples but combined into different composites. These composites were analyzed for metals, chlorinated pesticides, PCB congeners, PAHs, and 1,4-dichlorobenzene.

Water-column or SPP toxicity tests were performed with three species, the mysid *Mysidopsis bahia*, the juvenile silverside *Menidia beryllina*, and larvae of the mussel *Mytilus galloprovincialis*. Benthic acute toxicity tests were performed with three amphipods, *Ampelisca abdita*, *Rhepoxynius abronius*, and *Eohaustorius estuarius*, as well as with the mysid *M. bahia*.

The amphipod benthic toxicity test procedures followed EPA guidance for reduction of total ammonia concentrations in test systems prior to test initiation. A similar procedure was developed for the mysid toxicity test. Bioaccumulation tests were conducted with the burrowing polychaete worm *Nereis virens* and the surface-feeding, bent-nose clam *Macoma nasuta*. Sediment from the Mud Dump Reference Site and the Central Long Island Sound Reference Site were collected and incorporated in benthic toxicity and bioaccumulation test, as outlined above.

Eastchester sediment core samples were generally black or gray-black, silty-clayey material. Seven of the 18 stations were predominantly sand and gravel. The Eastchester sediment composite samples contained elevated levels of metals, pesticides (particularly the DDD/DDE/DDT group of compounds), PCBs, PAHs, and 1,4-dichlorobenzene.

The interpretation of acute toxicity test results was the same for both the Mud Dump Reference Site and the Central Long Island Sound Reference Site, except that the latter was not tested with *E. estuarius*. No statistically significant acute toxicity was found with either Eastchester composite in the *M. bahia* test or in the Reach A composite with *A. abdita*. Statistically significant acute toxicity and a greater than 20% increase in mortality over the reference sediment was found in the static-renewal tests with *A. abdita* (Reach B only), *R. abronius* (both Reaches A and B), and *E. estuarius* (Reach A only; Reach B was not tested due to insufficient material). In water-column toxicity tests, no acute toxicity was demonstrated with the Reach A composite. The 100% SPP treatments from Reach B were acutely toxic to all three species tested. The median lethal concentrations (LC_{50}) ranged from 37.6% SPP for *M. beryllina* to 68.6% SPP for *M. bahia*. The median effective concentration (EC_{50}) for *M. galloprovincialis* normal development, a more sensitive measure than survival, was 21.0% SPP for the Reach B composite and >100% for the Reach A composite.

Following 28-day bioaccumulation tests, concentrations of all metals (except Cd) were higher in *M. nasuta* than in *N. virens*. Pesticide and PCB concentrations were similar in the two species, with some analytes higher in the *N. virens*, and others higher in the *M. nasuta*. Concentrations of PAHs were higher in *M. nasuta* than in *N. virens*, many compounds by factors of 4 to 10 or more times. When tissue burdens of organisms exposed to Eastchester sediment were compared with those exposed to either Mud Dump Reference Site or Central Long Island Sound Reference Site sediment, Eastchester-exposed-tissue burdens were statistically significant and elevated for metals, pesticides, PCBs, and PAHs.

Tissues of both species exposed to each Eastchester sediment composite had tissue body burdens that were lower than the U.S. Food and Drug Administration (FDA) action levels for poisonous or deleterious substances in fish and shellfish for human consumption for selected pesticides, and FDA levels of concern for chronic shellfish consumption for selected metals.

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1.0 Introduction

1.1 Project Objectives

The objective of the Eastchester project (Federal Project [FP] No. 6) was to evaluate proposed dredged material from the Eastchester project area in the Hutchinson River to determine its suitability for unconfined ocean disposal at the Mud Dump Site. Tests and analyses for Mud Dump disposal were conducted on Eastchester sediment core samples according to the manual developed by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA), *Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual)* (EPA/USACE 1991), commonly referred to as the "Green Book," and the regional manual developed by the USACE-New York District (USACE-NYD) and EPA Region II, *Guidance for Performing Tests on Dredged Material to be Disposed of in Ocean Waters* (USACE-NYD/EPA Region II 1992), hereinafter referred to as the "Regional Guidance Manual." The Regional Guidance Manual provides specifications for the use of local or appropriate test species in biological tests and identifies chemical contaminants of concern. Because the Eastchester area is located between New York and southeastern Connecticut, its dredged material may also be considered for disposal at the Central Long Island Sound (CLIS) Disposal Site. Therefore, Eastchester sediments were also tested for possible disposal at the Central Long Island Reference Site according to the USACE-New England Division (NED) guidelines (USACE-NED/EPA Region 1 1989).

As required by the Regional Guidance Manual, the evaluation of proposed dredged material from the Eastchester area consisted of bulk sediment chemical analyses, chemical analyses of dredging site water and elutriate, water-column and benthic acute toxicity tests, and benthic bioaccumulation studies. Individual sediment core samples collected from the Eastchester project area were analyzed for grain size, moisture content, and total organic carbon (TOC). Two composite sediment samples (EC-A and EC-B), representing each reach proposed for dredging, were analyzed for bulk density, specific gravity, metals, chlorinated pesticides, polychlorinated biphenyl (PCB) congeners, polynuclear aromatic hydrocarbons (PAHs), and 1,4-dichlorobenzene. Site water and elutriate water, which was prepared from the suspended-particulate phase (SPP) of the two Eastchester sediment composites, were analyzed for metals, pesticides, and PCBs. Water-column, benthic toxicity, and bioaccumulation tests were performed with sediments from composite samples EC-A and EC-B. Water-column tests were performed with three species, the mysid *Mysidopsis bahia*, the juvenile silverside *Menidia beryllina*, and larvae of the mussel *Mytilus galloprovincialis*. Benthic acute toxicity tests were performed with three amphipods, *Ampelisca abdita*, *Rhepoxynius abronius*, and *Eohaustorius estuarius*, and the mysid *M. bahia*. Bioaccumulation tests were conducted on using the burrowing and deposit feeding worm *Nereis virens* and the surface-feeding clam *Macoma nasuta*.

An additional set of 11 composite samples was created for USACE-NED and analyzed for bulk density, specific gravity, metals, chlorinated pesticides, PCBs, PAHs, and 1,4-dichlorobenzene.

1.2 Project Background

The proposed Eastchester project area is located in the western Long Island Sound, east of the Bronx, New York, where the Hutchinson River flows into Eastchester Bay (Figure 1.1). The project requires dredging and disposal of an estimated 70,000 cu yd of sediment. Project depth of the channel is -10 ft mean low water (MLW) plus 2 ft of overdepth. Eastchester was one of seven waterways that the USACE-NYD requested the Battelle/Marine Sciences Laboratory (MSL) to evaluate in a series of dredged material projects that became known as the New York/New Jersey Federal Projects 2 program. The projects evaluated under the Federal Projects 2 program were Buttermilk Channel, the Hudson River, South Brother Island, Gravesend Bay Anchorage, Brown's Creek, Port Chester, and Eastchester. Sediment samples from 12 reaches in these waterways were collected during a survey that took place from March 7 through March 14, 1994. Combining sample collection and evaluation of multiple dredged material projects was more cost-effective for the USACE-NYD, because the expense of reference site testing and quality control analyses could be shared among projects.

1.3 Organization of This Report

Following this introduction, Section 2 presents the methods and materials used for sample collection, sample processing, sediment sample analysis of physical and chemical parameters, and quality assurance. Results of all physical/chemical analyses and bioassays are presented in Section 3. A discussion of the results and conclusions is provided in Section 4. Section 5 lists the literature cited in this report. Appendix A contains tabulated quality control data for all physical and chemical sediment analyses. Appendix B contains results of replicate sample analyses and quality control data for site water and elutriate chemical parameters. Appendix C contains raw data associated with water-column toxicity tests: water quality measurements, test animal survival data, and reference toxicant test results. Similar data for benthic acute toxicity tests are provided in Appendix D. Appendix E contains water quality measurements, test animal survival data, and reference toxicant test results for the bioaccumulation tests. Appendix F contains replicate sample results and quality control data for chemical analyses of *M. nasuta* tissue samples generated from the bioaccumulation tests, and Appendix G contains replicate sample results and quality control data for chemical analyses of *N. virens* tissue samples.

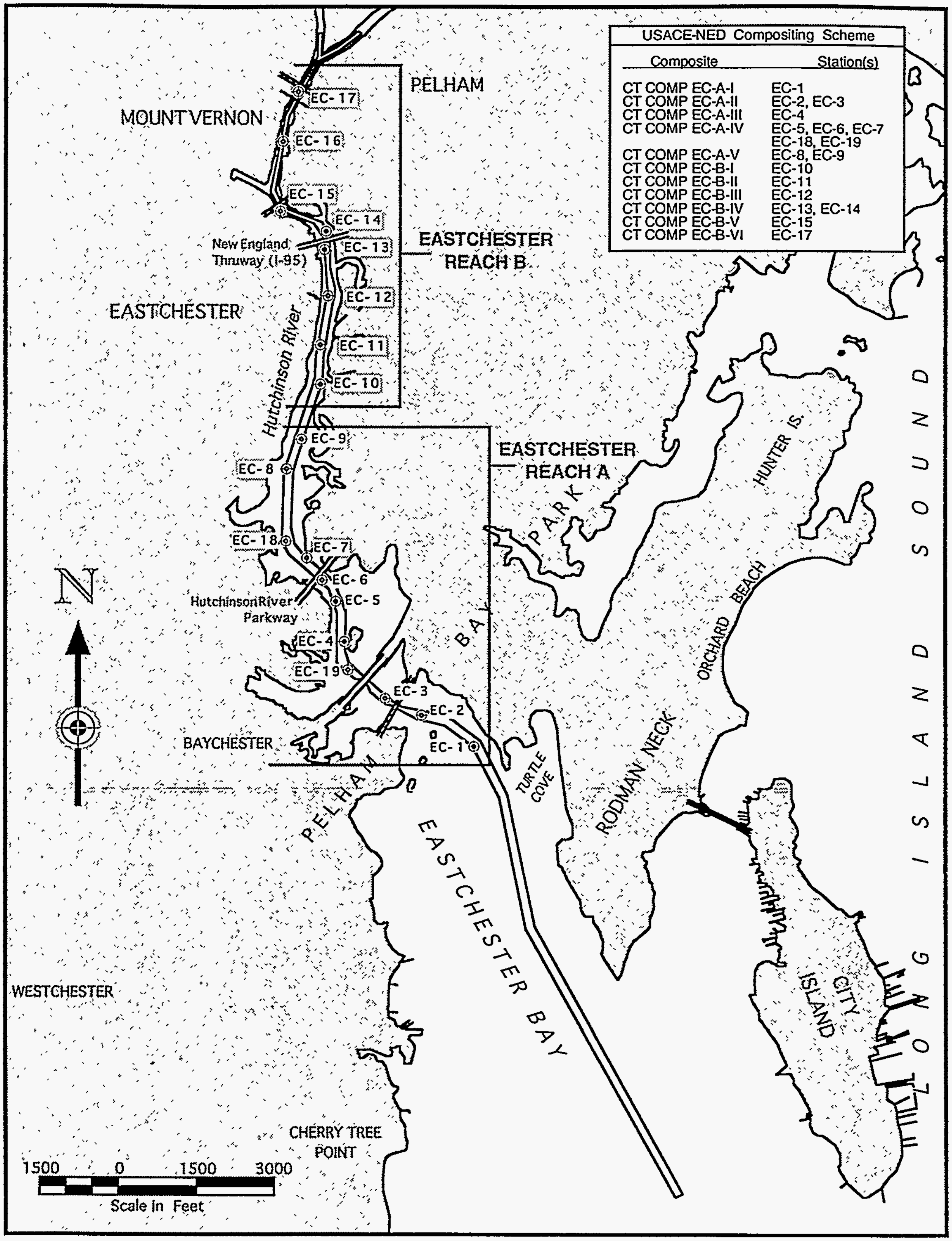

FIGURE 1.1. Location of Eastchester Project Area and Sample Collection Stations

2.0 Materials and Methods

2.1 Sediment and Water Collection

Sediment samples were collected from 18 stations within the Eastchester project area. Sampling locations were selected by the USACE-NYD based on recent bathymetric surveys. The locations, their coordinates, and water and core sampling depths are presented with the sampling results in Section 3.0. Water samples were collected at a representative location in the Eastchester project area and in the Mud Dump Site. Reference sediment was collected from the Mud Dump Reference Site and the Central Long Island Sound Reference Site. All samples were collected aboard either the M/V *Gelberman* or the M/V *Hayward,* which are owned and operated by USACE-NYD at Caven Point, New Jersey.

2.1.1 Test Sediment and Site Water Sampling

The approximate core sampling locations were first determined with the aid of reference to landmarks, such as shoreline features or buoys, as well as by water depth. Then, a hand-held Magellan Global Positioning System (GPS) was used to identify and record (within 30 m) each sampling station. The vessel's LORAN was available as a backup system. Water depth at the time of sampling was measured by a fathometer on the ship. The actual water depth was corrected to MLW depth by correcting to the tide height at the time the depth was recorded. The difference between the MLW depth and the project depth, plus 2 ft overdepth, yields the amount of core required.

Core samples were collected aboard the *Gelberman* or the *Hayward* using a vibracore sampler. The vibracore sampler consisted of a 4-in. outer diameter (OD), steel core barrel attached to an electric vibratory hammer. The vibratory hammer could be fitted to steel core barrels of various lengths, depending on the length of core needed. To collect a core sample, the core barrel was fitted with a 3.125-in. interior diameter (ID), steam-cleaned, Lexan polycarbonate tube. The vibracore was then suspended by the ship's crane. Once the coring apparatus was directly above the sampling station, the core was lowered through the water to the sediment surface. At this point, the station coordinates were recorded from the GPS, and water depth was recorded from the ship's fathometer. The vibratory hammer was switched on until the corer penetrated through the sediment to the desired project depth. Adequate penetration was determined relative to marks on the outside of the core barrel and on the cable suspending the vibracore from the crane. The vibracore apparatus was then pulled out of the sediment and lowered onto the ship's deck. A cutter-head and core-catcher assembly prevented loss of the sediment through the bottom of the core liner. After each core was brought on board, the liner was pulled from the barrel and the length of cored sediment was measured from the mudline to determine whether the project depth plus 2 ft overdepth had been reached. If not, the liner was replaced and a second core sample was attempted. If the sediment core length was at least project depth plus 2 ft overdepth, it was capped, sealed with tape, and labeled. While on board the sampling vessel, cores were kept cold (~4°C) in a freezer on the deck of the ship. If necessary, cores were cut into shorter sections to fit in the freezer.

Surface-water samples for dredging site water chemical analysis were collected at two stations in the Eastchester project area, one site water sample for each project reach. Site water was also collected from the Mud Dump Site for chemical analysis and use as dilution water in water-column toxicity tests. Water samples were collected using a clean, epoxy-coated bucket below the surface of the water. Water was then transferred to precleaned, 20-L polypropylene carboys. The carboys were rinsed with site water three times before filling. Space permitting, water samples were labeled and stored in the freezer (at 4°C) or in the shade while on board the ship. (Prior to the sampling survey, carboys were washed with hot water and detergent, acid-rinsed with dilute hydrochloric acid, then rinsed with distilled water, followed by acetone).

A log book was maintained containing records of each sample collected, including station designation, coordinates, replicate number, date, sampling time, water depth, core length, and number of core sections per core. At the end of each sampling day, when the *Gelberman* or the *Hayward* returned to Caven Point, all sediment cores and water samples were loaded into a refrigerated van, thermostatically controlled to maintain temperature at approximately 4°C. Sample identification numbers were logged on chain-of-custody forms daily.

At the conclusion of the sample collection survey, sediment cores and water samples were shipped by refrigerated van from Caven Point, New Jersey, to the MSL in Sequim, Washington. The shipment departed from Caven Point on March 14, 1994, and arrived at the MSL on March 18, 1994.

2.1.2 Reference and Control Sediment Sampling

Reference sediments for toxicity and bioaccumulation tests were collected from the Mud Dump Reference Site and the Central Long Island Sound Reference Site. Four 5-gal containers of surficial sediment were collected at each reference site using a van Veen sampler. After recovery, water was drained from the sampler, and the sediments were transferred to epoxy-coated steel buckets. The buckets were covered, labeled, and stored in a freezer at 4°C on the deck of ship. Records of reference sediment collected were coordinates, replicate number, date, sampling time, and water depth. Reference sediment samples were loaded into the refrigerated van at the staging area upon return to port, and sample identification numbers were logged on chain-of-custody forms.

Control sediments were used in each toxicity and bioaccumulation test to validate test procedures. Control sediment used in *M. nasuta* and *M. bahia* tests was collected from Sequim Bay, Washington, using a van Veen sampler deployed from an MSL research vessel. *R. abronius* control sediment was collected from West Beach, Whidbey Island, Washington, using a small anchor-dredge sampler specially designed for collecting the amphipods and their sediment. Locations of these control sites were determined by reference to known shoreline features. While in transit from the sampling site, all control sediments were stored in coolers at ambient temperature and were stored in the walk-in cold room at 4°C±2°C upon arrival at the MSL. Native control sediment for *A. abdita, E. estuarius*, and *N. virens* were supplied with the test organisms by their respective suppliers.

2.2 Test Organism Collection

Eight species of test organisms were used to evaluate sediment samples from the Eastchester project area:

- *Ampelisca abdita*, a tube-dwelling, surface detrital-feeding amphipod
- *Rhepoxynius abronius*, a free-burrowing, subsurface detrital-feeding amphipod
- *Eohaustorius estuarius*, a free-burrowing, subsurface detrital-feeding amphipod
- *Mysidopsis bahia*, a juvenile mysid shrimp
- *Menidia beryllina*, a juvenile silverside fish
- *Mytilus galloprovincialis*, the larval zooplankton stage of the mussel
- *Macoma nasuta*, the bent-nose clam, a burrowing, surface detrital-feeder
- *Nereis virens*, a burrowing, deposit-feeding polychaete.

All test organisms except mysids and silversides were wild-captured animals, collected either by a commercial supplier or by MSL personnel. The amphipod *A. abdita* was supplied by East Coast Amphipod, Kingston, Rhode Island. *A. abdita* and its native sediment were collected from Narragansett Bay, Rhode Island, by dragging a large dipnet along the sediment surface. Test organisms were carefully removed from their tubes for counting, and then placed in clean, native sediment for overnight transport to the MSL. The amphipod *R. abronius* was collected by MSL personnel from West Beach, at Whidbey Island, using the same anchor-dredge sampler that was used for collecting the amphipod's native sediment. The amphipods were transported to the MSL in clean coolers containing approximately 10 cm of sediment and 5 gal of clean seawater at a temperature approximating natural conditions. The amphipod *E. estuarius* and its native sediment were supplied by Northwest Aquatic Sciences, Newport, Oregon. *E. estuarius* were collected with a benthic dredge, transferred to small plastic containers with native sediment, and shipped in coolers to the MSL by overnight service. Mysids were purchased from Aquatic Biosystems, Fort Collins, Colorado. Mysids that were less than 24-h old were shipped via overnight delivery in plastic bags containing oxygen-supersaturated seawater maintained at approximately 15°C with "blue ice." Silversides were supplied by Aquatic Research Organisms in Hampton, New Hampshire, and were shipped via overnight delivery in plastic bags containing oxygen-supersaturated seawater maintained at approximately 22°C with blue ice. Mussels used for obtaining *M. galloprovincialis* larvae were purchased from the commercial supplier Johnson and Gunstone, Quilcene, Washington. Mussels were wrapped in moist paper towels and transported in a styrofoam cooler packed with blue ice to maintain an ambient temperature of approximately 15°C. Clams (*M. nasuta*) were collected from intertidal zones in Discovery Bay, Washington, by Johnson and Gunstone. The clams were kept in large containers filled with sediment and seawater obtained from the collection site and transported to the MSL. Worms (*N. virens*) were purchased through Envirosystems, Inc., and were collected from an intertidal region in Newcastle, Maine. The worms were packed in insulated boxes with mats of moist seaweed and shipped at ambient temperature to the MSL via overnight delivery.

All organisms were shipped or transported in native sediment or under conditions designed to ensure their viability. After arrival at the MSL, the test organisms were gradually acclimated to test conditions. Animals with abnormal behavior or appearance were not used in toxicological tests. All acclimation and animal care records are part of the raw data files for these projects.

2.3 Sediment Sample Preparation

Sediment sample preparation consists of all steps performed in the laboratory between receipt of the samples at the MSL and the preparation of samples for biological testing and physical/chemical analyses. Sediment samples for physical, chemical, and biological analysis were prepared from individual core samples, composites of a number of core samples, reference sediment, and control sediment. All sediment samples were assigned random, unique code numbers to ensure that samples were handled without bias by staff in the biology or chemistry laboratories.

Sediment for biological testing was used within the 6-week holding period specified in the Green Book. During this holding time, the sediment samples were received at the MSL; inventoried against chain-of-custody forms; processed and used for benthic and water-column toxicity tests, elutriate analysis, and bioaccumulation tests; and subsampled for sediment physical/chemical analyses. This section describes procedures followed for equipment preparation, compositing strategy, and preparation of sediments for biological testing and chemical analyses.

2.3.1 Laboratory Preparation and Safety Considerations

All glassware, stainless-steel or titanium utensils, Nalgene, Teflon, and other laboratory containers and equipment underwent stringent cleaning procedures to avoid contamination of samples. Glassware (e.g., test containers, aquaria, sediment transfer dishes) was washed with hot water and detergent, rinsed with deionized water, then soaked in a 10% solution of reagent grade nitric acid for a minimum of 4 h and rinsed again with deionized water before it was allowed to air dry. Glassware was then rinsed with methylene chloride and allowed to dry under a fume hood. Polyvinyl chloride (PVC), Nalgene, and Teflon tools were treated in the same manner as glassware. Stainless-steel bowls, spoons, spatulas, and other utensils were washed with hot water and detergent, rinsed with deionized water, and allowed to air dry. They were then solvent-rinsed with methylene chloride and allowed to dry under a fume hood.

Neoprene stoppers and polyethylene sheets or other porous materials were washed with hot water and detergent and rinsed with deionized water. These items were then "seasoned" by continuous soaking in 0.45-µm filtered seawater for at least 2 days prior to use. Large pieces of laboratory equipment, such as the epoxy-coated sediment mixer, were washed with a dilute solution of detergent, and thoroughly rinsed with tap water followed by deionized water.

Equipment used for determining water quality, including the meters for pH, dissolved oxygen (DO), temperature, ammonia and salinity, were calibrated according to the manufacturers' specifications and internal MSL standard operating procedures (SOPs).

Because the potential toxicity of the Eastchester sediment was unknown, sediment processing and testing were segregated from other laboratory activities. Specific areas at the MSL were established for sample storage and for core-cutting, sediment mixing, and sediment sieving. Work areas were covered with plastic sheeting to contain any waste sediment. Wastewater generated during all operations was retained in 55-gal barrels and periodically pumped through activated charcoal filters and into the MSL's wastewater treatment system. These procedures minimized any potential for cross-contamination of sediment samples and any potential accidental release to the environment.

Laboratory staff members were protected by personal safety equipment such as eyewear, Tyvek suits, plastic aprons, and rubber gloves. Those who were likely to have the most exposure to the potential volatile compounds in the bulk sediment (i.e., those responsible for opening, homogenizing, and compositing core samples) were also provided with half-mask respirators.

2.3.2 Preparation of Sediment for Benthic Testing and Bulk Sediment Analyses

Each core was opened by scoring the Lexan core liner longitudinally with a circular saw and splitting the liner with a clean linoleum knife to expose the sediment. As each sediment core sample was opened, it was examined for physical characteristics (e.g., sediment type and consistency, color, odor). In particular, the presence of any strata in the cores was noted. All core observations were recorded in the sediment preparation log book. The sediment between the mudline and project depth was then transferred from the core liner to a clean, stainless-steel bowl by scooping the sediment from the core liner with a spoon or spatula. The sediment was mixed by hand with stainless-steel utensils until the color and consistency appeared homogenous, creating a sample representative of the individual sampling station. Sieving was not necessary because organisms that might interfere with the benthic toxicity tests were not present in the sediment samples.

Aliquots of the homogenized sediment were then transferred to the appropriate sample jar(s) for physical or chemical analyses required on individual core samples. A portion of each homogenized core sample was also retained as an archive sample. The remainder of the homogenized sediment from the individual core stations was combined to create two composite samples representing the Reach A and Reach B of the Eastchester project area, designated COMP EC-A and EC-B, respectively. The Reach A composite contained sediments from Stations EC-1 through EC-9 plus EC-18 and EC-19. The Reach B composite contained sediments from Stations EC-10 through EC-17. Sediment was not collected at station EC-16, because concrete debris and hard-packed sediment in this area made penetration of the core impossible. Several unsuccessful attempts were made to collect sediment from the vicinity. Additional composites were created for chemical analysis as required by USACE-NED. The compositing scheme for these samples is provided in Section 3. Each sediment composite was homogenized in an epoxy-coated mixer. Aliquots of homogenized composite sediment were transferred to the appropriate sample jar(s) for physical or chemical analyses required on the composite sample. A portion of the homogenized composited sediment was also retained as an archive sample. The remainder was stored in labeled epoxy-coated pails, tightly covered, at 4°C±2°C until use for SPP/elutriate preparation or benthic toxicity and bioaccumulation tests.

The Mud Dump Reference Site sediment, Central Long Island Sound Reference Site sediment, *M. nasuta* native control sediment, and *N. virens* native control sediment were also homogenized in the large, epoxy-coated mixer, but prior to mixing, these sediments were pressed through a 1-mm mesh to remove live organisms that might affect the outcome of toxicity tests. After mixing, aliquots for physical and chemical analyses were removed. Native control sediments for *A. abdita*, *R. abronius*, and *E. estuarius* were sieved through a 0.5-mm mesh to remove live organisms and mixed in stainless-steel bowls after sieving. All reference and control sediments were stored at 4°C±2°C until use in benthic toxicity and bioaccumulation tests.

2.3.3 Preparation of Suspended-Particulate Phase and Elutriate

Toxicological effects of dredged sediments dissolved and suspended in the water-column at an open-water disposal site were simulated in the laboratory by preparation of the SPP. The SPP was prepared by creating a 4:1 (volume:volume) water-to-sediment slurry in 1–L glass jars with Teflon-lined lids. The jars were marked at 200 mL and 400 mL and filled to the 200-mL mark with 0.45-µm-filtered Sequim Bay seawater. Sequim Bay seawater was substituted for dredging site water to maintain consistency in salinity among the dredging projects tested. Homogenized sediment was added until the water was displaced to the 400-mL mark. Each jar was then filled to 1 L with filtered seawater, placed on a shaker table, and agitated for 30 min at 120 to 150 cycles/min. The slurry was then transferred to 500-mL Teflon jars, tightly sealed, and centrifuged at approximately 1750 rpm for 10 min, at a relative centrifugal force of approximately 1000 g. The centrifugation procedure replaced the 1-h settling procedure described for elutriate preparation in the Green Book. Low speed centrifugation provided a more timely SPP preparation and maintained consistency between projects.

Following centrifugation, the supernatant was poured into 4-L glass jars. The Teflon jars were rinsed after each use and the above process continued until an adequate amount of SPP was produced from each composite. Between SPP preparations, all glass and Teflon containers were cleaned according to procedures described in Section 2.3.1. When all SPP for a treatment was prepared, portions were taken for elutriate preparation. The remaining SPP was either used immediately for biological tests or stored at 4°C±2°C and used within 24 h for testing. The 100% SPP was mixed with Mud Dump Site water to yield three dilutions: 0%, 10%, and 50% SPP, for a total of four concentrations for each sediment composite.

To prepare elutriate for chemistry analyses, a 1-L aliquot of the SPP was collected in an acid-washed Teflon bottle for trace metals analysis, and three 1-L aliquots were collected in EPA-certified amber glass bottles for analysis of organic compounds. The SPP for metals analysis was transferred to acid-washed polycarbonate centrifuge jars, and the SPP for analysis of organic compounds was transferred to Teflon centrifuge jars. Both were centrifuged at 2000 rpm for 30 min at a relative centrifugal force of approximately 1200 g. The decanted supernatant liquid (elutriate) was analyzed for chemical constituents to identify potential water-soluble contaminants that could remain in the water-column after dredge and disposal operations. One liter of elutriate was submitted for triplicate trace metals analysis and three 1-L portions were submitted for analysis of organic compounds.

2.4 Physical and Chemical Analytical Procedures

Individual sediment cores, composited bulk sediment, water, elutriate, and tissue samples were analyzed for selected physical and chemical parameters. Table 2.1 lists the parameters measured in each sample type, the method used for each analysis, and the target analytical detection limits. The following sections briefly describe the procedures used for physical and chemical analyses. Procedures followed those required by the Regional Guidance Manual unless otherwise noted.

2.4.1 Grain Size and Percentage of Moisture

Grain size was measured following two methods described by Plumb (1981). The wet sieve method was used to determine the size distribution of sand or coarser-grained particles larger than a U.S. No. 230 standard sieve (62.5-µm mesh). The size distribution of particles smaller than a U.S. No. 230 sieve was determined using the pipet method. Grain size was reported as percentages within four general size classes:

gravel	>2000-µm diameter
sand	≥ 62.5-µm diameter and <2000-µm diameter
silt	≥ 3.9-µm diameter and < 62.5-µm diameter
clay	< 3.9-µm diameter.

Percentage of moisture was obtained using the Plumb (1981) method for determining total solids. The procedure involves drying a sediment sample at 100°C until a constant weight is obtained. Percentage of moisture was calculated by subtracting the percentage of total solids from 100%.

2.4.2 Bulk Density and Specific Gravity

Bulk density, or unit weight, was determined according to EM 111-2-1906 (USACE 1970). Specific gravity, the ratio of the mass of a given volume of material to an equal volume of water at the same temperature, was measured according to ASTM D-854.

2.4.3 Total Organic Carbon

Samples were analyzed according to the EPA Edison, New Jersey, Laboratory procedure (EPA 1986). Inorganic carbon was removed from the sample by acidification. The sample was combusted and the evolved carbon dioxide was quantitated using a carbon-hydrogen-nitrogen (CHN) analyzer. TOC was reported as a percentage of the dry weight of the unacidified sample.

TABLE 2.1. List of Analytes, Methods, and Target Detection Limits

Analyte	Methods	Sediment Detection Limit(a)	Tissue Detection Limit(b)	Water Detection Limit
PHYSICAL PARAMETERS				
Grain Size	Plumb (1981)	1.0%		
Specific Gravity	ASTM D-854			
Bulk Density	EM 1110-2-1906 (USACE 1970)			
Percent Moisture	Sediment: Plumb (1981)	1.0 %		
	Tissue: Freeze-dry		1.0 %	
METALS				
Arsenic	EPA 200.2, -.3, -.8 (c)	0.1 mg/kg	1.0 mg/kg	---
Cadmium	EPA 200.2, -.3, -.8 (c)	0.01 mg/kg	0.1 mg/kg	0.025 µg/L
Chromium	EPA 200.2, -.3, -.8 (c)	0.02 mg/kg	0.2 mg/kg	1.0 µg/L
Copper	EPA 200.2, -.3, -.8 (c)	0.1 mg/kg	1.0 mg/kg	0.35 µg/L
Lead	EPA 200.2, -.3, -.8 (c)	0.1 mg/kg	0.1 mg/kg	0.35 µg/L
Mercury	EPA 245.5 (sed.); 245.6 (tiss.) (c)	0.02 mg/kg	0.02 mg/kg	
	Bloom and Crecelius (1983) (water)			0.002 µg/L
Nickel	EPA 200.2, -.3, -.8 (c)	0.1 mg/kg	0.1 mg/kg	0.30 µg/L
Silver	EPA 200.2, -.3, -.9 (c)	0.1 mg/kg	0.1 mg/kg	0.25 µg/L
Zinc	EPA 200.2, -.3, -.8 (c)	0.1 mg/kg	1.0 mg/kg	0.15 µg/L
METALS (Required for Central Long Island Sound Disposal Testing)				
Antimony	EPA 200.2, -.3, -.8, -.9 (c)	0.1 µg/kg		
Beryllium	EPA 200.2, -.3, -.8, -.9 (c)	0.1 µg/kg		
Selenium	EPA 200.2, -.3, -.8, -.9 (c)	0.1 µg/kg		
Thallium	EPA 200.2, -.3, -.8, -.9 (c)	0.1 µg/kg		
ORGANIC COMPOUNDS				
TOC	EPA (1986)	0.1%		
Pesticides				
Aldrin	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) (c)			0.004 µg/L
α-Chlordane	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) (c)			0.014 µg/L
trans-Nonachlor	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) (c)			0.014 µg/L
Dieldrin	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) (c)			0.002 µg/L

TABLE 2.1. (contd)

Analyte	Methods	Sediment Detection Limit[(a)]	Tissue Detection Limit[(b)]	Water Detection Limit
4,4'-DDT	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.012 µg/L
2,4'-DDT	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.020 µg/L
4,4'-DDD	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.011 µg/L
2,4'-DDD	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.020 µg/L
4,4'-DDE	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.004 µg/L
2,4'-DDE	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.020 µg/L
Endosulfan I	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.014 µg/L
Endosulfan II	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.004 µg/L
Endosulfan sulfate	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.010 µg/L
Heptachlor	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.003 µg/L
Heptachlor epoxide	EPA 8080 (sediment, tissue)	1.0 ng/g	0.4 ng/g	
	EPA 608 (water) [(c)]			0.100 µg/L
PESTICIDES (Required for Central Long Island Sound Disposal Testing)				
Endrin	EPA 8080	0.02 mg/kg		
Endrin aldehyde	EPA 8080	0.02 mg/kg		
α-Hexachlorocyclohexane	EPA 8080	0.02 mg/kg		
β-Hexachlorocyclohexane	EPA 8080	0.02 mg/kg		
δ-Hexachlorocyclohexane	EPA 8080	0.02 mg/kg		
γ-Hexachlorocyclohexane	EPA 8080	0.02 mg/kg		
Methoxychlor	EPA 8080	0.02 mg/kg		
Toxaphene	EPA 8080	0.02 mg/kg		

TABLE 2.1. (contd)

Analyte	Methods	Sediment Detection Limit[a]	Tissue Detection Limit[b]	Water Detection Limit
PCBs				
PCB 8	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 18	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 28	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 44	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 49	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 52	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 66	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 87	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 101	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 105	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 118	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 128	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 138	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 153	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 170	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 180	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 183	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 184	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 187	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 195	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 206	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PCB 209	NYSDEC (1992)[c]	1.0 ng/g	0.4 ng/g	0.0005 µg/L
PAHs				
Acenaphthene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Acenaphthylene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Anthracene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Fluorene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Naphthalene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Phenanthrene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Benzo[a]anthracene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Benzo[a]pyrene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Benzo[b]fluoranthene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Benzo[g,h,i]perylene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Benzo[k]fluoranthene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Chrysene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Dibenzo[a,h]anthracene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Fluoranthene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Indeno[1,2,3-cd]pyrene	EPA 8270[c]	10 ng/g	4.0 ng/g	
Pyrene	EPA 8270[c]	10 ng/g	4.0 ng/g	

TABLE 2.1. (contd)

Analyte	Methods	Sediment Detection Limit[a]	Tissue Detection Limit[b]	Water Detection Limit
PAHS (Required for Central Long Island Sound Disposal Testing)				
Biphenyl	EPA 8270[c]	0.02 µg/g		
2,6 dimethylnaphthalene	EPA 8270[c]	0.02 µg/g		
1-methylphenanthrene	EPA 8270[c]	0.02 µg/g		
1-methylnaphthalene	EPA 8270[c]	0.02 µg/g		
2-methylnaphthalene	EPA 8270[c]	0.02 µg/g		
Industrial Chemicals				
1,4-Dichlorobenzene	EPA 8270[c]	1 ng/g	0.4 ng/g [c]	
Lipids	Randall (1988)		0.1%	

(a) Detection limits are in dry weight for all sediment parameters except Hg and lipids.
(b) Detection limits are in wet weight for all organic and inorganic tissue parameters.
(c) Equivalent MSL standard operating procedures were substituted for the methods cited.

2.4.4 Metals

Preparation and analysis of water samples for Cd, Cr, Cu, Pb, Ni, Ag, and Zn were conducted according to MSL SOPs equivalent to EPA Methods 200.2 and 200.9 (EPA 1991). Samples were chelated with 2% ammonium pyrrolidinedithiocarbamate (APDC), precipitated out of solution, and filtered. The filter was digested in concentrated nitric acid, and the digestate was analyzed by graphite furnace atomic absorption (GFAA) spectroscopy for Cr and Zn, or by inductively coupled plasma/mass spectrometry (ICP/MS) for Cd, Cu, Pb, Ni, and Ag. Water samples were analyzed for Hg directly by cold vapor atomic fluorescence (CVAF) according to the method of Bloom and Crecelius (1983). This CVAF technique is based on emission of 254-nm radiation by excited elemental Hg atoms in an inert gas stream. Mercuric ions in an oxidized sample were reduced to elemental Hg with tin chloride ($SnCl_2$), then purged onto gold-coated sand traps to preconcentrate the Hg and remove interferences. Mercury vapor was thermally desorbed to a second "analytical" gold trap, and from that into the fluorescence cell. The amount of fluorescence (indicated by peak area) is proportional to the quantity of Hg collected, and was quantified using a standard curve as a function of the quantity of the sample purged.

Sediment samples for analysis of USACE-NYD metals, As, Cd, Cr, Cu, Pb, Ni, and Zn and the USACE-NED metals, Tl, Be, Se, and Sb, were prepared according to an MSL SOP equivalent to EPA Method 200.2 (EPA 1991). Solid samples were first freeze-dried and blended in a Spex mixer mill. A 0.2- to 0.5-g aliquot of dried homogeneous sample was then digested using peroxide and nitric acid. Samples were heated in sealed Teflon bombs overnight at approximately 130°C. Sediment samples were analyzed for As, Cd, Cr, Cu, Pb, Ni, Zn, Tl, Be, Se, and Sb using ICP/MS, following an MSL SOP based on EPA Method 200.8 (EPA 1991). Sediment samples were analyzed for Ag by GFAA according to an MSL SOP based on EPA Method 200.9 (EPA 1991). Sediments were analyzed for Hg by CVAA according to an MSL procedure for total Hg determination equivalent to EPA Method 245.5 (EPA 1991).

Sediment samples initially showed poor matrix spike recovery for Ag. (Refer to Appendix A, QA/QC Summary for analysis of metals in sediment.) EPA Method 200.2 was modified by the addition of aqua regia to the digestion procedure and all samples were reanalyzed for Ag. Matrix spike recoveries improved and concentrations of Ag in the dredging site sediments increased slightly. The low recovery of Ag appears to occur in analysis of marine sediment samples having high (in excess of approximately 5 μg/g) Ag concentrations. During the EPA Method 200.2 digestion procedure, a precipitate of AgCl can form with the Ag in the sediment and the Cl in the seawater. The sample reanalyses showed little change between the EPA Method 200.2 digestion and the aqua regia-modified digestion because the dredging site sediments tested had fairly low levels of Ag. (Most samples were approximately 0.1 μg/g to 3 μg/g, with a few as high as 9 μg/g.) However, the aqua regia modification resulted in improved recovery of Ag in the matrix spike samples that were spiked with higher concentrations of Ag (20 μg/g). The additional metals required by USACE-NED (Sb, Be, Se, and Tl) were also analyzed in the sample extracts obtained from the aqua regia-modified digestion procedure.

Tissue samples were prepared according to an MSL SOP based on EPA Method 200.3 (EPA 1991). Solid samples were freeze-dried and blended, and a 0.2- to 0.5-g aliquot of dried homogeneous sample was then digested in a microwave using nitric acid, hydrogen peroxide, and hydrochloric acid. Tissue samples were analyzed for As, Cd, Cr, Cu, Pb, Ni, Ag, and Zn using the ICP/MS method ([EPA Method 200.8 [EPA 1991]). Tissue samples were analyzed for Hg by CVAA following an MSL procedure equivalent to EPA Method 245.6 (EPA 1991).

2.4.5 Chlorinated Pesticides and PCBs

Water samples were prepared and analyzed for chlorinated pesticides and PCBs according to an MSL procedure equivalent to EPA Method 8080 (EPA 1990), and incorporating techniques developed by the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends "Mussel Watch" Program (NOAA 1993). Samples were extracted with methylene chloride. Extract volumes were reduced and solvent exchanged to hexane. The sample extracts underwent cleanup by alumina and silica column chromatography; further interferences were removed by an additional cleanup treatment using high-performance liquid chromatography (HPLC). Sample extracts were concentrated and analyzed using gas chromatography with electron capture detection (GC-ECD) using the internal standard technique.

Sediment and tissue samples for analysis of pesticides and PCBs required by both the USACE-NYD and USACE-NED guidance manuals were extracted and analyzed according to an MSL procedure similar to EPA Method 8080 for pesticides and the New York State Department of Environmental Conservation (NYSDEC) Congener-Specific Method 91-11 (NYSDEC 1992). The method also uses techniques from the NOAA Mussel Watch procedure. A 20- to 50-g sample of homogenized sediment or macerated tissue was first combined with sodium sulfate in a sample jar to remove water. Samples were extracted by adding successive portions of methylene chloride and agitating sample jars at ambient temperature using a roller technique. Extract volumes were reduced and solvent-exchanged to hexane, followed by Florisil column chromatography cleanup. Interferences were removed using HPLC cleanup; tissue sample extracts underwent an additional cleanup by gel permeation chromatography (GPC). Sample extracts were concentrated and analyzed using GC-ECD by the internal standard technique.

The concentration of total PCB in each matrix was estimated by taking the sum of the 22 congeners (x) and multiplying by two. The procedure for calculation of total PCBs was established in 1996 (Mario Del Vicario, Chief of the Marine and Wetlands Protection Branch, U.S. Environmental Protection Agency Region 2, Feb 14, 1996, letter to John F. Tavolaro, Chief Operations Support Branch, U.S. Army Corps of Engineers, New York District). One-half of the detection limit was used in summation when an analyte was undetected.

2.4.6 PAHs and 1,4-Dichlorobenzene

Sediment samples were prepared for the analysis of 16 PAHs and 1,4-dichlorobenzene (see Table 2.1), and an additional seven PAHs required by the USACE-NED guidance manual according to an MSL method based on the NOAA Mussel Watch procedure (NOAA 1993). A 20- to 50-g sample of homogenized sediment or macerated tissue was first combined with sodium sulfate in a sample jar to remove water. Samples were extracted by adding successive portions of methylene chloride and agitating sample jars at ambient temperature using an ambient shaker technique. Extract volumes were reduced and solvent-exchanged to hexane, followed by column chromatography cleanup. Interferences were removed using HPLC cleanup; tissue sample extracts underwent an additional cleanup by GPC. Sample extracts were concentrated and analyzed using gas chromatography with mass spectrometry (GC/MS) in the selective ion monitoring (SIM) mode.

2.4.7 Lipids

The lipid content of *M. nasuta* and *N. virens* was determined by the analysis of unexposed background tissue samples of each species. The lipid analysis procedure is a modification of the Bligh and Dyer (1959) method, which involves a chloroform extraction followed by gravimetric measurement of lipids. Randall (1988) modified the original Bligh and Dyer method to accommodate a smaller tissue sample size. Lipid analysis was performed in triplicate, once for each species. Lipid concentration is reported as a percentage of the sample wet weight.

2.5 Biological Testing Procedures

2.5.1 Water-Column Toxicity Tests

Water-column effects of open-water dredged-material disposal were evaluated by exposing three species of water-column organisms to the SPP of the Eastchester sediment composite. The three test species were juvenile *M. beryllina* (silverside) and *M. bahia* (mysid), and larval *M. galloprovincialis* (mussel). Total ammonia monitoring was not performed during water-column toxicity tests, but prior to test initiation total ammonia concentrations were measured for the 100% SPP concentration and are presented in Section 3.4.

2.5.1.1 Water-Column Toxicity Test with *Menidia beryllina*

Upon receipt, the *M. beryllina* were placed in a 10-gal glass aquarium and gradually acclimated from 27.5‰ seawater to 30.0‰ Sequim Bay seawater over a 24-h period. *M. beryllina* were received and held at 20°C±2°C prior to testing and were fed concentrated brine shrimp nauplii daily. During acclimation and holding, 2% to 3% mortality of the silversides was observed.

Test containers for the water-column toxicity test with silversides were 500-mL glass jars, labeled with sediment treatment code, concentration, position number, and replicate number. Five replicates of each concentration (0%, 10%, 50%, and 100%) were tested. The 300-mL test volume of SPP was placed in each of the five replicate test chambers. Each test chamber was then placed in a randomly assigned position on a water table at 20°C±2°C and allowed to equilibrate to test temperature for several hours. After the concentrations were prepared and placed on the water table, water quality parameters were measured and recorded for all replicates of all concentrations for each sediment treatment.

To initiate the test, *M. beryllina* were transferred from the holding tank to test chambers using a wide-bore pipet and small transfer cups. Ten individuals were introduced to each test chamber, creating a test population of 50 silversides per concentration for each treatment. Ten animals per test chamber were used, rather than the 20 animals per chamber as described in the Regional Guidance Manual, because it is not possible to make accurate daily observations of *M. beryllina* behavior when using 20 animals. Test initiation time and date were recorded. Following test initiation, water quality parameters were recorded in one replicate of each concentration daily. Because several treatments had DO levels lower than 40% saturation prior to test initiation, all test chambers were aerated to maintain consistency in handling DO concentration among test containers. Acceptable parameters for this test were as follows:

Temperature	20°C±2°C
DO	>40% saturation (>3.04 mg/L at 20°C, 30‰)
pH	7.8±0.5
Salinity	30.0‰±2.0‰.

The test was run under a 16-h light/8-h dark photoperiod, and silversides were fed brine shrimp nauplii daily during the test. Observations of the animals were performed at 2 h, 24 h, 48 h, and 72 h, and the number of live, dead, and missing organisms was recorded. At the end of the 96-h test period, water quality parameters were measured for all test chambers, and the number of live, dead, and missing silversides was recorded on termination forms. As a quality control check, a second observer confirmed surviving test organisms on at least 10% of the termination counts.

A 96-h, water-only, reference toxicant test was performed concurrently with the toxicity test with each population of *M. beryllina* to establish the health and expected response of the test organisms. The reference toxicant test was conducted in the same manner as the water-column toxicity test. *M. beryllina* were exposed to a seawater control plus four concentrations of copper sulfate: 16, 64, 160, and 400 µg/L copper, using three replicates of each concentration.

2.5.1.2 Water-Column Toxicity Test with *Mysidopsis bahia*

Upon receipt, the *M. bahia* were placed in a 10-gal aquarium and gradually acclimated from 28.0‰ seawater to 30‰ Sequim Bay seawater over a 24-h period. Mysids were received and held at 20°C±2°C until testing and were fed concentrated brine shrimp nauplii twice daily prior to testing. Mortality of the *M. bahia* during holding was less than 1%.

The water-column toxicity test with the mysid was performed in 200 mL of test solution in 400-mL jars, labeled with sediment treatment code, concentration, position number, and replicate number. Five replicates of each concentration were tested. Each of the test chambers received 200 mL of test solution, then was placed randomly in a recirculating water bath and allowed to equilibrate to test temperature for several hours. Prior to test initiation, water quality parameters were measured in each replicate of each sediment treatment concentration. Acceptable water quality parameters for this test were as follows:

Temperature	20°C±2°C
DO	>40% saturation (>3.04 mg/L at 20°C, 30‰)
pH	7.8±0.5
Salinity	30.0‰±2.0‰.

To initiate the test, *M. bahia* were transferred from the holding tank to test chambers using a wide-bore pipet via small transfer cups. Ten individuals were introduced to each test chamber, creating a test population of 50 mysids per concentration (200 mysids per treatment). Ten animals per test chamber were used, rather than the 20 animals per chamber as described in the Regional Guidance Manual, because it is not possible to make accurate daily observations of *M. bahia* behavior when using 20 animals. Test initiation time and date were documented on data forms. Observations of test organisms were performed at 4 h, 24 h, 48 h, and 72 h, using a fluorescent light table to enhance visibility of the *M. bahia.* After test initiation, water quality parameters were measured daily in one replicate concentration of all concentrations for each sediment treatment. During the 96-h exposure, *M. bahia* were fed <24-h-old brine shrimp twice daily. Excess food was removed daily with a small pipet, taking care not to disturb test animals. Molted exoskeletons and any particles from the SPP solutions were also removed.

Prior to test termination, water quality parameters were measured in all replicates. At 96 h, the number of live versus dead animals was recorded for each test container. An animal was considered dead if it did not respond to gentle probing. As a quality control check, a second observer confirmed surviving test organisms on at least 10% of the termination counts.

A 96-h, water-only, reference toxicant test was performed concurrently with the toxicity test with each batch of *M. bahia* to establish the health and expected response of the test organisms. The reference toxicant test was conducted in the same manner as the water-column toxicity test. *M. bahia* were exposed to a seawater control plus four concentrations of copper sulfate: 100, 150, 200, and 300 µg/L copper, using three replicates of each concentration.

2.5.1.3 Water-Column Toxicity Test with *Mytilus galloprovincialis* Larvae

Prior to testing, adult *M. galloprovincialis* were held in flowing, unfiltered Sequim Bay seawater at ambient temperatures for approximately 5 days.

Chambers for the bivalve larvae test were 500-mL glass jars labeled with sediment treatment code, concentration, position number, and replicate number. Dilutions of SPP from the sediment composites (0%, 10%, 50%, and 100%) were prepared with Mud Dump Site water in a 2000-mL graduated cylinder, then 300 mL of test solution was transferred into each test chamber. Test chambers were placed in random positions on a water table and allowed to equilibrate to test temperature for several hours. Initial water quality parameters were measured in all replicates once test chambers reached testing temperatures (16°C±2°C).

Spawning was induced by placing *M. galloprovincialis* into 15°C, filtered Sequim Bay seawater and rapidly raising the holding water temperature to 20°C. Spawning generally occurs within 1 h of temperature elevation; however, on the first day of spawning, gametes were shed after 3 h to 4 h. For this group of mussels, the water bath was changed when DO levels fell below 3.0 mg/L. When spawning began, males and females were identified and isolated in individual jars containing filtered Sequim Bay seawater and allowed to shed gametes for approximately 45 min. Eggs from each female were filtered through a 75-µm Nytex screen into separate jars to remove feces, detritus, and byssal fibers. Sperm from at least three males were pooled and 10 mL of sperm solution was then added to each of the egg stocks. Egg-sperm solutions were gently mixed every 10 min with a perforated plunger. Fertilization proceeded for 1 h, then fertilization rate (percentage of fertilized eggs) was determined by removing a subsample and observing the number of multicell-stage embryos. Fertilization was considered successful if greater than 90% of the embryos were in the multicell stage. Egg stocks with greater than 90% fertilization were combined and rinsed on a 20-µm Nytex screen to remove excess sperm. Stock embryo solution density was estimated by removing a 0.1-mL subsample and counting all multicell embryos, then multiplying by 10 to yield embryo density (embryos/mL). Stock solution was diluted or concentrated to yield 7500 to 9000 embryos/mL. The test was initiated by introducing 1 mL of stock solution into each test chamber, to produce embryo densities of 25 to 30 embryos/mL. Test initiation date and time were recorded on data sheets. Following initiation, 10-mL stocking-density subsamples were removed from each container and preserved in 5% formaldehyde to determine actual stocking density later.

Water quality parameters were measured in one replicate of each concentration per treatment daily throughout the test. Acceptable ranges for water quality parameters were as follows:

Temperature	16°C±2°C
DO	>60%- 100% saturation (4.93 - 8.21 mg/L at 16°C, 30‰)
pH	7.8±0.
Salinity	30.0‰±2.0‰.

Each chamber was provided with gentle aeration to maintain consistency in handling DO concentration among test containers. The bivalve test was terminated after 72 h when greater than 80% of the larvae in the controls had reached the D-cell stage. Final water quality parameters were recorded for all replicates. The contents of each chamber were then homogenized with a perforated plunger, and a 10-mL subsample was removed and placed into a 20-mL scintillation vial. The subsample was then fixed with 1 mL of 50% solution of formaldehyde in seawater. Samples were scored for the appearance of normal and abnormal D-shaped larvae, blastula larvae, and total number of larvae. At least 10% of the counts were confirmed by a second observer.

A 72-h reference toxicant test was conducted to establish the health and expected response of the test organisms. The reference toxicant test was set up and conducted in the same manner as the liquid-phase tests. *M. galloprovincialis* larvae were exposed to a filtered Sequim Bay seawater control plus copper sulfate concentrations of 1, 4, 16, and 64 µg/L copper, with three replicates per concentration.

2.5.2 Benthic Acute Toxicity Tests

Deposited sediment effects of open-water dredged material disposal were evaluated by benthic acute toxicity tests with three marine amphipod species, *A. abdita*, *R. abronius*, and *E. estuarius*, and the mysid *M. bahia.*

2.5.2.1 Static Renewal Tests with *Ampelisca abdita, Rhepoxynius abronius, and Eohaustorius estuarius*

Upon receipt, the *A. abdita* were placed in a tub of clean sand from their collection area and gradually acclimated with flowing Sequim Bay seawater from 28‰ to 30.5‰, over a period of 2 days. *A. abdita* were received at approximately 11°C and acclimated to 20°C±2°C over 4 days. They were held at 20°C±2°C for one day and were not fed prior to testing. The *R. abronius* were also placed in a tub of clean sand from their collection area and held under flowing seawater upon arrival at the laboratory. They were received and held at a salinity of 30‰±2‰ and a temperature of 15°C±2°C until testing. *R. abronius* were not fed during the 11-day holding period. *E. estuarius* were received at the laboratory at approximately 14°C and 13‰ salinity and acclimated to 15°C and 30.5‰ salinity over a period of 4 days. They were held in a tub of clean sand from their collection area and maintained under flowing seawater. Tests were initiated 11 days after *E. estuarius* receipt.

All amphipod static renewal tests were performed in 1-L glass jars modified for use as flow-through test chambers. The test chambers were fitted with funneled lids and screened outflow and overflow ports (Figure 2.1). The static-renewal system was turned on long enough to deliver the seawater at a rate of two chamber exchanges per day. Five replicates of COMPs EC-A and EC-B, Mud Dump Reference Site, Central Long Island Sound Reference Site, and native test animal control treatments were tested.

Concentrations of ammonia have been encountered in the pore water of sediment core samples from New York/New Jersey waterways at concentrations high enough to affect survival of amphipods in benthic toxicity tests (Barrows et al. 1996). Therefore, the amphipod tests were conducted according to the ammonia protocols issued by EPA and the USACE (EPA/USACE 1993). This guidance requires postponing test initiation (exposure of test animals) until pore water total ammonia concentrations are <30 mg/L for *A. abdita* and *R. abronius*, and <60 mg/L for *E. estuarius*. During this "purging" period, test chambers were set up and maintained under test conditions, and the overlying water was exchanged twice daily until the pore water ammonia concentrations reached the level appropriate for the particular amphipod. Pore water ammonia measurements were made on "dummy" containers that were set up and maintained in the same manner as the actual test containers but without animals added to them. The pore water was obtained by siphoning off the overlying water in the dummy jar and centrifuging the sediment in a

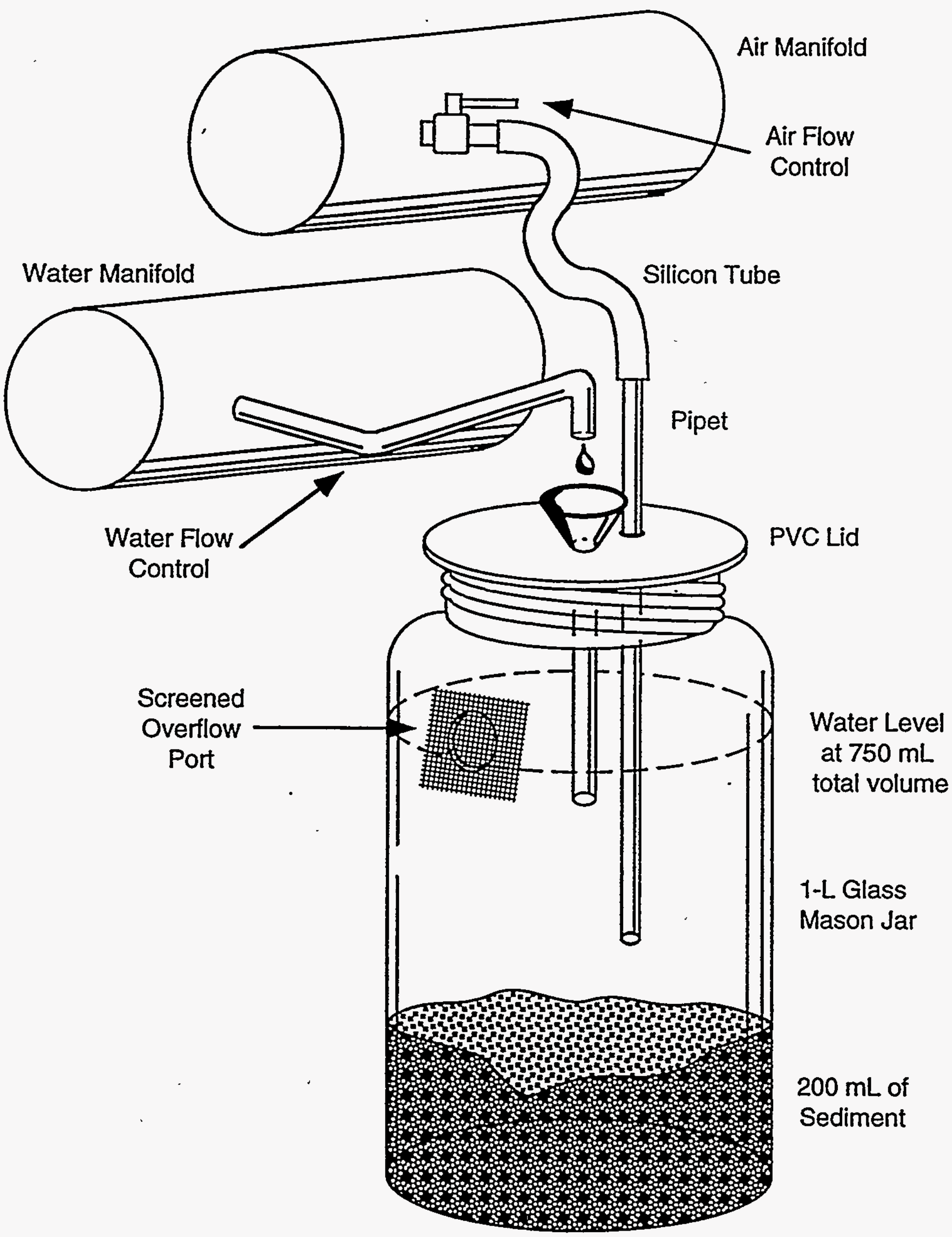

FIGURE 2.1. Testing Containers for Amphipod Static Renewal Toxicity Tests

Teflon jar for at least 20 min at a relative centrifugal force of approximately 1000 g. Salinity, temperature, and pH were also determined in the pore water samples.

The amphipod benthic toxicity tests were initiated by the addition of 20 organisms to each test chamber for a test population of 100 amphipods per sediment treatment. Amphipods were gently sieved from their native sediment in holding tanks and transferred to shallow baking dishes. For each test chamber, five animals were counted and transferred by pipet into each of four small, plastic cups. The organisms in each cup were recounted by a second analyst and the placed in the test chamber by dipping the cup below the surface of the water to release the amphipods.

Salinity, temperature, DO, and pH were measured in all replicates prior to test initiation, in at least one replicate per treatment daily, and in all replicates at test termination. Measurements of total ammonia levels in the overlying and pore water continued during testing. Overlying water ammonia was measured in all replicates prior to test initiation (Day 0), in at least one replicate per treatment daily, and in all replicates at test termination (Day 10). Pore water ammonia was measured on Day 0 and Day 10. Flow rates to each test chamber were calibrated once at the start on the renewal process. The water-system was turned on for 15 min twice a day. Test chambers were renewed for 9 days before testing and continued daily throughout the 10-day test. The following were the acceptable ranges for water quality during the amphipod tests:

	A. abdita	*R. abronius*	*E. estuarius*
Temperature	20°C±2°C	14°C±2°C	14°C±2°C
DO	>60% saturation	>60% saturation	>60% saturation
pH	7.8±0.5	7.8±0.5	7.8±0.5
Salinity	30‰±2‰	30‰±2‰	30‰±2‰
Ammonia	<30 mg/L	<30 mg/L	<60 mg/L
Renewal Rate	2 exchanges/day	2 exchanges/day	2 exchanges/day.

Gentle aeration was provided throughout the test, and the amphipods were not fed during testing. At the end of the 10-day period, the contents of each chamber were gently sieved through 0.5-mm mesh, and the number of live, dead, and missing amphipods was recorded on termination forms. An animal was considered dead if it did not respond to gentle probing. As a quality control check, a second observer confirmed surviving test organisms on at least 10% of the termination counts.

Reference toxicant tests with cadmium chloride were performed concurrently with each species. The reference toxicant tests were 96-h, water-only exposures that were otherwise conducted following the same procedures as for the static tests with sediment. *A. abdita* were exposed to nominal concentrations of 0, 0.25, 0.5, 1, and 2 mg/L cadmium. *R. abronius* were exposed to nominal concentrations of 0, 0.5, 1, 2, and 4 mg/L cadmium. *E. estuarius* were exposed to nominal concentrations of 0, 5, 10, 20, and 30 mg/L cadmium.

2.5.2.2 Static Test with *Mysidopsis bahia*

Upon receipt at the laboratory, *M. bahia* were placed in 10-gal aquaria and acclimated from 28‰ seawater to 30‰ with Sequim Bay seawater over a 24-h period. Mysids were received and held for 4 days at 20°C±2°C until testing and were fed concentrated brine shrimp nauplii twice daily prior to testing. Mortality of the *M. bahia* during holding was less than 1%.

The 10-day static benthic acute toxicity test with *M. bahia* was performed in 1-L glass jars. To prepare each test container, 200 mL of clean seawater was placed in each jar. Sediment was added until water was displaced up to the 400-mL mark, then seawater was added up to the 750-mL mark. Five replicates of each Eastchester composite, Mud Dump Reference Site sediment, Central Long Island Sound Reference Site, and control sediment (Sequim Bay sediment) were tested. The overlying water in the test chambers were renewed twice a day for 3 days, prior to test initiation. At the start of the test, the overlying water ammonia concentration was ≤9.78 mg/L in all test chambers. At the end of the test the overlying water ammonia concentration was ≤11.0 mg/L in all test chambers.

The mysid benthic toxicity test was initiated by the addition of 20 organisms to each test chamber for a test population of 100 mysids per sediment treatment. Mysids were transferred from holding tanks to shallow glass dishes. For each test chamber, five animals were counted and transferred by pipet into each of four small, plastic cups. The animals in each transfer cup were recounted by a second analyst. The animals were placed in the test chamber by dipping the cup below the surface of the water to release the mysids.

Salinity, temperature, DO, pH, and total ammonia in overlying water were measured in all replicates prior to test initiation, in at least one replicate per treatment daily, and in all replicates at test termination. The total ammonia concentrations in the overlying water were <20 mg/L in each test chamber. The following were the acceptable ranges for water quality parameters during the *M. bahia* benthic test:

Temperature	20°C±2°C
DO	>40% saturation
pH	7.8±0.5
Salinity	30‰ ± 2‰.

Gentle aeration was provided to all test chambers during the test to maintain consistency in handling DO concentration among test containers. At the end of the 10-day period, the contents of each chamber were gently sieved through 0.5-mm mesh, and the number of live and dead or missing mysids was recorded on termination forms. An animal was considered dead if it did not respond to gentle prodding. As a quality control check, a second observer confirmed surviving test organisms on at least 10% of the termination counts.

Because the same mysid population was used for the benthic test and the water-column test, one 96-h, water-only reference toxicant test with copper sulfate (0, 50, 100, 150, and 200 µg/L copper) was performed concurrently with these tests (see Section 2.5.1.2).

2.5.3 Bioaccumulation Testing

The bivalve *M. nasuta* and the polychaete *N. virens* were used to evaluate the potential bioaccumulation of contaminants from dredged material. The bioaccumulation tests were 28-day flow-through exposures to sediment followed by a 24-h depuration period that allowed the organisms to void their digestive tracts of sediment. *M. nasuta* and *N. virens* were tested in separate 10-gal flow-through aquaria. Animals were exposed to five replicates of COMPs EC-A and EC-B, Mud Dump Reference Site sediment, Central Long Island Reference Site sediment, and native control sediment. Each chamber contained 25 *M. nasuta* or 20 *N. virens.* Water quality parameters (temperature, DO, pH, and salinity) were measured in all replicates at test initiation, in at least one replicate per treatment daily, and in all replicates at test termination. Flow rates were measured daily in all chambers.

Upon receipt at the laboratory, *M. nasuta* were received damp and held in control sediment with flowing Sequim Bay seawater at 15°C±2°C until testing and were not fed. *N. virens* were placed in holding trays of control sediment with heated Sequim Bay seawater flowing into the trays. *N. virens* were received at 17°C and gradually acclimated to 20°C±2°C. *N. virens* were not fed prior to testing. Mortality of *M. nasuta* and N. *virens* during holding was less than 1%.

The Regional Guidance Manual provides an acceptable temperature range of 13°C±1°C for *M. nasuta*; however, laboratory logistics required that *M. nasuta* shared a 15°C flow-through water supply with *R. abronius.* This alteration of test temperature was not expected to affect the outcome of the test; bioaccumulation tests with *M. nasuta* have been conducted at 15°C±2°C successfully. After discussion with the USACE-NYD project manager, the following ranges for water quality parameters were established as acceptable for the *M. nasuta* and *N. virens* tests:

	M. nasuta	*N. virens*
Temperature	14°C±2°C	20°C±2°C
DO	> 60% saturation	> 60% saturation
pH	7.8±0.5	7.8±0.5
Salinity	30‰±2‰	30‰±2‰
Flow Rate	125±10 mL/min	125±10 mL/min.

Aeration was provided to all test chambers to maintain consistency in handling DO concentrations among test chambers. Water quality, organism behavior (e.g., burrowing activity, feeding) and organism mortality were recorded daily. Dead organisms were removed daily and at the end of the 28-day testing period, *M. nasuta* and *N. virens* were placed in clean, flowing seawater for 24 h, after which the tissues were transferred into the appropriate chemistry jars for metals, and organic compound analyses. All tissue samples were frozen immediately and stored at less than -20°C until analysis.

Static water-only reference toxicant tests (96-h) were also performed using copper sulfate in six geometrically increasing concentrations. The exposures were conducted using a test volume of 5 L in static 9.5-L (2.5-gal) aquaria. Three replicates of each concentration were tested, each containing 10 organisms. Water quality parameters were monitored at the same frequency and maintained within the same limits as the 28-day test, except that there were no flow rates. The *M. nasuta* reference toxicant test was conducted with treatments of 0, 0.25, 0.50, 0.75, 1.0, 1.5 and 2.5 mg/L copper; the *N. virens* test was conducted with treatments of 0, 0.05, 0.075, 0.15,0.20, 0.25, and 0.30 mg/L copper.

2.6 Data Analysis and Interpretation Procedures

Statistical analyses were conducted to determine the magnitude and significance of toxicity and bioaccumulation in test treatments relative to the reference treatment. Each statistical test was based on a random design that allowed unbiased comparison between treatments.

2.6.1 Randomization

All water-column and benthic toxicity tests were designed as completely random tests. Organisms were randomly allocated to treatments, and treatments were randomly positioned on water tables. To determine randomization, a random-number table was generated for each test using the discrete random-number generator in Microsoft *Excel* spreadsheet software.

2.6.2 Statistical Analysis of Water-Column Tests

Two statistical analyses are presented in the Green Book for the interpretation of SPP (water-column) tests. The first is a one-sided t-test between survival in control test replicates and survival in the 100% SPP test replicates. A significant difference indicates acute toxicity in the 100% SPP treatment. This analysis was performed only when survival in the 100% SPP is less than the control (0% SPP) survival, and when control survival is >90% for nonlarval tests and >70% for larval tests. Prior to conducting the t-test, angular transformation (arcsine of the square root) of the proportion surviving in test replicates was performed to reduce possible heterogeneity of variance between mean survival of test organisms in the control and in the 100% SPP. The second analysis required by the Green Book is estimation of the median lethal concentration (LC_{50}) or median effective concentration (EC_{50}). The LC_{50} or EC_{50} values for these tests were estimated using the trimmed Spearman-Karber method (Finney 1971) and are expressed in percentage of SPP. The Spearman-Karber estimator is appropriate only if there was increasing mortality (or effect) with increasing concentration, and if ≥50% mortality (or effect) was observed in at least one test concentration when normalized to control survival. If 50% mortality (or effect) did not occur in the 100% SPP concentrations for any treatments, then LC_{50} or EC_{50} values were reported as >100% SPP.

2.6.3 Statistical Analysis of Benthic Toxicity Tests

Benthic toxicity of all sediment treatments was compared to a single reference treatment using Dunnett's test (Dunnett 1964). The arcsine square root of the proportion of organisms surviving the test was used to stabilize the within-class variances. As recommended by the Green Book an experiment-wise error α=0.05 was used. Acute toxicity for the amphipod test was indicated when a test treatment was statistically significant relative to the reference treatment and had a greater than 20% difference in survival from the reference treatment. Acute toxicity for the mysid test was indicated when a test treatment was statistically significant relative to the reference treatment and had a greater than 10% difference in survival from the reference treatment.

2.6.4 Statistical Analysis of Bioaccumulation

The results of the chemical analyses of test organism tissues exposed to the dredged sediment treatments was statistically compared with those tissues similarly exposed to the Mud Dump and Central Long Island Sound Reference Site treatments using Dunnett's test with an experiment-wise error of α=0.05. The Dunnett's tests determined whether or not the concentrations of contaminants of concern in the organisms exposed to the dredged sediments statistically exceeded those of organisms exposed to the reference sediment.

Statistical analyses were performed on the dry weight concentrations. When a compound (metals, pesticides, PCBs, and PAHs) was undetected (indicated by a "Q" flag in the report tables and a "U" flag in the appendix tables), one-half the detection limit of a compound was used in numerical calculations. If the compound was undetected in all five replicates of a test treatment, or if the mean concentration of a compound was greater in tissue samples from the reference treatment than in tissue samples from the test treatments, no further analysis was necessary. If a compound was undetected in all five replicates of the reference treatment, a one-sided, one-sample t-test (α=0.05) was used to determine whether the tissue concentrations from organisms exposed to dredged sediment treatments were statistically greater than the mean detection limit for that compound in the reference tissue. Results of background and control tissues were not statistically compared with the reference. In addition to statistical comparisons, magnification factors, or ratio of mean concentration in organisms exposed to a dredged sediment treatment to the mean concentration in organisms exposed to a reference treatment (on a dry weight basis), were calculated. Whole detection limits were used for non-detects in this calculation.

2.7 Quality Assurance/Quality Control Procedures

The quality assurance/quality control (QA/QC) procedures for the Red Hook/Bay Ridge project were consistent with the Regional Guidance Manual and the Green Book, and were documented in the Work/Quality Assurance Project Plan, *Evaluation of Dredged Material Proposed for Ocean Disposal from Federal Projects in New York*, prepared by the MSL and submitted to the USACE-NYD for this program. This document describes all QA/QC procedures that were followed for sample collection, sample tracking and storage, and physical/chemical analyses. A member of Pacific Northwest National Laboratory's quality engineering staff was present throughout all phases of this program to observe procedures, review and audit data, and ensure that accepted protocols were followed. Data accumulation notebooks were assigned to each portion of these studies and served as records of day-to-day project activities.

3.0 Results

This section presents results of sample collection and processing, and physical and chemical analyses conducted on sediment samples collected from the proposed Eastchester dredging area.

3.1 Sample Collection and Processing

Sediment core samples were collected from the Eastchester project area on March 9 and 10, 1994 (Figure 1.1). The lower portion of Reach A was surrounded by marshes, woods, and undeveloped open land. The upper Reach A and lower portion of Reach B (between Hutchinson River Parkway and the New England Thruway overpasses) was bordered on the east side by tidal mud flats and marshes, which are adjacent to the Hutchinson River Parkway. Upper Reach A and lower Reach B on the upstream west side is more urbanized. Further upstream, beyond the New England Thruway, the channel became more narrow and the area was more industrialized. The bottom sediment was difficult to sample and hard-packed in the vicinity of concrete, gravel, and metal handling facilities.

Table 3.1 lists each sampling station within the Eastchester project area, sampling coordinates, collection date, length of core required for testing (including 2 ft of overdepth), and length of core actually collected. All samples were collected aboard the *Gelberman*. Eighteen core samples were collected (a core sample could not be successfully taken at Station EC-16). Three of the Eastchester core samples were collected to project depth (-10 ft MLW) plus 2 ft of overdepth. All of the remaining 15 cores were collected to within a few inches of project depth (or more, without a full 2-ft overdepth) except three (EC-10, EC-13, and EC 18). Cores at EC-10, EC-13, and EC-18 ranged form 0.7 ft to 2.3 ft short of project depth.

Upon delivery of the sediment core samples to the MSL on March 18, 1994, samples were prepared for the physical and chemical analyses according to the procedures described in Section 2. Individual sediment core samples were analyzed for grain size, moisture content, and TOC. Two composited sediment core samples representing Reaches A and B of the Eastchester project area (COMP EC-A and COMP EC-B) were analyzed for bulk density, specific gravity, metals, chlorinated pesticides, PCBs, PAHs, and 1,4-dichlorobenzene. Reach A consisted of stations EC-1 through EC-9, plus EC-18 and EC-19. Reach B consisted of stations EC-10 through EC-17. An additional set of 11 composite samples was requested by the USACE-NED. These 11 samples, designated CT COMPS, were analyzed for metals, chlorinated pesticides, PCBs, PAHs, and 1,4-dichlorobenzene. The CT COMPs were compared with the Central Long Island Sound Reference Site only. Table 3.2 shows the compositing scheme for the CT COMPS.

TABLE 3.1. Summary of Sediment Sample Data for Eastchester Project Area

Station	Collection Date	Station Coordinates Latitude N	Longitude W	Core Length Required (ft)	Core Length Collected (ft)	Depth (-ft MLW)
Eastchester Reach A, Core Samples						
EC-1	3/10/94	40° 51.59' N	73° 48.65' W	6.1	4.7	5.9
EC-2	3/10/94	40° 51.72' N	73° 48.82' W	3.8	1.9	8.2
EC-3	3/10/94	40° 51.78' N	73° 49.01' W	3.3	1.0	8.7
EC-4	3/10/94	40° 51.96' N	73° 49.14' W	5.0	3.5	7.0
EC-5	3/10/94	40° 52.06' N	73° 49.21' W	6.8	5.8	5.2
EC-6	3/10/94	40° 52.12' N	73° 49.26' W	5.3	5.3	6.7
EC-7	3/10/94	40° 52.19' N	73° 49.32' W	3.5	1.8	8.5
EC-8	3/09/94	40° 52.45' N	73° 49.40' W	3.8	3.8	8.2
EC-9	3/09/94	40° 52.52' N	73° 49.33' W	3.5	3.3	8.5
EC-18	3/10/94	40° 52.21' N	73° 49.39' W	6.5	3.0	5.5
EC-19	3/10/94	40° 51.84' N	73° 49.15' W	3.7	2.8	8.3
Eastchester Reach B, Core Samples						
EC-10	3/09/94	40° 52.72' N	73° 49.27' W	4.4	1.7	7.6
EC-11	3/09/94	40° 52.81' N	73° 49.27' W	4.6	2.8	7.4
EC-12	3/09/94	40° 52.91' N	73° 49.25' W	4.0	3.0	8.0
EC-13	3/09/94	40° 53.10' N	73° 49.23' W	7.5	3.2	4.5
EC-14	3/09/94	40° 53.18' N	73° 49.23' W	8.6	6.5	3.4
EC-15	3/09/94	40° 53.25' N	73° 49.43' W	5.8	4.2	6.2
EC-16	3/09/94	40° 53.40' N	73° 49.42' W	3.0	NC[(a)]	NA[(b)]
EC-17	3/09/94	40° 53.61' N	73° 49.35' W	5.4	6.3	6.6
Reference Sites, Grab Samples						
MDRS[(c)]	3/13/94	40° 20.19' N	73° 52.20' W	NA	NA	67[(d)]
MDRS	3/13/94	40° 20.21' N	73° 52.19' W	NA	NA	65
MDRS	3/13/94	40° 20.22' N	73° 52.19' W	NA	NA	66
MDRS	3/13/94	40° 20.22' N	73° 52.19' W	NA	NA	66
MDRS	3/13/94	40° 20.21' N	73° 52.23' W	NA	NA	65
MDRS	3/13/94	40° 20.21' N	73° 52.23' W	NA	NA	64
MDRS	3/13/94	40° 20.22' N	73° 52.23' W	NA	NA	66
MDRS	3/13/94	40° 20.21' N	73° 52.24' W	NA	NA	66
MDRS	3/13/94	NR[(e)]	NR	NA	NA	66
MDRS	3/13/94	NR	NR	NA	NA	66
MDRS	3/13/94	NR	NR	NA	NA	NR
MDRS	3/13/94	NR	NR	NA	NA	NR
CLIS	3/7/94	NR	NR	NA	NA	NR

(a) NC No core collected (metal and concrete debris and hard bottom at all EC-16 locations attempted)
(b) MDRS Mud Dump Reference Site.
(c) NA Not applicable.
(d) MDRS depth is depth in ft at time of sampling.
(e) NR Data not recorded during sample collection.

TABLE 3.2. Eastchester Composite Scheme for USACE, New England Division

Reach	Composite Number	Station Number
Reach A	CT COMP EC-A-I	Station EC-1
	CT COMP EC-A-II	Station EC-2 Station EC-3
	CT COMP EC-A-III	Station EC-4
	CT COMP EC-A-IV	Station EC-5 Station EC-6 Station EC-7 Station EC-18 Station EC-19
	CT COMP EC-A-V	Station EC-8 Station EC-9
Reach B	CT COMP EC-B-I	Station EC-10
	CT COMP EC-B-II	Station EC-11
	CT COMP EC-B-III	Station EC-12
	CT COMP EC-B-IV	Station EC-13 Station EC-14
	CT COMP EC-B-V	Station EC-15
	CT COMP EC-B-VI	Station EC-17

3.2 Physical and Chemical Analyses

3.2.1 Sediment Core Sample Description

Table 3.3 lists physical characteristics of each sediment core sample that was examined. Eastchester sediment samples were generally black or gray-black, silty-clayey material.

Table 3.3. Eastchester Sediment Core Descriptions

Station	Depth (-ft MLW) Core Top	Core Bottom	Project Depth[(a)]	Description of Observations
EC-1	5.9	10.5	12.0	Uniform slippery, gray-black, silty-clayey material with three, 3-5" bands of shell hash at ~7.5', 9', and 10'.
EC-2	8.2	10.1	12.0	Uniform, grayish silty/clayey material with flecks of shell hash interspersed though core sample.
EC-3	8.8	9.8	12.0	Uniform, grayish silty/clayey material with flecks of shell hash interspersed though core sample.
EC-4	7.0	10.5	12.0	Dark gray slippery, silty material followed by 3-5" band of shell hash; then ~1' of lighter gray, sandier material with patches of dark gray silty material; lower 1' was lighter gray, clayey material.
EC-5	5.2	11.0	12.0	Black, slippery, silty material followed by 4" layer of shell hash; then ~1.5' layer of black, slippery, silty/clayey material followed by 4" layer of gray sand; lower ~1' was gray clay.
EC-6	6.7	11.0	12.0	Black, slippery, silty/clayey material followed by 3-4" layer with shell hash interspersed through core; lower ~1' - lighter gray clayey material.
EC-7	8.5	10.3	12.0	Grayish-black, slippery, silty/clayey material with flecks of shell hash interspersed though core sample; some sandier material at lower end of core.
EC-8	8.2	12.0	12.0	Uniform black, slippery, silty/clayey material.
EC-9	8.5	11.8	12.0	Black, slippery, silty/clayey material; slightly lighter (more gray in color) and more clayey at lower end of core.
EC-10	7.6	9.3	12.0	Grayish-black, slippery, silty/clayey material.
EC-11	7.4	10.2	12.0	Uniform grayish-black, slippery, silty/clayey material
EC-12	8.0	11.0	12.0	Uniform dark black, slippery, silty material.
EC-13	4.5	7.7	12.0	Uniform dark black, slippery, silty material.
EC-14	3.4	9.9	12.0	Uniform dark black, soupy silty material; lower 3.5' was more dense, slippery material.
EC-15	6.2	10.0	12.0	Uniform dark black, silty material, grayish clay at lower 0.5'.
EC-17	6.6	12.9	12.0	Black, silty/clayey material; sand/gravel in lower ~1.5'.
EC-18	5.5	8.5	12.0	Black, slippery, silty/clayey material with shell hash at 6.5'; gray clay in lower 0.5'.
EC-19	8.3	11.1	12.0	Black slippery, silty/clayey material with 1" band of shell hash at ~9.6', 2" band of sand at ~10.5'.

(a) -10 ft MLW plus 2 ft overdepth.

3.2.2 Grain Size, Percentage of Moisture, Bulk Density, Specific Gravity, and Total Organic Carbon

Table 3.4 shows the results of the analysis of individual Eastchester core samples for grain size, percentage of moisture, and TOC. A quality control sample summary and associated quality control data for grain size and TOC measurements are provided in Appendix A.

The physical characteristics of Eastchester sediments were variable; 7 stations were predominantly sand and gravel (EC-1, EC-2, EC-3, EC-6, EC-7, EC-15, and EC-17), whereas the remaining 11 stations were predominantly silt and clay. Each reach contained at least one station that was dominated by coarser grain-size fractions. Percentages of gravel ranged from 0% to 31%; sand ranged from 11% to 69%; silt ranged from 5% to 53%; and clay ranged from 7% to 44%. Each sediment sample (station) was well represented (at least 7%) by three or more grain-size fractions. The Mud Dump Reference Site sediment was composed of 98% sand. The Central Long Island Sound Reference Site sediment was 60% silt and 34% clay. Neither reference site contained a broad representation of at least three grain size fractions, as was found in most Eastchester samples.

Bulk density and specific gravity were also measured on the Eastchester composites. The bulk density values for COMP EC-A, reported in both wet and dry weight, were 102 lb/ft^3 and 60 lb/ft^3 respectively. The bulk density values for COMP EC-B, also reported in both wet and dry weight, were 90 lb/ft^3 and 42 lb/ft^3 respectively. Specific gravity values for COMPs EC-A and EC-B were 2.66 and 2.49, respectively.

With a few exceptions, TOC was below 2.0% in sediment from Reach A and above 4.0% in sediment from Reach B. The moisture content ranged from 25% to 65% in Eastchester sediments. In general, sediment samples from Reach A had lower moisture content and lower TOC than sediment from Reach B. TOC was 0.01% in the Mud Dump Reference sediment and 1.64% in the Central Long Island Sound Reference sediment (1.64% TOC).

3.2.3 Metals

Table 3.5 shows the results of the metals analysis of sediment samples from COMPs EC-A and EC-B; the Mud Dump and Central Long Island Sound Reference Sites; and CT composites created for USACE-NED. A quality control sample summary and quality control data associated with the metals analysis are provided in Appendix A.

Levels of all nine metals in COMPs EC-A and EC-B sediments exceeded those found in the Mud Dump Reference Site sediment. Concentrations of Ag, Cd, Cu, Ni, Pb, and Zn were at least an order of magnitude higher in both COMPs EC-A and EC-B than in the reference

TABLE 3.4. Results of Analysis of Eastchester Sediment Samples for Grain Size, Percentage of Moisture, and Total Organic Carbon

	Total Percent (dry weight)					
Station	Gravel >2000 µm	Sand 62.5-2000 µm	Silt 3.9-62.5 µm	Clay <3.9 µm	Moisture (% wet weight)	TOC (% dry weight)
Reach A						
EC-1	14	47	19	20	40	2.20
EC-2	5	60	16	19	34	1.08[a]
EC-3	19	69	5	7	25	1.27[b]
EC-4	1	48	40	11	30	0.55
EC-5	1	46	37	16	36	1.19
EC-6	15	49	20	16	34	1.72
EC-7	19	53	16	12	37	1.38
EC-8[c]	0	21	39	40	60	3.51
EC-9	0	11	45	44	65	4.26
EC-18	3	24	53	20	45	1.54[a]
EC-19	6	40	28	26	47	1.90
Reach B						
EC-10	1	31	35	33	52	3.70
EC-11	0	24	41	35	64	4.42
EC-12	1	30	39	30	63	4.92
EC-13	1	16	47	36	60	6.20
EC-14	0	20	46	34	63	5.95
EC-15	8	58	24	10	42	2.87
EC-17	31	45	15	9	41	6.09[a]
MDRS[d]	1	98	0	1	16	0.01
CLIS[e]	0	6	60	34	52	1.64

(a) Mean of two replicate analyses.
(b) Mean of three replicate analyses.
(c) Grain size data from EC-8 are a mean of three replicate analyses.
(d) MDRS - Mud Dump Reference Site.
(e) CLIS - Central Long Island Sound Reference Site.

sediment. Mercury levels were approximately two to three orders of magnitude greater in Eastchester composites than in the Mud Dump Reference Site sediment. Overall metals concentrations in COMP EC-B exceeded those of COMP EC-A by 1.3 (Ni) to 3.4 (Pb) times.

CT COMPs prepared for USACE-NED contained a broader range of metals contamination than COMPs EC-A and EC-B. CT COMPs EC-A-II and EC-A-III had metals concentrations equal to or less than Central Long Island Sound sediment. CT COMP EC-A-I had metals concentrations similar to or slightly higher (greater by a factor of < 2.3) than Central Long Island

TABLE 3.5. Results of Analysis of Eastchester Sediment Samples for Metals

Sediment	Metals (mg/kg dry weight)												
Treatment	Ag[a]	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Be[a]	Sb[a]	Se[a]	Tl[a]
COMP EC-A	1.48	5.87	1.52	63.8	85.6	0.470	40.5	113	144	NA	NA	NA	NA
COMP EC-B	2.60	8.62	4.94	87.9	233	1.27	51.4	382	420	NA	NA	NA	NA
MDRS[b]	0.062	5.64	0.085	10.0	1.90	0.006	3.10	6.50	14.1	NA	NA	NA	NA
CLIS[c]	0.689	7.01	0.523	58.3	46.0	0.202	27.2	43.0	116	NA	NA	NA	NA
CT COMP EC-A-I	1.13	6.56	1.18	43.4	56.3	0.401	23.0	67.1	108	0.691	0.404	0.89	0.331
CT COMP EC-A-II[d]	0.328	2.72	0.377	21.8	21.0	0.103	16.3	24.1	36.9	0.433 J	0.080	0.28	0.144
CT COMP EC-A-III	0.552	2.84	0.690	40.3	43.0	0.164	24.5	43.8	79.7	0.597	0.18	0.41	0.276
CT COMP EC-A-IV	1.31	5.36	1.31	65.4	81.1	0.414	55.7	111	143	0.517	0.487	0.63	0.282
CT COMP EC-A-V	3.20	13.0	3.89	112	209	1.30	45.7	282	333	1.04	1.24	1.02	0.502
CT COMP EC-B-I	3.65	11.9	4.57	108	242	1.45	46.6	337	362	0.945	1.69	0.84	0.519
CT COMP EC-B-II	3.38	11.1	4.15	104	250	1.21	44.1	322	379	0.939	1.49	0.81	0.436
CT COMP EC-B-III	3.13	12.6	5.06	102	238	1.26	47.7	484	560	0.794	4.81	0.84	0.405
CT COMP EC-B-IV	4.15	12.5	7.50	128	332	1.75	59.4	581	603	0.875	3.09	1.18	0.466
CT COMP EC-B-V	1.32	5.36	3.12	64.3	185	0.878	67.2	297	352	0.602	1.74	0.56	0.306
CT COMP EC-B-VI	2.86	6.01	6.16	56.3	139	0.766	32.0	335	346	0.560	1.62	0.76	0.233

(a) Selected metals were analyzed only in the USACE-NED composites; NA not applicable to NYD composites.
(b) MDRS - Mud Dump Reference Site.
(c) CLIS - Central Long Island Site.
(d) Metals concentrations are a mean of three replicate analyses.

Sound sediment. In comparison with Central Long Island Sound sediment, CT COMP EC-A-IV had higher concentrations of all metals analyzed except As. CT COMP EC-A-V had the highest metals concentrations of the composites from Reach A. All metals in CT COMP EC-A-V sediment were measured at higher concentrations than in Central Long Island Sound sediment. The greatest differences were found with Ag, Cd, Cu, Hg, and Pb, which were higher in CT COMP EC-A-V than Central Long Island Sound sediment by factors ranging from 4.5 (Cu) to 7.4 (Cd). Sediment metals concentrations were generally higher in stations from Reach B than Reach A. From Reach B, the lowest metals concentrations were generally found in the sandiest of the Reach B sites, CT COMPs EC-B-V and EC-B-VI. These two composites had metals concentrations greater than Central Long Island Sound reference sediment by factors of less than 4.5 for all metals except Cd and Pb, which were greater by factors ranging from 6.0 (Cd in CT COMP EC-B-V) to 14.3 (Cd in CT COMP EC-B-IV).

3.2.4 Chlorinated Pesticides and PCBs

Table 3.6 shows the results of the analysis of Eastchester and Mud Dump Reference Site sediments for chlorinated pesticides. Tables 3.7 and 3.8 show results of chlorinated pesticide analysis of USACE-NED, sediment composites from Reach A and Reach B, respectively, and the Central Long Island Sound reference. A quality control sample summary and associated quality control data are provided in Appendix A.

The COMPs EC-A and EC-B sediment contained concentrations of pesticides that were elevated over those found in the Mud Dump Reference site sediment. The dominant pesticides found in both COMP EC-A and COMP EC-B were the DDT family of compounds (49.8 µg/kg and 196 µg/kg total DDTs, respectively), followed by α-chlordane, dieldrin, and *trans*-nonachlor. In general, COMP EC-B had higher concentrations of chlorinated pesticides than COMP EC-A, particularly for the DDT family of compounds, α-chlordane, and *trans*-nonachlor. Endosulfan I and 2,4'-DDE coeluted in the primary GC analysis of these samples, but examination of the confirmatory analysis using a second GC column revealed that neither compound was detected. The value shown is the detection limit for 2,4'-DDE. Pesticides were either undetected or detected at concentrations near or below the target detection limit (1.0 µg/kg) in sediment from the Mud Dump Reference Site.

In the CT COMPs prepared for USACE-NED, concentrations of chlorinated pesticides were higher in Reach B than in Reach A, with the exception of CT COMP EC-A-V. In Reach A sediments, the DDT family of compounds, α-chlordane (in CT COMPs EC-A-IV and EC-A-V only) and *trans*-nonachlor (in CT COMP EC-A-V only) were the only chlorinated pesticides found above the detection limit. Total DDT was estimated at concentrations at least three times higher (CT COMP EC-A-II) and up to twenty-two times higher (CT COMP EC-A-V) than in Central Long Island Sound sediment. Pesticides were either undetected or detected at

TABLE 3.6. Results of Analysis of Eastchester Sediment for Chlorinated Pesticides and PCBs

Analyte	Concentration in µg/kg dry weight COMP EC-A	COMP EC-B	MDRS(a)
2,4'-DDD	10.0	28.7	0.0109 J(b)
2,4'-DDT	0.89 U(c)	6.31	0.604 U
4,4'-DDD	19.1	118	0.0604 J
4,4'-DDE	16.5	33.63	0.0132 J
4,4'-DDT	5.10 U	7.20	3.45 U
Total DDT(d)	**49.8**	**196**	**2.91**
Aldrin	0.86 U	1.06 U	0.579 U
α-Chlordane	3.66	40.6	0.00670 J
Dieldrin	4.37	10.2	0.215 J
Endosulfan I /2,4'-DDE(e)	2.35 U	2.90 U	1.59 U
Endosulfan II	4.54	2.16 U	0.0450 J
Endosulfan sulfate	0.68 J	2.04 U	1.12 U
Heptachlor	1.92 U	2.37 U	1.30 U
Heptachlor epoxide	1.07 U	1.32 U	0.721 U
trans-Nonachlor	1.90	25.0	0.00417 J
PCB 8	2.40 J(b)	14.6	2.91 U(c)
PCB 18	7.23	40.7	1.85 U
PCB 28	13.1	51.9	1.21 U
PCB 44	11.5	47.0	0.22 J
PCB 49	10.4	42.4	0.04 J
PCB 52	13.7	66.1	0.06 J
PCB 66	18.4	162	0.04 J
PCB 87	4.69	14.3	0.05 J
PCB 101	10.6	45.9	0.04 J
PCB 105	3.97	12.7	0.03 J
PCB 118	9.21	33.2	0.02 J
PCB 128	2.68	20.7	0.92 U
PCB 138	8.83	47.9	0.07 J
PCB 153	6.50	32.8	0.03 J
PCB 170	3.78	28.7	0.97 U
PCB 180	5.63	32.1	0.65 U
PCB 183	1.31	6.01	0.72 U
PCB 184	0.29 J	1.68	0.01 J
PCB 187	2.81	14.7	0.01 J
PCB 195	0.79 J	6.80	0.83 U
PCB 206	2.53	10.9	1.26 U
PCB 209	3.02	10.3	0.79 U
Total PCB(f)	**287**	**1490**	**13.4**

(a) MDRS - Mud Dump Reference Site.
(b) J Analyte detected is below established method detection limit (MDL).
(c) U Undetected at or above the given concentration.
(d) Sum of 2,4'-DDD, endosulfan I/2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT; one-half of the detection limit used in summation when analyte was undetected.
(e) Endosulfan I and 2,4'-DDE coelute; both compounds were undetected; value shown is the detection limit for 2,4'-DDE.
(f) Total PCB = 2.0(x), where x= sum of all PCB congeners; one-half of the detection limit used in summation when analyte was undetected.

TABLE 3.7. Results of Analysis of USACE, New England Division, Eastchester Reach A Sediment Composite Samples for Chlorinated Pesticides

	Concentration in µg/kg dry weight					
Analyte	CT COMP EC-A-1	CT COMP EC-A-II	CT COMP EC-A-III	CT COMP EC-A-IV	CT COMP EC-A-V	CLIS(a)
2,4'-DDD	2.26	2.03	2.11	6.95	14.86	1.14 U(b)
2,4'-DDT	0.92 U	0.71 U	0.77 U	0.84 U	1.19 U	1.07 U
4,4'-DDD	5.10	4.40	5.85	16.95	46.70	0.57 J(c)
4,4'-DDE	5.53	4.24	6.35	16.88	35.69	1.04 J
4,4'-DDT	5.28 U	4.08 U	4.38 U	1.78 J	3.41 J	0.53 J
Total DDT(d)	**17.2**	**14.0**	**17.9**	**43.4**	**102.8**	**4.65**
Aldrin	0.89 U	0.69 U	0.74 U	0.80 U	1.14 U	1.02 U
α-Chlordane	0.64 J	0.34 J	0.71 J	2.91	13.95	1.49 U
Dieldrin	0.86 J	0.83 J	0.68 J	3.08	9.16	0.78 J
Endosulfan I /2,4'-DDE(e)	2.43 U	1.88 U	2.02 U	0.45 J	3.14 U	2.80 U
Endosulfan II	1.81 U	1.40 U	1.50 U	1.64 U	2.34 U	2.09 U
Endosulfan sulfate	1.71 U	1.32 U	1.42 U	1.55 U	2.21 U	1.98 U
Endrin(f)	3.29 U	2.55 U	2.73 U	2.98 U	4.25 U	3.80 U
Endrin aldehyde(f)	1.97 U	1.52 U	1.63 U	1.78 U	2.54 U	2.27 U
Heptachlor	1.99 U	1.54 U	1.65 U	1.80 U	2.57 U	2.30 U
Heptachlor epoxide	1.10 U	0.85 U	0.92 U	1.00 U	1.42 U	1.27 U
α-BHC(f)	1.23 U	0.95 U	1.02 U	1.11 U	1.58 U	1.42 U
β-BHC(f)	1.81 U	1.40 U	1.51 U	1.64 U	2.34 U	2.09 U
δ-BHC(f)	1.65 U	1.27 U	1.37 U	1.49 U	2.13 U	1.90 U
Lindane(f)	0.75 J	1.11 U	0.27 J	1.30 U	1.86 U	0.89 J
Methoxychlor(f)	2.06 U	1.59 U	1.71 U	1.87 U	2.66 U	2.38 U
Toxaphene(f)	62.43 U	48.29 U	51.82 U	56.53 U	80.57 U	72.07 U
trans-Nonachlor	0.11 J	0.22 J	0.27 J	1.51 J	6.51	2.19 U

(a) CLIS - Central Long Island Sound reference site.
(b) U Undetected at or above the given concentration.
(c) J Analyte detected is below established method detection limit (MDL).
(d) Sum of 2,4'-DDD, endosulfan I/2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT; one-half of the detection limit used in summation when analyte was undetected.
(e) Endosulfan I and 2,4'-DDE coelute; both compounds were undetected; value shown is the detection limit for 2,4'-DDE.
(f) Analyte required only in samples designated for Central Long Island Disposal Testing Site.

concentrations near or below the target detection limit (1.0 µg/kg) in Central Long Island Sound Reference sediment. In Reach B sediments, the DDT family of compounds, α-chlordane, dieldrin, and *trans*-nonachlor were detected in all CT COMPs and were the only chlorinated pesticides found above the detection limit. CT COMPs EC-B-III and EC-B-IV had the highest concentrations of chlorinated pesticides. In all Reach B CT COMPs, total DDT was estimated at concentrations one to three orders of magnitude greater than in Central Long Island Sound reference sediment.

TABLE 3.8. Results of Analysis of USACE, New England Division, Eastchester Reach B Sediment Composite Samples for Chlorinated Pesticides

Analyte	CT COMP EC-B-I	CT COMP EC-B-II	CT COMP EC-B-III	CT COMP EC-B-IV	CT COMP EC-B-V (a)	CT COMP EC-B-VI	CLIS (b)
	Concentration in µg/kg dry weight						
2,4'-DDD	16.6	12.5	30.9	29.0	11.3	27.84	1.14 U(c)
2,4'-DDT	1.23 U	1.47 U	1.36 U	5.53	0.86 U	0.92 U	1.07 U
4,4'-DDD	53.3	50.3	125	118	43.8	103	0.57 J(d)
4,4'-DDE	38.6	30.4	43.9	49.0	12.1	22.7	1.04 J
4,4'-DDT	2.19 J	4.17 J	10.2	13.67	3.06 J	7.14	0.53 J
Total DDT(e)	**113**	**100**	**213**	**217**	**71.9**	**162**	**4.65**
Aldrin	1.18 U	1.41 U	1.30 U	1.32 U	0.83 U	0.88 U	1.02 U
α-Chlordane	14.5	18.9	35.5	52.7	21.4	47.2	1.49 U
Dieldrin	8.52	8.07	18.1	17.8	6.96	8.87	0.78 J
Endosulfan I /2,4'-DDE(f)	3.24 U	3.87 U	3.57 U	3.62 U	2.27 U	2.41 U	2.80 U
Endosulfan II	2.42 U	2.88 U	2.66 U	2.70 U	1.70 U	1.80 U	2.09 U
Endosulfan sulfate	2.28 U	2.72 U	2.51 U	2.55 U	1.60 U	1.70 U	1.98 U
Endrin(g)	4.40 U	5.24 U	4.84 U	4.91 U	3.08 U	3.26 U	3.80 U
Endrin aldehyde(g)	2.62 U	3.13 U	2.89 U	2.93 U	1.84 U	1.95 U	2.27 U
Heptachlor	2.65 U	3.16 U	2.92 U	2.94 J	1.86 U	1.97 U	2.30 U
Heptachlor epoxide	1.47 U	1.76 U	1.62 U	1.64 U	1.03 U	1.09 U	1.27 U
α-BHC(g)	0.28 J	1.95 U	1.80 U	1.83 U	1.15 U	1.22 U	1.42 U
β-BHC(g)	2.42 U	2.89 U	2.67 U	2.70 U	1.70 U	1.80 U	2.09 U
δ-BHC(g)	2.20 U	2.62 U	2.42 U	2.46 U	1.54 U	1.63 U	1.90 U
Lindane(g)	1.92 U	2.29 U	2.11 U	2.14 U	1.35 U	1.42 U	0.89 J
Methoxychlor(g)	2.75 U	3.28 U	3.03 U	3.07 U	1.93 U	2.04 U	2.38 U
Toxaphene(g)	83.3 U	99.3 U	91.7 U	93.06 U	58.4 U	61.9 U	72.1 U
trans-Nonachlor	7.45	11.81	16.27	31.07	13.36	28.01	2.19 U

(a) Values shown are a mean of three replicate analyses.
(b) CLIS - Central Long Island Sound reference site.
(c) U Undetected at or above the given concentration.
(d) J Analyte detected is below established method detection limit (MDL).
(e) Sum of 2,4'-DDD, endosulfan I/2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT; one-half of the detection limit used in summation when analyte was undetected.
(f) Endosulfan I and 2,4'-DDE coelute; both compounds were undetected; value shown is the detection limit for 2,4'-DDE.
(g) Analyte required only in samples designated for Central Long Island Disposal Testing Site.

Table 3.6 also shows the results of the analysis of the Eastchester and Mud Dump Reference Site sediment for PCBs. A quality control sample summary and associated quality control data are provided in Appendix A. All of the 22 PCB congeners were detected in COMPs EC-A and EC-B sediments, with three congeners (PCBs 8, 184, and 195) found at a concentration below the detection limit in COMP EC-A only. Total PCB concentrations were calculated as 287 µg/kg for COMP EC-A and 1487 µg/kg for COMP EC-B, approximately one or two orders of magnitude higher (respectively) than in reference site sediment. PCBs were either undetected or detected at concentrations near or below the target detection limit (1.0 µg/kg) in Mud Dump Reference Site sediment.

Results of sediment analyses for PCBs in the composites prepared for USACE-NED are shown in Tables 3.9 (Reach A) and 3.10 (Reach B). Concentrations of PCBs were higher in Reach B than in Reach A with the exception of CT COMP EC-A-V. Total PCBs in Reach A ranged from 45.7 µg/kg (CT COMP EC-A-I) to 1029 µg/kg (CT COMP EC-A-V) and in Reach B ranged from 832 µg/kg (CT COMP EC-B-V) to 2720 µg/kg (CT COMP EC-B-III). Total PCBs in all CT COMPs were at least one order of magnitude higher than Central Long Island Sound sediment (36.3 µg/kg), except CT COMPs EC-A-I, EC-A-II, EC-A-III, and EC-A-IV.

3.2.5 PAHs and 1,4-Dichlorobenzene

Table 3.11 shows the results of the analysis of the Eastchester and Mud Dump Reference Site sediments for PAHs and 1,4-dichlorobenzene. A quality control sample summary and associated quality control data are provided in Appendix A.

All 17 PAHs analyzed were detected in COMPs EC-A and EC-B sediments. In COMP EC-A, low-molecular-weight PAH (LPAH) made up approximately 16% of the total PAH concentration, whereas high-molecular-weight PAH (HPAH) made up 84% of the total. Concentrations of PAHs in COMP EC-B sediment were approximately 7.4 times higher and had a higher proportion of LPAHs (32% of the total PAHs) than COMP EC-A. The COMP EC-A and COMP EC-B PAH levels were about two and three orders of magnitude higher, respectively, than those found in the Mud Dump Reference Site sediment. Concentrations of PAH compounds in Mud Dump Reference Site sediment were either undetected or detected at concentrations below the target detection limit of 10.0 µg/kg.

Concentrations of 1,4-dichlorobenzene were approximately 10 times higher in COMP EC-B than in COMP EC-A sediment. The Mud Dump Reference Site sediment did not have detectable levels of 1,4-dichlorobenzene.

All 24 PAHs analyzed were detected in the CT COMPs prepared for USACE-NED and in the Central Long Island Sound Reference sediment. Concentrations of PAHs were consistently lower in Reach A (Table 3.12) than in Reach B (Table 3.13). CT COMPs EC-A-I, EC-A-II, and EC-A-III all contained less than 5000 µg/kg total PAHs, whereas CT COMPs EC-A-IV and EC-A-V had 11,800 µg/kg and 18,700 µg/kg total PAHs, respectively. Total PAHs in Central Long Island Sound sediment was estimated at 1520 µg/kg. All Reach A and Reach B composites contained less than 27% LPAHs (percent of total PAHs) except EC-B-VI, in which LPAHs constituted 51% of the total PAHs. The concentration of total PAHs in EC-B-VI was more than 4.5 times higher than in any other CT COMP sediment and two orders of magnitude higher than Central Long Island Sound reference sediment.

TABLE 3.9. Results of Analysis of USACE, New England Division, Eastchester Reach A Sediment Composite Samples for PCBs

Analyte	Concentration in µg/kg dry weight					
	CT COMP EC-A-I	CT COMP EC-A-II	CT COMP EC-A-III	CT COMP EC-A-IV	CT COMP EC-A-V	CLIS(a)
PCB 8	0.54 J(b)	0.52 J	0.76 J	2.25 J	12.0	1.39 J
PCB 18	2.82 U(c)	2.18 U	2.11 J	6.32	33.9	3.26 U
PCB 28	3.61	1.00 J	6.39	9.46	48.6	2.13 J
PCB 44	1.24 J	0.92 J	3.67	10.5	42.6	0.53 J
PCB 49	0.89 J	1.30 U	2.20	9.09	38.3	0.40 J
PCB 52	2.23	1.29	4.02	14.6	47.1	0.17 J
PCB 66	2.68	2.19	6.15	24.3	92.7	1.57 J
PCB 87	1.29	0.76	1.87	4.78	15.1	0.18 J
PCB 101	3.13	2.03	3.52	11.2	38.8	1.12
PCB 105	0.77	0.47	1.28	3.64	10.1	0.19 J
PCB 118	1.92	1.23	2.60	8.11	28.2	0.89 J
PCB 128	1.53	0.76 J	0.84 J	3.01	6.67	0.65 J
PCB 138	2.59	1.94	2.90	8.94	29.6	1.45
PCB 153	2.79 J	1.59 J	2.15 J	6.35	19.8	1.51 J
PCB 170	1.56	1.60	1.26	2.82	8.04	1.08 J
PCB 180	2.52	1.62	1.64	5.64	14.1	0.59 J
PCB 183	0.59 J	0.62 J	0.44 J	1.44	3.51	0.07 J
PCB 184	0.16 J	0.13 J	0.16 J	0.54 J	1.14 J	0.20 J
PCB 187	1.62	1.16	1.03	3.40	7.09	0.67 J
PCB 195	0.59 J	0.30 J	1.05 U	1.03 J	2.63	0.14 J
PCB 206	2.28	0.41 J	1.60 U	2.12	5.87	0.66 J
PCB 209	2.13	0.56 J	1.00 U	3.60	8.50	0.94 J
Total PCB(d)	75.3	45.7	93.6	286	1030	36.3

(a) CLIS - Central Long Island Sound Reference Site.
(b) J Analyte detected is below established method detection limit (MDL).
(c) U Undetected at or above the given concentration.
(d) Total PCB= 2(x) where x is the sum of all PCB congeners detected; one-half of the detection limit used in summation when analyte was undetected.

TABLE 3.10. Results of Analysis of USACE, New England Division, Eastchester Reach B Sediment Composite Samples for PCBs

Analyte	CT COMP EC-B-I	CT COMP EC-B-II	CT COMP EC-B-III	CT COMP EC-B-IV	CT COMP EC-B-V	CT COMP EC-B-VI	CLIS(a)
	Concentration in µg/kg dry weight						
PCB 8	6.47	8.63	39.5	35.6	7.46	1.43 J(b)	1.39 J
PCB 18	26.9	25.0	91.1	83.7	21.5	10.9	3.26 U(c)
PCB 28	42.9	35.5	117	93.5	37.7	22.4	2.13 J
PCB 44	43.5	35.0	157	86.6	28.3	18.8	0.53 J
PCB 49	34.9	41.3	105	71.1	25.1	12.3	0.40 J
PCB 52	51.6	53.1	94.9	117	35.6	30.1	0.17 J
PCB 66	59.6	37.9	234	158	94.8	97.3	1.57 J
PCB 87	14.0	10.8	23.1	27.4	6.53	8.96	0.18 J
PCB 101	33.2	29.4	95.1	81.3	27.3	33.3	1.12
PCB 105	12.9	12.9	17.3	18.6	17.8	9.10	0.19 J
PCB 118	28.2	26.2	51.5	52.0	14.9	20.3	0.89 J
PCB 128	5.45	5.61	10.9	12.6	6.01	54.0	0.65 J
PCB 138	31.6	56.3	151	70.4	42.7	44.8	1.45
PCB 153	26.4	20.0	38.7	48.1	11.8	24.7	1.51 J
PCB 170	17.2	20.4	24.6	24.6	9.12	17.8	1.08 J
PCB 180	31.4	18.9	40.3	42.0	10.8	32.6	0.59 J
PCB 183	4.97	2.35	7.92	7.18	1.93	10.6	0.07 J
PCB 184	0.49 J	0.62 J	2.71	3.13	0.80 J	2.06	0.20 J
PCB 187	15.4	7.99	19.5	19.3	3.93	11.9	0.67 J
PCB 195	6.36	3.18	6.36	5.90	1.73	7.48	0.14 J
PCB 206	15.0	10.1	20.3	14.9	5.10	14.5	0.66 J
PCB 209	9.42	6.23	12.6	15.8	4.91	15.1	0.94 J
Total PCB(d)	**1036**	**935**	**2720**	**2180**	**832**	**1000**	**36.3**

(a) CLIS - Central Long Island Sound Reference Site.
(b) J Analyte detected is below established method detection limit (MDL).
(c) U Undetected at or above the given concentration.
(d) Total PCB = 2(x) where x = sum of all PCB congeners detected; one-half of the detection limit used in summation when analyte was undetected.

TABLE 3.11. Results of Analysis of Eastchester Sediment for PAHs and 1,4-Dichlorobenzene

Analyte	Concentration in µg/kg dry weight			
	COMP EC-A	COMP EC-B	MDRS[a]	
Naphthalene	97.7	4577	1.13	J[b]
Biphenyl	27.4	191	6.94	U[c]
Acenaphthylene	119	786	6.61	U
Acenaphthene	93.6	3112	8.59	U
Fluorene	102	1452	7.11	U
Phenanthrene	534	6846	0.72	J
Anthracene	295	2308	6.96	U
TOTAL LPAH[d]	**1,270**	**19,300**	**20.0**	
Fluoranthene	1392	7993	0.53	J
Pyrene	1303	8850	0.55	J
Benzo[a]anthracene	582	3684	0.62	J
Chrysene	717	4321	9.42	U
Benzo[b]fluoranthene	872	4766	0.50	J
Benzo[k]fluoranthene	328	1698	8.42	U
Benzo[a]pyrene	630	3745	6.58	U
Indeno[1,2,3-cd,d]pyrene	456	2330	5.68	U
Dibenzo[a,h]anthracene	115	664	5.77	U
Benzo[g,h,i]perylene	422	2221	4.77	U
TOTAL HPAH[d]	**6,820**	**40,300**	**22.5**	
TOTAL PAH[d]	**8,090**	**59,600**	**42.5**	
1,4-Dichlorobenzene	25.0	228	0.79	U

(a) MDRS - Mud Dump Reference Site.
(b) J Analyte detected is below established method detection limit (MDL).
(c) U Undetected at or above given concentration.
(d) One-half detection limit used in summation for undetected values.

TABLE 3.12. Results of Analysis of USACE, New England Division, Eastchester Reach A Sediment Composite Samples for PAHs and 1,4-Dichlorobenzene

	Concentration in µg/kg dry weight					
Analyte	CT COMP EC-A-I	CT COMP EC-A-II	CT COMP EC-A-III	CT COMP EC-A-IV	CT COMP EC-A-V	CLIS(a)
Naphthalene	47.9	15.2	24.3	79.7	238.6	21.6
1-Methylnaphthalene(b)	15.3	5.02 J(c)	7.80 J	38.4	92.0	6.26 J
2-Methylnaphthalene(b)	34.4	10.1	16.3	58.9	164	11.1 J
Biphenyl(b)	12.1	3.23 J	5.23 J	19.4	73.1	3.77 J
2,6-Dimethylnaphthalene(b)	10.5	3.24 J	4.74 J	22.1	83.9	2.12 J
Acenaphthylene	70.6	29.74	37.9	132	295	29.0
Acenaphthene	19.4	8.52 J	11.8	122	168	4.03 J
Fluorene	32.9	11.9	23.6	136	233	8.62 J
Phenanthrene	204	71.8	159	859	1082	79.6
Anthracene	133	70.0	88.3	381	627	29.2
1-Methylphenanthrene(b)	42.5	14.8	24.6	150	275	18.8
TOTAL LPAH	**623**	**244**	**403**	**2000**	**3330**	**214**
Fluoranthene	585	411	341	2051	2950	193
Pyrene	655	379	441	1877	2870	205
Benzo[a]anthracene	303	158	203	796	1260	82.8
Chrysene	367	180	261	927	1320	115
Benzo[b]fluoranthene	522	223	320	1150	1902	175
Benzo[k]fluoranthene	186	84.9	123	377	597	62.5
Benzo[e]pyrene(b)	284	114	170	511	920	97.3
Benzo[a]pyrene	355	138	213	826	1175	120
Perylene(b)	90.3	34.8	47.6	170	282	39.1
Indeno[123-c,d]pyrene	271	93.6	159	524	966	100.1
Dibenzo[a,h]anthracene	71.9	24.9	42.0	138	249	21.1
Benzo[g,h,i]perylene	254.7	84.1	149	478	906	94.2
TOTAL HPAH	**3950**	**1930**	**2470**	**9830**	**15400**	**1310**
TOTAL PAH	**4570**	**2170**	**2870**	**11800**	**18700**	**1520**
1,4-Dichlorobenzene	15.6	6.49	1.01 U(d)	23.6	87.5	1.40 U(d)

(a) CLIS - Central Long Island Sound Reference Site.
(b) Analyte required only in samples designated for Central Long Island Sound Disposal Site Testing.
(c) J Analyte detected is below established method detection limit (MDL).
(d) U Undetected at or above the given concentration.

TABLE 3.13. Results of Analysis of USACE, New England Division, Eastchester Reach B Sediment Composite Samples for PAHs and 1,4-Dichlorobenzene

Analyte	Concentration in µg/kg dry weight						
	CT COMP EC-B-I	CT COMP EC-B-II	CT COMP EC-B-III	CT COMP EC-B-IV	CT COMP EC-B-V	CT COMP EC-B-VI	CLIS[(a)]
Naphthalene	293.4	463	1022	696	381	14700	21.6
1-Methylnaphthalene[(b)]	95.7	287	388	640	273	11900	6.26 J[(c)]
2-Methylnaphthalene[(b)]	190	421	511	872	249	3150	11.1 J
biphenyl[(b)]	64.1	134	108	203	83.3	410	3.77 J
2,6-Dimethylnaphthalene[(b)]	89.9	306	345	550	152	5098	2.12 J
Acenaphthylene	393	303	530	562	356	12540	29.0
Acenaphthene	200	223	609	751	468	10800	4.03 J
Fluorene	234	328	738	876	550	4680	8.62 J
Phenanthrene	1130	1350	3760	2520	2900	20700	79.6
Anthracene	839	700	1350	686	841	7260	29.2
1-Methylphenanthrene[(b)]	344	479	669	1064	505.	4940	18.8
TOTAL LPAH	**3870**	**4500**	**10000**	**9420**	**6760**	**85000**	**214**
Fluoranthene	4180	3307	6770	4940	5310	15030	193
Pyrene	4170	3160	6380	4670	5140	19500	205
Benzo[a]anthracene	2020	114	2860	2060	2390	7850	82.8
Chrysene	2540	1400	3580	2630	2800	8410	115
Benzo[b]fluoranthene	3400	2230	4320	3220	3260	8010	175
Benzo[k]fluoranthene	780	591	774	1090	688	1030	62.5
Benzo[e]pyrene[(b)]	1240	904	1340	1750	1730	4610	97.3
Benzo[a]pyrene	2400	1170	2940	2190	2390	7640	120
Perylene[(b)]	381	288	466	604	407	994	39.1
Indeno[1,2,3-c,d]pyrene	1408	11120	2170	499	1650	4030	100
Dibenzo[a,h]anthracene	356	283	519	651	388	1040	21.1
Benzo[g,h,i]perylene	1350	1080	2050	1540	1520	3790	94.2
TOTAL HPAH	**24200**	**16700**	**34200**	**25900**	**27700**	**81900**	**1310**
TOTAL PAH	**28100**	**21200**	**44200**	**35300**	**34500**	**167000**	**1520**
1,4-Dichlorobenzene	84.5	11.3	17.7	190	8.72	8.20	1.40 U[(d)]

(a) CLIS - Central Long Island Sound Reference Site.
(b) Analyte required only in samples designated for Central Long Island Sound Disposal Site Testing.
(c) J Analyte detected is below established method detection limit (MDL).
(d) U Undetected at or above the given concentration.

3.3 Site Water and Elutriate Analyses

Metals, chlorinated pesticides, and PCBs were analyzed in dredging site water collected from Eastchester project area, Reach A and Reach B, and in elutriate samples prepared with clean seawater (Sequim Bay) and the Eastchester sediment composites. Sequim Bay seawater was used in place of dredging site water to maintain consistency in salinity among the dredging projects. Mud Dump Site water and Sequim Bay control water were also analyzed. All water and elutriate samples were analyzed in triplicate. Mean results of the triplicate analyses are presented and discussed in the following sections. Complete results of all site water and elutriate samples, as well as a quality control summary and associated quality control data are provided in Appendix B.

3.3.1 Metals

Results of analysis of Sequim Bay control water, Mud Dump Site water, Eastchester Reach A and Reach B site waters, and Eastchester Reach A and Reach B elutriates are shown in Table 3.14. Concentrations of Cd, Cr, and Zn were similar between the control water and Mud Dump Site water, whereas concentrations of Ag, Cu, Hg, Ni, and Pb were at least twice as high in the Mud Dump Site water than in the control. In particular, Hg and Pb were about an order of magnitude higher in the Mud Dump Site than in the control water.

Site water from the two Eastchester reaches contained similar metals concentrations and consistently had the highest metal concentrations of the waters and elutriates analyzed. The concentrations of Cr, Pb, and Hg (Reach B only) were approximately 20 times higher in Eastchester site waters than in Mud Dump Site Water. All other metals analyzed were at least three times higher in Eastchester site waters than in Mud Dump Site Water. The largest between-site differences were exhibited for Ag and Hg, which were found in greatest abundance at Reach B by a factor of two.

Elutriate metal concentrations were more similar to the concentrations found in the Mud Dump Site water than those in the Eastchester site water. Elutriates showed greater differences between the two Eastchester reaches than did site water. Reach B elutriates contained large concentrations of metals compared to Reach A elutriates, generally on the order of two to seven

TABLE 3.14. Metals in Eastchester Site Water and Elutriate

Analyte	Control Water	Mud Dump Site Wate r	Eastchester Reach A Site Water	Eastchester Reach A Elutriate	Eastchester Reach B Site Water	Eastchester Reach B Elutriate
	Concentration in µg/L[(a)]					
Silver	0.0035 Q[(b)]	0.0223	0.0900	0.0035 Q	0.159	0.0283
Cadmium	0.0557	0.0603	0.521	0.0125 Q	0.409	0.147
Chromium	0.180	0.27	6.51	0.603	4.51	1.70
Copper	0.471	2.06	15.4	0.630	18.9	3.60
Mercury	0.0003	0.0096	0.0648	0.0006	0.183	0.0262
Nickel	0.469	1.27	4.50	0.744	4.68	1.74
Lead	0.0430	0.931	21.4	0.966	18.1	5.48
Zinc	9.20	10.3	62.6	1.32	68.3	4.78

(a) Value shown is the mean of triplicate analyses; one-half the detection limit used for non-detects.
(b) Q undetected at or above twice the given concentration.

times those found at Reach A. The most significant difference between the two elutriates was found with Hg concentrations (0.0262 µg/L at Reach B vs. 0.0006 µg/L at Reach A).

3.3.2 Chlorinated Pesticides and PCBs

Results of analysis of Sequim Bay control water, Mud Dump Site water, Eastchester Reach A and Reach B site water, and Eastchester elutriates for chlorinated pesticides and PCBs are shown in Table 3.15. With few exceptions, the same pesticides and PCB congeners were detected in the site water and elutriate samples. Elutriates generally had higher pesticide residue concentrations than the site water samples. Pesticide concentrations were similar in the two Eastchester site waters, with aldrin, dieldrin, α-chlordane, 4,4'-DDD, 4,4'-DDT, 4,4'-DDE, and *trans*-nonachlor found in greatest abundance. Total DDT concentrations for the Reach A site water and elutriate samples were 10.8 ng/L and 16.1 ng/L, respectively. Total DDT concentrations for the Reach B site water and elutriate samples were 5.40 and 20.4 ng/L, respectively, and were more similar to concentrations found in the control and Mud Dump Site Water samples.

The PCB congeners 66 (Reach A) and PCB 52 (Reach B) were found in the highest concentrations in the elutriate samples. In general, concentrations of PCBs were factors of two to five times higher in elutriates than in site water samples. For most of the congeners detected, concentrations in the Reach B elutriate were higher than in the Reach B elutriate. Total PCB concentrations were approximately one order of magnitude higher in the elutriate samples from Reach A and B, than in any of the site water samples.

TABLE 3.15. Chlorinated Pesticides and PCBs in Eastchester Site Water and Elutriate

	Concentration in ng/L[(a)]					
Analyte	Control Water	Mud Dump Site Water	Eastchester Reach A Site Water	Eastchester Reach A Elutriate	Eastchester Reach B Site Water	Eastchester Reach B Elutriate
2,4'-DDD	0.39 Q[(b)]	0.38 Q	0.49	2.67	0.38 Q	2.73
2,4'-DDT	0.40 Q	0.39 Q	0.39 Q	0.44 Q	0.41	0.83
4,4'-DDD	0.57 Q	0.56 Q	4.13	4.59	2.73	10.4
4,4'-DDE	0.49 Q	0.47 Q	2.48	7.37	0.86	5.16
4,4'-DDT	0.49 Q	0.48 Q	2.94	0.55 Q	0.61	0.68 Q
Total DDT[(c)]	**2.76**	**2.69**	**10.8**	**16.1**	**5.40**	**20.4**
Aldrin	0.36 Q	0.36 Q	18.1	0.41 Q	10.5	17.1
α-chlordane	0.46 Q	0.45 Q	4.74	1.35	2.53	10.4
Dieldrin	0.48 Q	0.47 Q	2.51	2.18	1.91	3.31
Endosulfan I/2,4'-DDE	0.42 Q	0.41 Q	0.41 Q	0.47 Q	0.41 Q	0.57 Q
Endosulfan II	5.51 Q	5.38 Q	5.38 Q	6.17 Q	5.38 Q	7.58 Q
Endosulfan Sulfate	4.03 Q	3.94 Q	3.94 Q	4.51 Q	3.94 Q	5.54 Q
Heptachlor	1.02	0.32 Q	0.32 Q	0.36 Q	0.32 Q	0.44 Q
Heptachlor Epoxide	0.42 Q	0.41 Q	0.41 Q	0.47 Q	0.41 Q	0.58 Q
trans-Nonachlor	0.47 Q	0.46 Q	2.09	0.86	1.25	5.74
PCB 8	0.43 Q	0.42 Q	0.42 Q	4.08	0.42 Q	0.59 Q
PCB 18	0.52 Q	0.51 Q	0.94	3.63	0.51 Q	0.72 Q
PCB 28	0.59 Q	0.57 Q	1.80	7.59	5.69	8.70
PCB 44	0.60 Q	0.59 Q	2.05	6.99	1.04	8.01
PCB 49	0.51 Q	0.50 Q	0.50 Q	3.77	0.50 Q	7.53
PCB 52	0.60 Q	0.59 Q	1.96	11.6	0.59 Q	45.6
PCB 66	0.47 Q	0.46 Q	0.46 Q	36.7	0.46 Q	19.3
PCB 87	0.53 Q	0.51 Q	1.36	1.67	0.99	3.44
PCB 101	0.53 Q	0.52 Q	0.52 Q	3.88	0.52 Q	8.04
PCB 105	0.63 Q	0.62 Q	0.73	1.57	0.62 Q	1.88
PCB 118	0.50 Q	0.49 Q	1.08	3.94	0.65	7.33
PCB 128	0.56 Q	0.55 Q	0.55 Q	0.63 Q	0.55 Q	2.07
PCB 138	0.67 Q	0.66 Q	1.12	4.81	0.92	7.98
PCB 153	0.64 Q	0.63 Q	1.02	3.09	0.77	5.35
PCB 170	0.19	0.56 Q	0.56 Q	2.29	0.56 Q	0.79 Q
PCB 180	0.50 Q	0.49 Q	0.49 Q	2.25	0.49 Q	0.69 Q
PCB 183	0.52 Q	0.51 Q	0.51 Q	0.64	0.51 Q	1.40
PCB 184	0.49	0.51 Q	0.56	0.58 Q	0.51	0.72 Q
PCB 187	0.49 Q	0.48 Q	0.48 Q	0.96	0.48 Q	0.68 Q
PCB 195	0.57 Q	0.55 Q	0.55 Q	0.51	0.55 Q	0.78 Q
PCB 206	0.55 Q	0.54 Q	0.54 Q	0.70	0.54 Q	0.76 Q
PCB 209	0.61 Q	0.60 Q	0.60 Q	0.90	0.60 Q	0.84 Q
Total PCBs[(d)]	**23.4**	**23.7**	**37.6**	**206**	**36.9**	**266**

(a) Value shown is the mean of triplicate analyses; one-half the detection limit used for non-detects.
(b) Q Undetected at or above twice the given concentration.
(c) Total DDT is the sum of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE/Endosulfan I, and 2,4'-DDD; one-half of the detection limit was used in summation when analyte was not detected.
(d) Total PCBs = 2(x), where x is the sum of all PCB congeners detected; one-half of the detection limit used in summation when an analyte was undetected.

3.4 Water-Column and Benthic Toxicity Testing

Both water-column and benthic tests were performed on the Eastchester sediment COMPs EC-A and EC-B. Suspended-particulate-phase tests were conducted with the silverside *M. beryllina*, the mysid *M. bahia*, and larvae of the bivalve *M. galloprovincialis*. Benthic acute toxicity tests were performed with the infaunal amphipods, *A. abdita*, *R. abronius*, and *E. estuarius*, and the mysid *M. bahia*. Complete test results, water quality measurements, and the results of the reference-toxicant tests are presented in Appendix C for water-column tests, and Appendix D for benthic test results. Throughout this section the term "acutely toxic" is used to express *statistically* significant differences and greater than 10% (mysid) or 20% (amphipod) decreases in survival from the reference sediment. Tests for statistical significance between test treatments and reference treatments were performed following methods outlined in Section 2.6.

3.4.1 *Menidia beryllina* Water-Column Toxicity Test

Results of the *M. beryllina* water-column toxicity test are summarized in Table 3.16. Complete test results, as well as water quality data, are presented in Appendix C, Tables C.1 through C.4. Control (0% SPP) survival was greater than 90% for both composites, validating this test. Survival in the 100% SPP was 88% for COMP EC-A and 0% for COMP EC-B. A significant reduction in survival was observed in the 100% SPP, relative to the 0% SPP, for both composites. However, survival in the 100% SPP of COMP EC-A was very high (88%). The *M. beryllina* median-lethal concentration (LC_{50}) was >100% SPP for COMP EC-A and 37.6% SPP for COMP EC-B.

All water quality parameters were within acceptable ranges throughout the test except for a minor elevation in pH (0.04) in COMP EC-B, 100% SPP. The copper reference toxicant test produced an LC_{50} of 98.1 µg/L Cu, within the control range (mean ± 2 standard deviations) established at the MSL (71 µg/L to 136 µg/L Cu). Ammonia concentrations in the 100% SPP was 9.9 mg/L in COMP EC-A and 33.2 mg/L in COMP EC-B at the time of preparation.

3.4.2 *Mysidopsis bahia* Water-Column Toxicity Test

Results of the *M. bahia* water-column toxicity test are summarized in Table 3.16. Complete test results, as well as water quality data, are presented in Appendix C, Tables C.5 through C.8. This test was validated by 100% survival in the 0% SPP of both composites. Survival was 100% in COMP EC-A 100% SPP and 0% in COMP EC-B 100% SPP. Only

TABLE 3.16. Summary of Water-Column Toxicity Tests Performed with Eastchester Sediment Composites

Composite	Test Organism	Survival in 0% SPP	Survival in 100% SPP	0% and 100% Significantly Different	LC_{50} (%SPP)
EC-A	*M. beryllina*	100%	88%	Yes	>100
EC-B	*M. beryllina*	96%	0%	Yes	37.6
EC-A	*M. bahia*	100%	100%	No	>100
EC-B	*M. bahia*	100%	0%	Yes	68.6
EC-A	*M. galloprovincialis*	97%	90%	No	>100
EC-B	*M. galloprovincialis*	100%	14%	Yes	46.6 (survival)
EC-A	*M. galloprovincialis*	97%	87%	No	>100[a]
EC-B	*M. galloprovincialis*	98%	0%	Yes	21.0[a](normal)

(a) Median effective concentration (EC_{50}) based on normal development to the D-cell, prodissoconch I stage.

COMP EC-B survival was significantly lower than the control. The *M. bahia* LC_{50} for COMP EC-B was 68.6% SPP.

All water quality parameters were within acceptable ranges throughout the test, with the exception of pH, which rose to 8.4 in the several replicates of the COMP EC-B 100% SPP treatment. The Cu reference toxicant test revealed an LC_{50} of 151 µg/L Cu, which is within the control range established at the MSL (116 µg/L to 229 µg/L Cu). The highest ammonia concentration measured in the COMP EC-A 100% SPP preparation was 9.7 mg/L. Ammonia was not measured in the COMP EC-B 100% SPP preparation.

3.4.3 *Mytilus galloprovincialis* Water-Column Toxicity Test

Results of the *M. galloprovincialis* water-column toxicity test are summarized in Table 3.16. Complete test results and water quality data are presented in Appendix C, Tables C.9 through C.12. This test was validated by greater than 90% survival and normal development in the controls. Survival in the 100% SPP preparation was 90% for COMP EC-A and 14% for COMP EC-B. Significantly reduced survival, relative to the controls, was observed in the 100% SPP treatment of both composites. The LC_{50} was >100% SPP for COMP EC-A and 46.6% SPP for COMP EC-B. Normal development, which is considered a more sensitive indicator of toxicity, was significantly reduced only in COMP EC-B 100% SPP, with 0% normal prodissoconch I in this treatment. The median effective concentration (EC_{50}) was >100% SPP for COMP EC-A and 21.0% SPP for COMP EC-B.

All water quality parameters were within acceptable ranges, with the exception of pH, which exceeded 8.3 (by less than 0.1) in the COMP EC-B 50% and 100% treatments. The Cu reference toxicant test produced an EC_{50} of 6.5 µg/L Cu, which is within the control range established for copper at MSL (EC_{50}: 5.7 µg/L to 21µg/L Cu). The total ammonia concentration in the 100% SPP was measured at 2.7 mg/L for COMP EC-A and 25 mg/L for COMP EC-B.

3.4.4 *Ampelisca abdita* Benthic Acute Toxicity Test

Results of the benthic acute toxicity test with *A. abdita* are summarized in Table 3.17. Complete test results and water quality data are presented in Appendix D, Tables D.1 through D.5. Survival in the *A. abdita* control sediment was 97%, validating this test. Survival in the Eastchester composites was 88% and 7% for COMPs EC-A and EC-B, respectively. COMP EC-A was not acutely toxic to *A. abdita* when compared with either the Mud Dump reference (93%) or the Central Long Island Sound reference (97%). COMP EC-B was acutely toxic to *A. abdita* relative to both reference sediments.

Water quality parameters were within acceptable ranges throughout the test, except for minor deviations (see Table D.2). The Cd reference toxicant test produced an LC_{50} of 0.66 mg/L Cd, within the control range established by other scientists and at the MSL (0.5 mg/L to 1.4 mg/L Cd). Ammonia concentrations were less than 1.2 mg/L in the overlying water and less than 9.3 mg/L and 16.4 mg/L in COMP EC-A and COMP EC-B pore water, respectively.

3.4.5 *Rhepoxynius abronius* Benthic Acute Toxicity Test

Results of the benthic acute toxicity test with *R. abronius* are summarized in Table 3.17. Complete test results and water quality data are presented in Appendix D, Tables D.6 through D.10. Survival in the West Beach control sediment was 97%, validating this test. Survival in the Eastchester composites was 65% in COMP EC-A and 69% in COMP EC-B. Both composites were acutely toxic to *R. abronuis* when compared to both the Mud Dump (98% survival) and the Central Long Island Sound (91% survival) reference sediments.

All water quality parameters were within acceptable ranges throughout the test, with the exception of a maximum pH of approximately 8.5 in COMP EC-B and the native control sediment. The Cd reference toxicant test revealed an LC_{50} of 1.14 mg/L Cd, which is within the control range established at the MSL (0.48 mg/L to 1.70 mg/L Cd). Ammonia concentrations were

TABLE 3.17. Summary of Benthic Acute Toxicity Tests Performed with Eastchester Sediments

Test Organism and Composite	Mean % Survival	Statistically Significant from MDRS	>20% Amphipod >10% Mysid Difference MDRS	Statistically Significant from CLIS	>20% Amphipod >10% Mysid Difference CLIS
A. abdita (EC-A)	88%	No	No	Yes	No
A. abdita (EC-B)	7%	Yes	Yes	Yes	Yes
R. abronius (EC-A)	65%	Yes	Yes	Yes	Yes
R. abronius (EC-B)	69%	Yes	Yes	Yes	Yes
E. estuarius (EC-A)	81%	Yes	No	NT[(a)]	NT
E. estuarius (EC-B)	NT	NT	NT	NT	NT
M. bahia (EC-A)	74%	No	No	No	No
M. bahia (EC-B)	92%	No	No	No	No

(a) NT - Not Tested.

less than 2.0 mg/L in the overlying water and less than 6.7 mg/L and 19 mg/L in the COMP EC-A and COMP EC-B pore water, respectively.

3.4.6 *Eohaustorius estuarius* Benthic Acute Toxicity Test

Results of the benthic acute toxicity test with *E. estuarius* are summarized in Table 3.17. Complete test results and water quality data are presented in Appendix D, Tables D.11 through D.15. Survival in the control sediment was 99%, validating this test. Survival in COMP EC-A (81%) was statistically significant from the survival of *E. estuarius* exposed to the Mud Dump Reference sediment (96% survival). However, the difference in survival between these two sediments was not greater than 20%. Insufficient sediment was available for testing with COMP EC-B.

All water quality parameters were within acceptable ranges throughout the test. The Cd reference toxicant test revealed an LC_{50} of 8.54 mg/L Cd, which is within the control range established at the MSL (7.92 mg/L to 22.9 mg/L Cd). Ammonia concentrations were less than 3.0 mg/L in the overlying water and less than 13 mg/L in the pore water.

3.4.7 *Mysidopsis bahia* Benthic Acute Toxicity Test

Results of the benthic acute toxicity test with *M. bahia* are summarized in Table 3.17. Complete test results and water quality data are presented in Appendix C, Tables D.16 through D.19. Survival was 74% in COMP EC-A and 92% in COMP EC-B. Neither composite was acutely toxic when compared with the Mud Dump (76% survival) or the Central Long Island Sound (74% survival) reference sediments. A control sediment treatment was not run concurrently with the Eastchester sediment treatments; thus, the results of this test are not useful for regulatory purposes. However, the mysid benthic test was rerun 2 weeks later using other New York Federal Project-2 sediments. Mysid survival with the control treatment of that test was 93%.

All water quality parameters were within acceptable ranges throughout the test. The Cu reference toxicant test produced an LC_{50} of 151 µg/L Cu, which is within the control range established at the MSL (116 µg/L to 229 µg/L Cu). Overlying-water ammonia concentrations in the EC-A and EC-B composites were less than 3.0 mg/L and 16 mg/L, respectively.

3.5 Bioaccumulation Tests with *Macoma nasuta* and *Nereis virens*

Bioaccumulation tests with *M. nasuta* and *N. virens* were conducted using the two Eastchester composites (EC-A and EC-B), the Mud Dump and Central Long Island Sound Reference sediments, and control sediments. Both *M. nasuta* and *N. virens* were exposed for 28 days under flow-through conditions. Survival was greater than 90% in the *M. nasuta* control exposure, and was 89% in the *N. virens* control exposure. No statistically significant differences in *M. nasuta* or *N. virens* survival were observed between either Eastchester composite and either reference sediment. Complete test results and water quality data are presented in Appendix E. The tissues of the exposed organisms were analyzed for metals and selected organic contaminants (pesticides, PCBs, and PAHs), the results of which are summarized in this section. Complete test results and water quality data are tabulated in Appendix E for both species. Analytical results, including a quality control summary and associated quality control data, are presented in Appendix F for *M. nasuta* and in Appendix G for *N. virens*.

The statistical analysis of tissue data was performed using sample dry weight concentrations to remove any variance associated with water content in each sample. Statistical difference between reference site and test sediment exposures is shown in the following tables with the results of sample analysis on a wet weight basis. Reporting data in this manner allows for comparison of wet weight concentrations obtained from this study with regulatory levels such as the U. S. Food and Drug Administration (FDA) action levels reported in Section 4.0 of this report. Lipids were analyzed in triplicate on the background samples of the *M. nasuta* and *N. virens* tissues. The average lipid content for *M. nasuta* and *N. virens* were 0.59% and 2.11%

wet weight, respectively. At the end of this section, Eastchester Reach A and B tissue concentrations are compared with the reference tissue concentrations on a dry weight basis to show the degree of magnification above reference.

3.5.1 Bioaccumulation of Metals in *Macoma nasuta*

Results of analysis of *M. nasuta* tissues exposed to Eastchester composites, Mud Dump Reference Site, and Central Long Island Sound Reference Site sediments for metals are shown in Tables 3.18 and 3.19, respectively. All nine metals analyzed were detected in tissues exposed to the Eastchester composites. COMP EC-A produced significantly elevated concentrations of Cr, Cu, Ni, and Pb relative to the Mud Dump Reference treatment. The magnification factor, the magnitude by which a contaminant concentration in the test composite tissues exceeds that from the reference composite tissues, was below 2 for all metals except Pb, which had a magnification factor of 5.9. COMP EC-B produced statistically significant and elevated concentrations of Cu and Pb relative to the Mud Dump Reference Site. The largest magnification factor was found with Pb, with a magnification of 4.8 relative to the Mud Dump Reference Site.

In comparison with tissues exposed to the Central Long Island Sound Reference Site, significantly elevated concentrations of only Cd and Pb were found with COMPs EC-A and EC-B. No magnification factors exceeded five for any of the metals.

TABLE 3.18. Mean Concentrations of Metals in *Macoma nasuta* Tissues Exposed to Eastchester Composites and Mud Dump Reference Site Sediment

	Concentration (mg/kg wet weight)[a]				
Analyte	MDRS[b]	COMP EC-A	SD[c]	COMP EC-B	SD
Silver	0.0372	0.0386	No	0.0232	No
Arsenic	3.16	2.80	No	2.90	No
Cadmium	0.0355	0.0419	No	0.0412	No
Chromium	0.408	0.672	Yes	0.363	No
Copper	1.78	2.87	Yes	2.39	Yes
Mercury	0.0180 Q[d]	0.0181	No	0.0142	No
Nickel	0.402	0.715	Yes	0.486	No
Lead	0.157	1.72	Yes	1.36	Yes
Zinc	13.1	13.2	No	11.3	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) MDRS - Mud Dump Reference Site.
(c) SD Significantly different.
(d) Q Undetected at or above twice the given concentration.

TABLE 3.19. Mean Concentrations of Metals in *Macoma nasuta* Tissues Exposed to Eastchester Composites and Central Long Island Sound Reference Site Sediment

	Concentration (mg/kg wet weight)(a)				
Analyte	CLIS(b)	COMP EC-A	SD(c)	COMP EC-B	SD
Silver	0.0294	0.0386	No	0.0232	No
Arsenic	2.78	2.80	No	2.90	No
Cadmium	0.0236	0.0419	Yes	0.0412	Yes
Chromium	0.451	0.672	No	0.363	No
Copper	2.31	2.87	No	2.39	No
Mercury	0.0153	0.0181	No	0.0142	No
Nickel	0.576	0.715	No	0.486	No
Lead	0.848	1.72	Yes	1.36	Yes
Zinc	11.2	13.2	No	11.3	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) CLIS- Central Long Island Sound Reference Site.
(c) SD Significantly different.

3.5.2 Bioaccumulation of Chlorinated Pesticides in *Macoma nasuta*

Results of analysis of *M. nasuta* tissues exposed to the Eastchester composites, Mud Dump Reference Site and Central Long Island Sound Reference Site sediments for chlorinated pesticides are shown in Tables 3.20 and 3.21, respectively. In comparison with tissues exposed to the Mud Dump Reference Site sediment, COMP EC-A tissues were statistically significant and elevated for aldrin, dieldrin, α-chlordane, 2,4'-DDD, 4,4'-DDD, and 4,4'-DDE. Dieldrin and 2,4'-DDD exceeded reference concentrations by factors of 3.41 and 7.19, and α-chlordane, 4,4'-DDD, 4,4'-DDE exceeded reference concentrations by greater than 10 times. In EC-B exposed tissues, significant elevations relative to the Mud Dump Reference Site were found with the same pesticides as with COMP EC-A with the addition of *trans*-nonachlor. Magnification factors in excess of 10 were found with α-chlordane, 4,4'-DDD, and 4,4'-DDE.

In comparison with *M. nasuta* tissues exposed to the Central Long Island Sound Reference Site, both COMPs EC-A and EC-B produced significant elevations of six pesticides: aldrin, dieldrin, α-chlordane, 2,4'-DDD, 4,4'-DDD, and 4,4'-DDE. The highest magnification factors (in excess of ten) in both composites were found with aldrin, α-chlordane and 4,4'-DDD. COMP EC-A had magnification factors greater than five for 4,4'-DDE and 2,4'-DDD. COMP EC-B had magnification factors greater than five for *trans*-nonachlor. Total DDT

TABLE 3.20. Concentrations of Pesticides and PCBs in *Macoma nasuta* Tissues Exposed to Eastchester Composites and Mud Dump Reference Site Sediment

Analyte	Concentration (µg/kg wet weight)[a]				
	MDRS[b]	COMP EC-A	SD[c]	COMP EC-B	SD
2,4'-DDD	0.12 Q[d]	1.72	Yes	1.76	Yes
2,4'-DDE	0.18	0.13 Q	No	0.16 Q	No
2,4'-DDT	0.09 Q	0.09 Q	No	0.11 Q	No
4,4'-DDD	0.13 Q	4.95	Yes	5.68	Yes
4,4'-DDE	0.34	10.3	Yes	4.12	Yes
4,4'-DDT	1.23	2.12	No	3.27	No
Total DDT[e]	**2.09**	**19.3**	**Yes**	**15.1**	**Yes**
α-Chlordane	0.05 Q	1.25	Yes	3.04	Yes
Aldrin	0.35	1.34	Yes	1.66	Yes
Dieldrin	0.26 Q	1.69	Yes	1.72	Yes
Endosulfan I	0.09 Q	0.09 Q	No	0.11 Q	No
Endosulfan II	0.09 Q	0.09 Q	No	0.13	No
Endosulfan Sulfate	0.09 Q	0.09 Q	No	0.11 Q	No
Heptachlor	0.09 Q	0.09 Q	No	0.27 Q	No
Heptachlor Epoxide	0.06 Q	0.07 Q	No	0.08 Q	No
trans-Nonachlor	0.07 Q	0.32	No	1.22	Yes
PCB 8	0.87	1.03	No	0.69	No
PCB 18	0.21 Q	3.75	Yes	6.01	Yes
PCB 28	0.62	6.47	Yes	7.50	Yes
PCB 44	0.08 Q	2.48	Yes	2.78	Yes
PCB 49	0.17	5.54	Yes	4.88	Yes
PCB 52	0.81	7.98	Yes	7.11	Yes
PCB 66	0.18	8.78	Yes	6.99	Yes
PCB 87	0.16	2.18	Yes	1.46	Yes
PCB 101	0.45	4.78	Yes	3.59	Yes
PCB 105	0.09	0.34	No	0.90	Yes
PCB 118	0.17	2.96	Yes	2.59	Yes
PCB 128	0.07 Q	0.31	Yes	0.33	Yes
PCB 138	0.18	1.46	Yes	1.34	Yes
PCB 153	0.15	1.72	Yes	1.57	Yes
PCB 170	0.12	0.39	No	0.24	No
PCB 180	0.09 Q	2.62	Yes	0.75	Yes
PCB 183	0.12 Q	0.18	No	0.14 Q	No
PCB 184	0.12 Q	0.12 Q	No	0.14 Q	No
PCB 187	0.06 Q	0.51	Yes	2.03	Yes
PCB 195	0.05 Q	0.05 Q	No	0.06 Q	No
PCB 206	0.05 Q	0.10	No	0.13	No
PCB 209	0.05 Q	0.05 Q	No	0.06 Q	No
Total PCBs[f]	**9.74**	**108**	**Yes**	**103**	Yes

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) MDRS- Mud Dump Reference Site.
(c) SD Significantly different.
(d) Undetected at or above twice the given concentration.
(e) Total DDT is the sum of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, and 2,4'-DDD; one-half of the detection limit was used in summation when analyte was not detected.
(f) Total PCB = 2(x), where x=sum of all PCB congeners; one-half of the detection limit used in summation when analyte was undetected.

TABLE 3.21. Concentrations of Pesticides and PCBs in *Macoma nasuta* Tissues Exposed to Eastchester Composites and Central Long Island Sound Reference Site Sediment

	Concentration (µg/kg wet weight)[a]				
Analyte	CLIS[b]	COMP EC-A	SD[c]	COMP EC-B	SD
2,4'-DDD	0.13 Q[d]	1.72	Yes	1.76	Yes
2,4'-DDE	0.13 Q	0.13 Q	No	0.16 Q	No
2,4'-DDT	0.09 Q	0.09 Q	No	0.11 Q	No
4,4'-DDD	0.16	4.95	Yes	5.68	Yes
4,4'-DDE	1.27	10.3	Yes	4.12	Yes
4,4'-DDT	7.20	2.12	No	3.27	No
Total DDT[e]	**8.98**	**19.3**	**Yes**	**15.1**	**No**
α-Chlordane	0.05 Q	1.25	Yes	3.04	Yes
Aldrin	0.06 Q	1.34	Yes	1.66	Yes
Dieldrin	0.33	1.69	Yes	1.72	Yes
Endosulfan I	0.09 Q	0.09 Q	No	0.11 Q	No
Endosulfan II	0.09 Q	0.09 Q	No	0.13	No
Endosulfan Sulfate	0.09 Q	0.09 Q	No	0.11 Q	No
Heptachlor	0.09 Q	0.09 Q	No	0.27 Q	No
Heptachlor Epoxide	0.07 Q	0.07 Q	No	0.08 Q	No
trans-nonachlor	0.07 Q	0.32	No	1.22	Yes
PCB 8	0.20 Q	1.03	No	0.69	No
PCB 18	0.21 Q	3.75	Yes	6.01	Yes
PCB 28	0.77	6.47	Yes	7.50	Yes
PCB 44	0.15	2.48	Yes	2.78	Yes
PCB 49	0.62	5.54	Yes	4.88	Yes
PCB 52	0.74	7.98	Yes	7.11	Yes
PCB 66	0.96	8.78	Yes	6.99	No
PCB 87	0.19	2.18	Yes	1.46	Yes
PCB 101	0.97	4.78	Yes	3.59	Yes
PCB 105	0.10	0.34	No	0.90	Yes
PCB 118	0.41	2.96	Yes	2.59	Yes
PCB 128	0.13	0.31	Yes	0.33	Yes
PCB 138	0.59	1.46	Yes	1.34	Yes
PCB 153	1.06	1.72	No	1.57	No
PCB 170	0.10	0.39	Yes	0.24	No
PCB 180	0.26	2.62	Yes	0.75	Yes
PCB 183	0.12 Q	0.18	No	0.14 Q	No
PCB 184	0.12 Q	0.12 Q	No	0.14 Q	No
PCB 187	1.01	0.51	No	2.03	No
PCB 195	0.05 Q	0.05 Q	No	0.06 Q	No
PCB 206	0.06 Q	0.10	No	0.13	No
PCB 209	0.05 Q	0.05 Q	No	0.06 Q	No
Total PCBs[f]	**17.7**	**108**	**Yes**	**103**	**Yes**

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) CLIS - Central Long Island Sound Reference Site.
(c) SD Significantly different.
(d) Undetected at or above twice the given concentration.
(e) Total DDT is the sum of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, and 2,4'-DDD; one-half of the detection limit was used in summation when analyte was not detected.
(f) Total PCB = 2(x), where x=sum of all PCB congeners; one-half of the detection limit used in summation when analyte was undetected.

concentrations for COMPs EC-A (19.3 µg/kg) and EC-B (15.1 µg/kg) were statistically significant and elevated above tissues exposed to both the Mud Dump and Central Long Island Sound Reference sediments (Tables 3.20 and 3.21).

3.5.3 Bioaccumulation of PCBs in *Macoma nasuta*

Results of analysis of *M. nasuta* tissues exposed to the Eastchester composites, Mud Dump Reference Site and Central Long Island Sound Reference Site sediments for PCBs are shown in Tables 3.20 and 3.21. At least 18 of 22 PCBs analyzed were detected in *M. nasuta* tissues exposed to the two Eastchester composites. Fourteen PCBs were observed at concentrations that were significantly elevated in COMP EC-A tissues relative to those in tissues exposed to the Mud Dump Reference Site sediment. The concentrations of ten PCB congeners (PCBs 28, 44, 49, 52, 66, 87, 101, 118, 153, and 180) exceeded those of the Mud Dump Reference tissues by at least 10 times. Fifteen PCBs were observed at concentrations that were significantly elevated in COMP EC-B tissues relative to those in tissues exposed to the Mud Dump Reference Site sediment. Concentrations of six PCB congeners (PCBs 18, 28, 44, 49, 66 and 187) in COMP EC-B tissues exceeded those of the Mud Dump Reference tissues by at least 10 times.

In comparison with tissues exposed to the Central Long Island Sound Reference Site sediments, concentrations of 13 PCBs were significantly elevated in COMP EC-A-exposed tissues. Magnifications of greater than 10 were found with PCB congeners 44 and 52. Similar results were found with COMP EC-B, in which significant elevations of 12 PCBs were found relative to the Central Long Island Sound Reference Site; only PCBs 18 and 44 were found at magnifications in excess of 10. Total PCB concentrations of 108 µg/kg and 103 µg/kg were found at statistically significant and elevated concentrations in tissues exposed to COMPs EC-A and EC-B respectively, relative to both reference sites.

3.5.4 Bioaccumulation of PAHs and 1,4-Dichlorobenzene in *Macoma nasuta*

Results of analysis of *M. nasuta* tissues exposed to the Eastchester composites, Mud Dump Reference Site and Central Long Island Sound Reference Site sediments for PAHs and 1,4-dichlorobenzene are shown in Tables 3.22 and 3.23. All PAHs analyzed were detected in *M. nasuta* tissues exposed to each Eastchester composite at significantly elevated concentrations, relative to tissues exposed to the Mud Dump Reference Site sediment, with the exception of benzo[k]fluoranthene in COMP EC-B tissues. Nine of the 16 PAHs analyzed were

TABLE 3.22. Concentrations of PAHs and 1,4-Dichlorobenzene in *Macoma nasuta* Tissues Exposed to Eastchester Composites and Mud Dump Reference Site Sediment

	Concentration (µg/kg wet weight)[(a)]				
Analyte	MDRS[(b)]	COMP EC-A	SD[(c)]	COMP EC-B	SD
Naphthalene	1.12	2.87	Yes	5.25	Yes
Acenaphthylene	0.36 Q[(d)]	2.10	Yes	3.19	Yes
Acenaphthene	0.64 Q	4.22	Yes	40.3	Yes
Fluorene	0.61 Q	3.42	Yes	26.8	Yes
Phenanthrene	1.26 Q	15.6	Yes	225	Yes
Anthracene	1.10 Q	12.4	Yes	107	Yes
Fluoranthene	2.64 Q	201	Yes	477	Yes
Pyrene	2.25 Q	226	Yes	512	Yes
Benzo[a]anthracene	2.36	79.4	Yes	206	Yes
Chrysene	1.12 Q	96.5	Yes	259	Yes
Benzo[b]fluoranthene	3.37	109	Yes	179	Yes
Benzo[k]fluoranthene	1.83	35.5	Yes	22.0	No
Benzo[a]pyrene	1.21	59.7	Yes	109	Yes
Indeno[123-cd]pyrene	0.87 Q	21.3	Yes	27.4	Yes
Dibenzo[a,h]anthracene	0.62 Q	5.04	Yes	5.94	Yes
Benzo[g,h,i]perylene	0.99	21.0	Yes	29.8	Yes
1,4-Dichlorobenzene	0.92 Q	0.93 Q	No	1.11 Q	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) MDRS - Mud Dump Reference Site.
(c) SD Significantly different.
(d) Q undetected at or above twice the given concentration.

found at concentrations over 10 times higher in *M. nasuta* exposed to COMP EC-A than in the Mud Dump Reference Site sediment. In tissues exposed to COMP EC-B, 13 PAHs were found at concentrations over 10 times higher than in the reference sediment. The compound 1,4-dichlorobenzene was undetected in all replicates of the tissues exposed to the Eastchester and reference composites.

Fifteen of the 16 PAHs analyzed were detected at significantly elevated concentrations in tissues exposed to each Eastchester composite, relative to tissues exposed to the Central Long Island Sound Reference Site sediment. Only benzo[k]fluoranthene in both COMPs EC-A and EC-B tissues was not statistically significant and elevated relative to this reference. Magnifications greater than or equal to 10 in COMP EC-A tissues were found with fluoranthene,

TABLE 3.23. Concentrations of PAHs and 1,4-Dichlorobenzene in *Macoma nasuta* Tissues Exposed to Eastchester Composites and Central Long Island Sound Reference Site Sediment

	Concentration (µg/kg wet weight)[a]				
Analyte	CLIS[b]	COMP EC-A	SD[c]	COMP EC-B	SD
Naphthalene	0.93 Q[d]	2.87	Yes	5.25	Yes
Acenaphthylene	0.99	2.10	Yes	3.19	Yes
Acenaphthene	0.65 Q	4.22	Yes	40.3	Yes
Fluorene	0.62 Q	3.42	Yes	26.8	Yes
Phenanthrene	3.29	15.6	Yes	225	Yes
Anthracene	3.05	12.4	Yes	107	Yes
Fluoranthene	9.18	201	Yes	477	Yes
Pyrene	11.6	226	Yes	512	Yes
Benzo[a]anthracene	5.23	79.4	Yes	206	Yes
Chrysene	5.19	96.5	Yes	259	Yes
Benzo[b]fluoranthene	13.2	109	Yes	179	Yes
Benzo[k]fluoranthene	5.64	35.5	No	22.0	No
Benzo[a]pyrene	5.98	59.7	Yes	109	Yes
Indeno[123-cd]pyrene	4.38	21.3	Yes	27.4	Yes
Dibenzo[a,h]anthracene	0.76	5.04	Yes	5.94	Yes
Benzo[g,h,i]perylene	4.42	21.0	Yes	29.8	Yes
1,4-Dichlorobenzene	0.93 Q	0.93 Q	No	1.11 Q	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) CLIS-Central Long Island Sound Reference Site.
(c) SD Significantly different.
(d) Q undetected at or above twice the given concentration.

pyrene, benzo[a]anthracene and chrysene. For COMP EC-B-exposed tissues, magnifications greater than 10 relative to Central Long Island Sound reference sediment-exposed tissues were found with acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, and benzo[a]pyrene.

3.5.5 Bioaccumulation of Metals in *Nereis virens*

Results of analysis of *N. virens* tissues exposed to the Eastchester composites, Mud Dump Reference Site and Central Long Island Sound Reference Site sediments for metals are shown in Tables 3.24 and 3.25. All metals analyzed except Ag were detected in *N. virens* exposed to COMPs EC-A and EC-B. Metals were not statistically significant and elevated in *N. virens* exposed to COMPs EC-A and EC-B compared with *N. virens* exposed to either reference, except for Pb in COMP EC-B relative to the Mud Dump Reference.

TABLE 3.24. Concentrations of Metals in *Nereis virens* Tissues Exposed to Eastchester Composites and Mud Dump Reference Site Sediment

	Concentration (mg/kg wet weight)(a)				
Analyte	MDRS(b)	COMP EC-A	SD(c)	COMP EC-B	SD
Silver	0.0224	0.0119 Q(d)	No	0.0122 Q	No
Arsenic	2.07	1.95	No	1.97	No
Cadmium	0.0619	0.0681	No	0.0642	No
Chromium	0.103 Q	0.132	No	0.175	No
Copper	3.30	1.72	No	2.41	No
Mercury	0.0121	0.0118	No	0.0082	No
Nickel	0.928 Q	0.116	No	0.128	No
Lead	0.311	0.540	No	0.806	Yes
Zinc	11.2	14.8	No	11.0	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) MDRS- Mud Dump Reference Site.
(c) SD Significantly different.
(d) Q Undetected at or above twice the given concentration.

TABLE 3.25. Concentrations of Metals in *Nereis virens* Tissues Exposed to Eastchester Composites and Central Long Island Sound Reference Site Sediment

	Concentration (mg/kg wet weight)(a)				
Analyte	CLIS(b)	COMP EC-A	SD(c)	COMP EC-B	SD
Silver	0.0122 Q(d)	0.0119 Q	No	0.0122	No
Arsenic	2.08	1.95	No	1.97	No
Cadmium	0.0548	0.0681	No	0.0642	No
Chromium	0.107 Q	0.132	No	0.175	No
Copper	1.52	1.72	No	2.41	No
Mercury	0.0104	0.0118	No	0.0082	No
Nickel	0.153	0.116	No	0.128	No
Lead	0.361	0.540	No	0.806	No
Zinc	26.2	14.8	No	11.0	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) CLIS- Central Long Island Sound Reference Site.
(c) SD Significantly different.
(d) Q Undetected at or above twice the given concentration.

3.5.6 Bioaccumulation of Chlorinated Pesticides in *Nereis virens*

Results of analysis of *N. virens* tissues exposed to the Eastchester composites, Mud Dump Reference Site, and Central Long Island Sound Reference Site sediments for chlorinated pesticides are shown in Tables 3.26 and 3.27, respectively. In comparison with the Mud Dump Reference Site sediment, COMP EC-A tissues were statistically significantly elevated for aldrin, α-chlordane, dieldrin, and some of the DDT-related compounds. In COMP EC-B tissues, the same suite of compounds plus 2,4'-DDD, 4,4'-DDT, *trans*-nonachlor, and heptachlor were statistically significant and elevated. *N. virens* tissue concentrations of α-chlordane, 4,4'-DDE, 2,4'-DDD, and 4,4'-DDD from both COMPs EC-A and EC-B exceeded reference tissue concentrations by greater than 10 times.

In comparison with *N. virens* tissues exposed to the Central Long Island Sound Reference Site, statistically significant and elevated levels of α-chlordane and 4,4'-DDE were found at levels greater than five times reference in both Eastchester composites. Only α-chlordane was elevated greater than 10 times in Eastchester composites relative to tissues exposed to Central Long Island Sound Reference Site sediment. Total concentrations of DDT were statistically significant and elevated in tissues exposed to COMPs EC-A and EC-B relative to tissues exposed to both reference sites.

3.5.7 Bioaccumulation of PCBs in *Nereis virens*

Results of analysis of *N. virens* tissues exposed to the Eastchester composites, Mud Dump Reference Site and Central Long Island Sound Reference sediments for PCBs are shown in Tables 3.26 and 3.27. At least 13 of 22 PCBs analyzed were detected in *N. virens* tissues exposed to Eastchester composites at concentrations that were statistically significant and elevated relative to those in tissues exposed to the Mud Dump Reference Site sediment. In both Eastchester composites, seven PCBs (PCBs 28, 44, 49, 52, 66, 101 and 118) were observed at concentrations at least 10 times those of the tissues exposed to the Mud Dump Reference Site. Three PCBs (PCBs 28, 44 and 66) were found in tissues exposed to COMPs EC-A and EC-B at concentrations at least 10 times those of tissues exposed to Central Long Island Sound Reference Site. Total PCB concentrations were statistically significant and elevated in tissues exposed to COMPs EC-A (114 µg/kg) and EC-B (155 µg/kg) relative to both reference sites.

TABLE 3.26. Concentrations of Pesticides and PCBs in *Nereis virens* Tissues Exposed to Eastchester Composites and Mud Dump Reference Site Sediment

Analyte	Concentration (µg/kg wet weight)[a]				
	MDRS[b]	COMP EC-A	SD[c]	COMP EC-B	SD
2,4'-DDD	0.18	4.09	No	4.99	Yes
2,4'-DDE	0.14 Q[d]	0.13 Q	No	0.16	No
2,4'-DDT	0.09 Q	0.09 Q	No	0.09 Q	No
4,4'-DDD	0.51	8.15	Yes	10.8	Yes
4,4'-DDE	0.15	3.81	Yes	3.50	Yes
4,4'-DDT	0.08 Q	0.41	No	0.69	Yes
Total DDT[e]	**1.15**	**16.7**	**Yes**	**20.2**	**Yes**
Aldrin	0.07 Q	1.43	Yes	1.39	Yes
α-Chlordane	0.05 Q	1.51	Yes	4.82	Yes
Dieldrin	0.58	2.54	Yes	2.96	Yes
Endosulfan I	0.09 Q	0.09 Q	No	0.09 Q	No
Endosulfan II	0.09 Q	0.09 Q	No	0.09 Q	No
Endosulfan Sulfate	0.09 Q	0.09 Q	No	0.16 Q	No
Heptachlor	0.10 Q	0.28	No	0.69	Yes
Heptachlor Epoxide	0.07 Q	0.07 Q	No	0.20	No
trans-Nonachlor	0.54	1.53	No	3.88	Yes
PCB 8	0.21 Q	0.21 Q	No	0.21 Q	No
PCB 18	0.22 Q	4.12	Yes	5.58	Yes
PCB 28	0.11 Q	5.38	Yes	5.81	Yes
PCB 44	0.09 Q	2.46	Yes	2.71	Yes
PCB 49	0.12 Q	4.78	Yes	5.13	Yes
PCB 52	0.32	9.11	Yes	10.8	Yes
PCB 66	0.05 Q	1.93	No	2.40	No
PCB 87	0.11	0.73	Yes	0.87	Yes
PCB 101	0.46	6.14	Yes	8.76	Yes
PCB 105	0.18	1.88	Yes	3.29	Yes
PCB 118	0.15 Q	3.53	Yes	5.94	Yes
PCB 128	0.25	0.73	No	1.22	No
PCB 138	1.18	4.11	Yes	6.51	Yes
PCB 153	2.01	4.96	No	7.16	No
PCB 170	0.28	1.04	No	1.47	Yes
PCB 180	0.58	2.61	Yes	5.28	Yes
PCB 183	0.17	0.73	Yes	1.12	Yes
PCB 184	0.12 Q	0.12 Q	No	0.12 Q	No
PCB 187	0.50	1.56	No	2.29	Yes
PCB 195	0.05 Q	0.05 Q	No	0.15	No
PCB 206	0.23	0.64	No	0.68	No
PCB 209	0.16	0.32	Yes	0.20	No
Total PCB[f]	**15.1**	**114**	**Yes**	**155**	**Yes**

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) MDRS Mud Dump Reference Site.
(c) SD Significantly different.
(d) Q Undetected at or above twice the given concentration.
(e) Total DDT is the sum of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, and 2,4'-DDD. One-half of the detection limit was used in summation when constituent was not detected.
(f) Total PCB = 2(x), where x=sum of all PCB congeners; one-half of the detection limit used in summation when analyte was undetected.

TABLE 3.27. Concentrations of Pesticides and PCBs in *Nereis virens* Tissues Exposed to Eastchester Composites and Central Long Island Sound Reference Site Sediment

	Concentration (µg/kg wet weight)(a)							
Analyte	CLIS(b)		COMP EC-A		SD(c)	COMP EC-B		SD
2,4'-DDD	1.11		4.09		No	4.99		No
2,4'-DDE	0.13	Q(d)	0.13	Q	No	0.16		No
2,4'-DDT	0.09	Q	0.09	Q	No	0.09	Q	No
4,4'-DDD	1.90		8.15		Yes	10.8		Yes
4,4'-DDE	0.62		3.81		Yes	3.50		Yes
4,4'-DDT	0.08	Q	0.41		No	0.69		Yes
Total DDT(e)	**3.93**		**16.7**		**Yes**	**20.2**		**Yes**
Aldrin	0.82		1.43		No	1.39		No
α-Chlordane	0.12		1.51		Yes	4.82		Yes
Dieldrin	0.90		2.54		Yes	2.96		Yes
Endosulfan I	0.09	Q	0.09	Q	No	0.09	Q	No
Endosulfan II	0.09	Q	0.09	Q	No	0.09	Q	No
Endosulfan Sulfate	0.12		0.09	Q	No	0.16	Q	No
Heptachlor	0.09	Q	0.28		No	0.69		No
Heptachlor Epoxide	0.11		0.07	Q	No	0.20		No
trans-Nonachlor	0.61		1.53		No	3.88		Yes
PCB 8	0.20	Q	0.21	Q	No	0.21	Q	No
PCB 18	0.21	Q	4.12		Yes	5.58		Yes
PCB 28	0.27		5.38		Yes	5.81		Yes
PCB 44	0.11		2.46		Yes	2.71		Yes
PCB 49	0.53		4.78		Yes	5.13		Yes
PCB 52	1.81		9.11		Yes	10.8		Yes
PCB 66	0.05	Q	1.93		No	2.40		No
PCB 87	0.23		0.73		Yes	0.87		Yes
PCB 101	2.99		6.14		No	8.76		Yes
PCB 105	0.86		1.88		No	3.29		No
PCB 118	1.95		3.53		No	5.94		No
PCB 128	0.55		0.73		No	1.22		No
PCB 138	2.87		4.11		No	6.51		No
PCB 153	3.79		4.96		No	7.16		No
PCB 170	0.61		1.04		No	1.47		No
PCB 180	1.17		2.61		Yes	5.28		Yes
PCB 183	0.44		0.73		No	1.12		Yes
PCB 184	0.12	Q	0.12	Q	No	0.12	Q	No
PCB 187	0.97		1.56		No	2.29		No
PCB 195	0.05	Q	0.05	Q	No	0.15		No
PCB 206	0.32		0.64		No	0.68		No
PCB 209	0.19		0.32		Yes	0.20		No
Total PCB(f)	**40.6**		**114**		**Yes**	**155**		**Yes**

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) CLIS Central Long Island Sound Reference Site.
(c) SD Significantly different.
(d) Q Undetected at or above twice the given concentration.
(e) Total DDT is the sum of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, and 2,4'-DDD. One-half of the detection limit was used in summation when constituent was not detected.
(f) Total PCB = 2(x), where x=sum of all PCB congeners; one-half of the detection limit used in summation when analyte was undetected.

3.5.8 Bioaccumulation of PAHs and 1,4-Dichlorobenzene in *Nereis virens*

Results of analysis of *N. virens* tissues exposed to the Eastchester composites, Mud Dump Reference Site, and Central Long Island Sound Reference Site sediments for PAHs and 1,4-dichlorobenzene are shown in Tables 3.28 and 3.29, respectively. All PAHs analyzed were detected in tissues exposed to both Eastchester composites. Concentrations of fluoranthene and pyrene in tissues exposed to COMP EC-A were significantly elevated by at least a factor of 10 over tissues exposed to the Mud Dump Reference Site. Concentrations of acenaphthene, fluoranthene, pyrene, and chrysene were statistically significant and elevated in tissues exposed to COMP EC-B over concentrations in those tissues exposed to the reference sediments by a factor of 10. The compound 1,4-dichlorobenzene was not detected in any of the test composite tissues.

In comparison with tissues exposed to the Central Long Island Sound Reference Site, concentrations of fluoranthene and pyrene were statistically significant and elevated by a factor of 10 in COMP EC-A tissues. Concentrations of acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, chrysene, benzo[a]pyrene, and benzo[b]fluoranthene and benzo[k]fluoranthene, and benzo[g,h,i]perylene were significantly elevated in tissues exposed to COMP EC-B.

3.5.9 Magnification Factors of Compounds in *Macoma nasuta* and *Nereis virens* Tissues

Tables 3.30 and 3.31 show the calculated magnification factors of all compounds analyzed in tissues of *M. nasuta* and *N. virens*. Magnification factors were calculated using the dry weight concentrations of the compounds in the tissues of the test organism. These factors show the magnification of the Eastchester-exposed tissues over the Mud Dump Reference Site-exposed tissues and the Central Long Island Site-exposed tissues. When all replicate analyses of a compound showed that the compound was undetected, the magnification factor displays the magnification of the Eastchester-exposed tissues above the reference tissue detection limit.

TABLE 3.28. Concentrations of PAHs and 1,4-Dichlorobenzene in *Nereis virens* Exposed to Eastchester Composites and Mud Dump Reference Site Sediment

	Concentration (µg/kg wet weight)[(a)]				
Analyte	MDRS[(b)]	COMP EC-A	SD[(c)]	COMP EC-B	SD
Naphthalene	4.49	1.64	No	7.17	No
Acenaphthylene	0.88	1.41	No	3.21	Yes
Acenaphthene	2.02	4.44	No	28.4	Yes
Fluorene	1.85	1.47	No	7.78	No
Phenanthrene	3.01	3.00	No	31.7	Yes
Anthracene	1.17 Q[(d)]	3.47	Yes	9.82	Yes
Fluoranthene	2.80 Q	60.5	Yes	135	Yes
Pyrene	3.86	65.9	Yes	115	Yes
Benzo[a]anthracene	3.43	5.39	No	15.9	No
Chrysene	1.18 Q	21.9	Yes	52.1	Yes
Benzo[b]fluoranthene	2.66	8.01	Yes	16.6	Yes
Benzo[k]fluoranthene	1.09	5.01	Yes	9.98	Yes
Benzo[a]pyrene	0.78 Q	4.65	Yes	13.0	Yes
Indeno[123-cd]pyrene	1.43	1.89	No	5.28	No
Dibenzo[a,h]anthracene	0.66 Q	0.92	No	2.29	No
Benzo[g,h,i]perylene	1.27	3.00	No	7.16	Yes
1,4-Dichlorobenzene	0.97 Q	0.93 Q	No	0.95 Q	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) MDRS - Mud Dump Reference Site.
(c) SD Significantly different.
(d) Q Undetected at or above twice the given concentration.

TABLE 3.29. Concentrations of PAHs and 1,4-Dichlorobenzene in *Nereis virens* Tissues Exposed to Eastchester Composites and Central Long Island Sound Reference Site Sediment

	Concentration (µg/kg wet weight)[a]				
Analyte	CLIS[b]	COMP EC-A	SD[c]	COMP EC-B	SD
Naphthalene	1.85	1.64	No	7.17	No
Acenaphthylene	0.36 Q[d]	1.41	Yes	3.21	Yes
Acenaphthene	1.40	4.44	Yes	28.4	Yes
Fluorene	0.61 Q	1.47	No	7.78	Yes
Phenanthrene	1.55	3.00	No	31.7	Yes
Anthracene	1.11 Q	3.47	Yes	9.82	Yes
Fluoranthene	2.66 Q	60.5	Yes	135	Yes
Pyrene	3.74	65.9	Yes	115	Yes
Benzo[a]anthracene	1.73	5.39	No	15.9	Yes
Chrysene	1.91	21.9	Yes	52.1	Yes
Benzo[b]fluoranthene	3.33	8.01	No	16.6	Yes
Benzo[k]fluoranthene	2.36	5.01	No	9.98	Yes
Benzo[a]pyrene	1.05	4.65	Yes	13.0	Yes
Indeno[123-cd]pyrene	1.70	1.89	No	5.28	No
Dibenzo[a,h]anthracene	0.63 Q	0.92	No	2.29	No
Benzo[g,h,i]perylene	1.55	3.00	No	7.16	Yes
1,4-Dichlorobenzene	0.92 Q	0.93 Q	No	0.95 Q	No

(a) Value shown is a mean of five replicates; one-half the detection limit used when analyte was undetected.
(b) CLIS - Central Long Island Site.
(c) SD Significant difference.
(d) Q Undetected at or above twice the given concentration.

TABLE 3.30 Magnification Factors of All Analyzed Compounds in *Macoma nasuta* Tissues Exposed to the Eastchester Composites Relative to Tissues Exposed to the Mud Dump Reference Site and the Central Long Island Sound Reference Site

	Magnification Factors[a]			
	MDRS[b]		CLIS[c]	
Analyte	EC-A	EC-B	EC-A	EC-B
Ag	0.99	0.68	1.31	0.89
As	0.97	1.03	1.00	1.07
Cd	1.30	1.31	1.76	1.78
Cr	1.77	0.99	1.48	0.82
Cu	1.78	1.53	1.24	1.06
Hg	1.11	0.89	1.18	0.95
Ni	1.95	1.36	1.24	0.86
Pb	5.92	4.80	2.02	1.64
Zn	1.09	0.95	1.17	1.03
2,4'-DDD	7.19	7.54	6.86	7.19
2,4'-DDE	0.94	1.17	0.99	1.24
2,4'-DDT	1.04	1.30	0.99	1.23
4,4'-DDD	**19.9**	**23.4**	**18.5**	**21.8**
4,4'-DDE	**30.3**	**12.3**	8.12	3.31
4,4'-DDT	1.86	2.90	0.29	0.46
α-Chlordane	**13.1**	**32.6**	**12.7**	**31.6**
Aldrin	3.66	4.62	**10.4**	**13.2**
Dieldrin	3.41	3.55	3.17	3.30
Endosulfan I	1.03	1.29	0.99	1.24
Endosulfan II	1.03	1.34	0.99	1.28
Endosulfan Sulfate	1.03	1.29	0.99	1.24
Heptachlor	1.01	3.05	0.96	2.93
Heptachlor Epoxide	1.05	1.31	1.00	1.25
trans-Nonachlor	2.43	8.70	2.33	8.34
PCB 8	1.12	0.94	2.72	2.26
PCB 18	9.11	**15.0**	8.73	**14.4**
PCB 28	**10.8**	**12.9**	8.31	9.87
PCB 44	**15.3**	**17.5**	**11.2**	**12.8**
PCB 49	**23.9**	**21.6**	8.87	8.00
PCB 52	**10.2**	9.35	**10.7**	9.75
PCB 66	**37.9**	**30.9**	9.05	7.39
PCB 87	**10.9**	7.44	9.07	6.20
PCB 101	**11.3**	8.65	4.93	3.79
PCB 105	3.41	8.22	3.21	7.75
PCB 118	**10.6**	9.47	5.98	5.36
PCB 128	2.17	2.40	1.94	2.15
PCB 138	5.18	4.85	2.46	2.30
PCB 153	**10.6**	9.89	1.61	1.50
PCB 170	2.30	1.76	2.30	1.76
PCB 180	**15.2**	4.43	9.92	2.89

TABLE 3.30. (contd)

Analyte	Magnification Factors(a)			
	MDRS(b)		CLIS(c)	
	EC-A	EC-B	EC-A	EC-B
PCB 183	1.10	1.27	1.06	1.22
PCB 184	1.01	1.27	0.97	1.22
PCB 187	4.14	**16.7**	0.51	2.07
PCB 195	1.05	1.30	1.00	1.24
PCB 206	1.26	1.63	1.20	1.55
PCB 209	1.03	1.31	1.00	1.26
Naphthalene	1.59	2.99	1.54	2.89
Acenaphthylene	3.04	4.74	2.12	3.31
Acenaphthene	3.39	**33.3**	3.23	**31.7**
Fluorene	2.88	**23.1**	2.75	**22.1**
Phenanthrene	<u>6.38</u>	**94.2**	4.39	**64.9**
Anthracene	<u>5.81</u>	**51.1**	4.07	**35.8**
Fluoranthene	**39.3**	**95.4**	**21.9**	**53.2**
Pyrene	**51.7**	**120**	**19.4**	**45.0**
Benzo[a]anthracene	**34.6**	**91.6**	**15.2**	**40.2**
Chrysene	**44.5**	**122**	**18.5**	**50.8**
Benzo[b]fluoranthene	**33.4**	**56.4**	<u>8.21</u>	**13.8**
Benzo[k]fluoranthene	**18.5**	**11.9**	<u>6.28</u>	4.03
Benzo[a]pyrene	**40.5**	**75.3**	<u>9.96</u>	**18.5**
Indeno[123-cd]pyrene	**12.6**	**16.6**	4.84	<u>6.37</u>
Dibenzo[a,h]anthracene	4.18	<u>5.03</u>	3.99	4.79
Benzo[g,h,i]perylene	**15.4**	**22.2**	4.74	<u>6.87</u>
1,4-Dichlorobenzene	1.04	1.30	1.00	1.24

(a) Magnification factors are the ratio of the test treatment concentration to the reference treatment concentration (dry weight basis). When the analyte was undetected in one or more replicates, the achieved detection limit value was used in the calculation. Underlined values are ≥5 and <10 times reference site values, values shown in bold are ≥10 times reference site values.
(b) MDRS - Mud Dump Reference Site.
(c) CLIS - Central Long Island Sound Reference Site.

TABLE 3.31. Magnification Factors of All Analyzed Compounds in *Nereis virens* Tissues Exposed to the Eastchester Composites Relative to Tissues Exposed to the Mud Dump Reference Site and the Central Long Island Sound Reference Site

	Magnification Factors[a]			
	MDRS[b]		CLIS[c]	
Analyte	EC-A	EC-B	EC-A	EC-B
Ag	0.94	0.94	1.00	1.00
As	0.92	0.91	0.95	0.94
Cd	1.08	1.00	1.27	1.17
Cr	1.04	1.14	1.04	1.14
Cu	0.52	0.72	1.15	1.58
Hg	0.96	0.64	1.17	0.78
Ni	1.02	1.08	0.92	0.98
Pb	1.43	2.17	1.52	2.31
Zn	1.27	0.94	0.57	0.42
2,4'-DDD	**14.1**	**16.8**	3.60	4.28
2,4'-DDE	0.93	0.94	1.02	1.02
2,4'-DDT	0.93	0.94	1.02	1.02
4,4'-DDD	**13.7**	**17.8**	4.10	<u>5.34</u>
4,4'-DDE	**16.5**	**14.9**	<u>6.08</u>	<u>5.46</u>
4,4'-DDT	2.67	4.24	2.94	4.67
Aldrin	**10.2**	<u>9.94</u>	1.75	1.70
α-Chlordane	**14.5**	**44.9**	**11.4**	**35.3**
Dieldrin	3.55	4.03	2.71	3.09
Endosulfan I	0.93	0.94	1.02	1.02
Endosulfan II	0.93	0.94	1.02	1.02
Endosulfan Sulfate	0.93	1.61	0.98	1.68
Heptachlor	1.67	3.43	1.84	3.78
Heptachlor Epoxide	0.93	1.66	0.83	1.48
trans-Nonachlor	2.80	<u>6.95</u>	2.55	<u>6.33</u>
PCB 8	0.93	0.93	1.03	1.03
PCB 18	<u>8.97</u>	**11.8**	<u>9.87</u>	**13.0**
PCB 28	**25.0**	**26.3**	**17.9**	**18.8**
PCB 44	**13.8**	**14.9**	**14.2**	**15.3**
PCB 49	**18.9**	**19.6**	<u>8.65</u>	<u>9.00</u>
PCB 52	**20.8**	**23.8**	4.92	<u>5.63</u>
PCB 66	**21.2**	**25.4**	**23.6**	**28.4**
PCB 87	3.97	4.61	2.61	3.03
PCB 101	**12.8**	**17.6**	2.06	2.84
PCB 105	<u>9.13</u>	**15.4**	2.22	3.76
PCB 118	**11.3**	**18.4**	1.78	2.90
PCB 128	2.05	3.28	1.31	2.10
PCB 138	3.43	<u>5.24</u>	1.45	2.22
PCB 153	2.44	3.40	1.33	1.85
PCB 170	3.50	4.77	1.75	2.38
PCB 180	4.44	<u>8.82</u>	2.24	4.44

TABLE 3.31. (contd)

Analyte	Magnification Factors(a) MDRS(b) EC-A	MDRS(b) EC-B	CLIS(c) EC-A	CLIS(c) EC-B
PCB 183	2.88	4.26	1.61	2.38
PCB 184	0.94	0.94	1.04	1.04
PCB 187	3.08	4.37	1.63	2.32
PCB 195	0.94	1.64	1.02	1.78
PCB 206	2.66	2.75	2.08	2.14
PCB 209	1.99	1.21	1.69	1.02
Naphthalene	0.44	1.35	1.02	3.14
Acenaphthylene	1.17	2.56	2.01	4.41
Acenaphthene	1.90	**11.6**	2.50	**15.2**
Fluorene	0.75	3.24	1.44	6.18
Phenanthrene	0.90	7.71	1.40	**12.0**
Anthracene	1.45	3.93	1.59	4.33
Fluoranthene	**10.5**	**22.5**	**11.5**	**24.8**
Pyrene	**12.2**	**20.6**	**13.0**	**21.9**
Benzo[a]anthracene	1.54	4.36	2.79	7.92
Chrysene	8.99	**20.9**	9.41	**21.8**
Benzo[b}fluoranthene	2.61	5.28	2.43	4.92
Benzo[k]fluoranthene	2.72	5.30	2.15	4.18
Benzo[a]pyrene	2.92	7.93	2.88	7.82
Indeno[123-cd]pyrene	1.03	2.36	1.03	2.36
Dibenzo[a,h]anthracene	1.06	1.75	1.17	1.93
Benzo[g,h,i]perylene	1.59	3.72	1.54	3.60
1,4-Dichlorobenzene	0.93	0.94	1.03	1.03

(a) Magnification factors are the ratio of the test treatment concentration to the reference treatment concentration (dry weight basis). When the analyte was undetected in one or more replicates, the achieved detection limit value was used in the calculation. Underlined values are ≥5 and <10 times reference site values, values shown in bold are ≥10 times reference site values.
(b) MDRS - Mud Dump Reference Site.
(c) CLIS - Central Long Island Sound Reference Site.

4.0 Discussion and Conclusions

In this section, physical and chemical analyses, and bioassays performed on the Eastchester sediment composite are evaluated relative to the Mud Dump Reference Site and Central Long Island Sound Reference Site sediments by the Green Book Tier III guidelines and by additional guidelines provided by USACE-NYD. The Tier III evaluation uses water-column toxicity tests, benthic toxicity tests, and whole-sediment bioaccumulation studies to assess the impact of contaminants in the dredged material on marine organisms and to determine whether there is potential for the material to have an unacceptable environmental effect during ocean disposal. The Green Book Tier III and USACE-NYD provide the following guidance for determining whether the proposed dredged material is unacceptable for ocean disposal:

- Water-Column Toxicity. The limiting permissible concentration (LPC) of dissolved plus suspended contaminants cannot exceed 0.01 of the acutely toxic concentration at the boundaries of the disposal site within the first 4 h after disposal, or at any point in the marine environment after the first 4 h. The acutely toxic concentration in this case is taken to be the median lethal concentration (LC_{50}); therefore, acute toxicity in SPP tests would require at least 50% mortality in an SPP treatment to be evaluated according to the Green Book. A numerical mixing model should be used to predict whether concentrations greater than 0.01 of the acutely toxic SPP concentrations are likely to occur beyond the boundaries of the disposal site within the first 4 h after disposal.
- Benthic Acute Toxicity. The proposed dredged material does not meet the LPC for benthic toxicity when the difference between organism survival in the test sediment and the reference site sediment is statistically significant, and survival in test sediment is at least 20% lower than survival in reference sediment for *A. abdita*, *R. abronius*, and *E. estuarius*, or at least 10% for *M. bahia*.
- Bioaccumulation. The proposed dredged material does not meet the LPC for bioaccumulation if tissue concentrations of one or more contaminants of concern are greater than applicable FDA levels. Regional guidance (USACE 1981) for interpretation of bioaccumulation was also considered. When the bioaccumulation of contaminants in the dredged material exceeds that in the reference material exposures, further case-specific evaluation criteria listed in the Green Book should be consulted to determine LPC and benthic effects compliance.

Sections 4.1 through 4.4 discuss the proposed Eastchester dredged material in terms of sediment characterization and Tier III evaluations. The contribution of each Eastchester composite to water-column or benthic acute toxicity and potential for bioaccumulation relative to each reference is also presented.

4.1 Sediment Physical and Chemical Characterization

Eastchester sediment core samples were generally black or gray-black, silty-clayey material. The grain-size distributions of core samples were variable. Seven stations were predominantly sand and gravel (EC-1, EC-2, EC-3, EC-6, EC-7, EC-15, and EC-17), whereas the remaining 11 stations were predominantly silt and clay. Sediment moisture contents ranged from 25% to 65% in individual cores. Levels of all nine metals analyzed in COMP EC-A and COMP EC-B sediments exceeded those found in the Mud Dump Reference Site sediment. The dominant pesticides found in both COMP EC-A and COMP EC-B were the DDT family of compounds (49.8 µg/kg and 196 µg/kg total DDTs, respectively), followed by α-chlordane, dieldrin, and *trans*-nonachlor. In general, COMP EC-B had higher concentrations of chlorinated pesticides than COMP EC-A. All of the 22 PCB congeners analyzed were detected in COMPs EC-A and EC-B sediments, with total PCB concentrations of 287 µg/kg for COMP EC-A and 1490 µg/kg for COMP EC-B. All 17 PAHs analyzed were detected in COMP EC-A and EC-B sediments. In COMP EC-A, LPAH made up approximately 16% of the total PAH concentration (8090 µg/kg, dry weight). Concentrations of PAHs in COMP EC-B sediment were approximately 7.4 times higher (total PAH of 59,600 µg/kg, dry weight) and had a higher proportion of LPAHs (32% of the total PAHs) than COMP EC-A. The concentrations of 1,4-dichlorobenzene were 25 µg/kg and 228 µg/kg in COMPs EC-A and EC-B, respectively.

In the CT COMPs prepared for USACE-NED, composites from Reach A generally had lower concentrations of contaminants than composites from Reach B. CT COMPs contained a broader range of metals contamination than COMPs EC-A and EC-B. The highest metals concentrations were found in CT COMPs EC-B-I through EC-B-IV. The DDT family of compounds, α-chlordane, dieldrin, and *trans*-nonachlor were the only chlorinated pesticides found above the detection limit in either Reach A or Reach B CT COMPs. Total PCBs in Reach A ranged from 45.7 µg/kg (CT COMP EC-A-II) to 1030 µg/kg (CT COMP EC-A-V) and in Reach B ranged from 832 µg/kg (CT COMP EC-B-V) to 2720 µg/kg (CT COMP EC-B-III). Total PAHs ranged from 2170 µg/kg (CT COMP EC-A-II) to 18,700 µg/kg (CT COMP EC-A-V) in Reach A, and from 21,200 µg/kg (CT COMP EC-B-II) to 167,000 µg/kg (CT COMP EC-B-VI) in Reach B. All Reach A and Reach B CT COMPs contained less than 27% LPAHs (% of total PAHs) except EC-B-VI, in which LPAHs constituted 51% of the total PAHs.

4.2 Site Water and Elutriate Chemical Characterization

Sequim Bay control water had the lowest concentrations of metals, when compared with Mud Dump Site water and Eastchester Reach A and Reach B site waters. The highest metals concentrations were found in the two Eastchester site waters. Whereas Eastchester Reach A elutriate concentrations of metals were generally lower than Mud Dump Site water, Reach B elutriate metals concentrations were consistently higher than Mud Dump Site water. Many pesticides and PCB congeners were not detected in the site water samples. The majority of detected pesticides and PCB congeners were at higher concentrations in elutriates than in site water, with the notable exception of aldrin, which was highest in Reach A site water.

4.3 Toxicity

The contribution of each Eastchester composite to benthic acute toxicity relative to the Mud Dump Reference Site is presented in Figure 4.1. In comparison with the Mud Dump Reference Site, no statistically significant acute toxicity was found with either Eastchester composite in the static test with *M. bahia* and in the Reach A composite with the static-renewal test using *A. abdita*. Acute toxicity and at least 20% increase in mortality over the Mud Dump Reference Site sediment was found in static-renewal tests with *R. abronius* (Reaches A and B), and *A. abdita* (Reach B only). Therefore, both Eastchester sediment composites did not meet the LPC for benthic toxicity to these test organisms at the Mud Dump Site, if the observed effects were due to persistent contaminants.

The contribution of each Eastchester composite to benthic acute toxicity relative to the Central Long Island Sound Reference Site is presented in Figure 4.2. In comparisons with the Central Long Island Sound Reference Site, no statistically significant acute toxicity was found with *M. bahia* and with *A. abdita* (Reach A only). Statistically significant acute toxicity and a greater than 20% increase in mortality over the reference sediment was found in static-renewal tests with *A. abdita* (Reach B only) and *R. abronius* (Reaches A and B). Therefore, both Eastchester sediment composites did not meet the LPC for benthic toxicity to these test organisms at the Central Long Island Sound Reference Site, if the observed effects were due to persistent contaminants.

The water-column toxicity of Eastchester composites is also presented in Figures 4.1 and 4.2. In water-column toxicity tests, 100% SPP from Reach A was acutely toxic to *M. beryllina* and *M. galloprovincialis*. The 100% SPP from Reach B was acutely toxic to all three species tested. For Reach B, the LC_{50}s ranged from 37.6% SPP for *M. beryllina* to 68.6% SPP for *M. bahia*. The EC_{50} for *M. galloprovincialis* normal development, a more sensitive measure than survival, was 21.0% SPP for Reach B and >100% SPP for Reach A. Based on acute mortality results (LC_{50}s), the LPC for water-column effects outside of the disposal site boundaries after 4 h is 0.38% SPP for Eastchester Reach B. SPP concentrations exceeding this value after 4 h at the any disposal site boundary would be unacceptable. Because Eastchester Reach A did not cause acute water-column toxicity, there is no need to estimate an LPC for water-column effects of Reach A sediments.

Category	Sediment Treatment	Eastchester Reach A vs. MDRS		Eastchester Reach B vs. MDRS	
Acute Toxicity	*A. abdita* Benthic Static-Renewal Test	- [a]		AT [b]	
Acute Toxicity	*E. estuarius* Benthic Static-Renewal Test	-		NT [c]	
Acute Toxicity	*R. abronius* Benthic Static-Renewal Test	AT		AT	
Acute Toxicity	*M. bahia* Benthic Static Test	-		-	
Acute Toxicity	*M. beryllina* SPP Test	S [d]		S	
Acute Toxicity	*M. bahia* SPP Test	-		S	
Acute Toxicity	*M. galloprovincialis* SPP Test	-		S	
	Test Species(e)	*N. virens*	*M. nasuta*	*N. virens*	*M. nasuta*
Any Significant Bioaccumulation	# of Metals (9 total)	-	4	1	2
Any Significant Bioaccumulation	# of Pesticide compounds (15 total)	5	6	9	7
Any Significant Bioaccumulation	# of PCB congeners (22 total)	13	14	14	15
Any Significant Bioaccumulation	# of PAH compounds (16 total)	7	16	11	15
Any Significant Bioaccumulation	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation ≤ 2 times Ref.	# of Metals (9 total)	-	3	-	1
Bioaccumulation ≤ 2 times Ref.	# of Pesticide compounds (15 total)	-	-	-	-
Bioaccumulation ≤ 2 times Ref.	# of PCB congeners (22 total)	1	-	-	-
Bioaccumulation ≤ 2 times Ref.	# of PAH compounds (16 total)	1	1	-	-
Bioaccumulation ≤ 2 times Ref.	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation >2≤ 5 times Ref.	# of Metals (9 total)	-	-	1	1
Bioaccumulation >2≤ 5 times Ref.	# of Pesticide compounds (15 total)	1	2	3	2
Bioaccumulation >2≤ 5 times Ref.	# of PCB congeners (22 total)	4	2	4	3
Bioaccumulation >2≤ 5 times Ref.	# of PAH compounds (16 total)	3	4	3	2
Bioaccumulation >2≤ 5 times Ref.	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation >5≤10 times Ref.	# of Metals (9 total)	-	1	-	-
Bioaccumulation >5≤10 times Ref.	# of Pesticide compounds (15 total)	-	1	2	2
Bioaccumulation >5≤10 times Ref.	# of PCB congeners (22 total)	2	2	2	6
Bioaccumulation >5≤10 times Ref.	# of PAH compounds (16 total)	1	2	4	1
Bioaccumulation >5≤10 times Ref.	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation >10 times Ref.	# of Metals (9 total)	-	-	-	-
Bioaccumulation >10 times Ref.	# of Pesticide compounds (15 total)	4	3	4	3
Bioaccumulation >10 times Ref.	# of PCB congeners (22 total)	6	10	8	6
Bioaccumulation >10 times Ref.	# of PAH compounds (16 total)	2	9	4	12
Bioaccumulation >10 times Ref.	1,4-dichlorobenzene	-	-	-	-

(a) - No significant difference/no significant bioaccumulation at this level.
(b) AT Acutely toxic; significantly different from reference and mortality >20% higher than reference (>10% for mysids)
(c) NT Not tested.
(d) S Significantly different mortality between 0% and 100% SPP.
(e) Number of compounds bioaccumulating in tissues of test species.

FIGURE 4.1. Summary Matrix of Eastchester Sediment Toxicity and Bioaccumulation in Comparison with the Mud Dump Reference Site

	Sediment Treatment	Eastchester Reach A vs. CLIS	Eastchester Reach B vs. CLIS
Acute Toxicity	*A. abdita* Benthic Static-Renewal Test	- [(a)]	AT [(b)]
Acute Toxicity	*E. estuarius* Benthic Static-Renewal Test	NT [(c)]	NT
Acute Toxicity	*R. abronius* Benthic Static-Renewal Test	AT	AT
Acute Toxicity	*M. bahia* Benthic Static Test	-	-
Acute Toxicity	*M. beryllina* SPP Test	S [(d)]	S
Acute Toxicity	*M. bahia* SPP Test	-	S
Acute Toxicity	*M. galloprovinciallis* SPP Test	-	S

	Test Species[(e)]	Reach A *N. virens*	Reach A *M. nasuta*	Reach B *N. virens*	Reach B *M. nasuta*
Any Significant Bioaccumulation	# of Metals (9 total)	-	2	-	2
Any Significant Bioaccumulation	# of Pesticide compounds (15 total)	5	6	7	7
Any Significant Bioaccumulation	# of PCB congeners (22 total)	8	13	9	12
Any Significant Bioaccumulation	# of PAH compounds (16 total)	7	15	13	15
Any Significant Bioaccumulation	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation ≤ 2 times Ref.	# of Metals (9 total)	-	1	-	2
Bioaccumulation ≤ 2 times Ref.	# of Pesticide compounds (15 total)	-	-	-	-
Bioaccumulation ≤ 2 times Ref.	# of PCB congeners (22 total)	1	1	-	-
Bioaccumulation ≤ 2 times Ref.	# of PAH compounds (16 total)	1	1	-	-
Bioaccumulation ≤ 2 times Ref.	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation >2≤ 5 times Ref.	# of Metals (9 total)	-	1	-	-
Bioaccumulation >2≤ 5 times Ref.	# of Pesticide compounds (15 total)	3	1	3	2
Bioaccumulation >2≤ 5 times Ref.	# of PCB congeners (22 total)	3	3	4	4
Bioaccumulation >2≤ 5 times Ref.	# of PAH compounds (16 total)	3	8	5	3
Bioaccumulation >2≤ 5 times Ref.	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation >5≤10 times Ref.	# of Metals (9 total)	-	-	-	-
Bioaccumulation >5≤10 times Ref.	# of Pesticide compounds (15 total)	1	2	3	2
Bioaccumulation >5≤10 times Ref.	# of PCB congeners (22 total)	2	7	2	6
Bioaccumulation >5≤10 times Ref.	# of PAH compounds (16 total)	1	2	3	2
Bioaccumulation >5≤10 times Ref.	1,4-dichlorobenzene	-	-	-	-
Bioaccumulation >10 times Ref.	# of Metals (9 total)	-	-	-	-
Bioaccumulation >10 times Ref.	# of Pesticide compounds (15 total)	1	3	1	3
Bioaccumulation >10 times Ref.	# of PCB congeners (22 total)	2	2	3	2
Bioaccumulation >10 times Ref.	# of PAH compounds (16 total)	2	4	5	10
Bioaccumulation >10 times Ref.	1,4-dichlorobenzene	-	-	-	-

(a) - No significant difference/no significant bioaccumulation at this level.

(b) AT Acutely toxic; significantly different from reference and mortality >20% higher than reference (>10% for mysids)

(c) NT Not tested.

(d) S Significantly different mortality between 0% and 100% SPP.

(e) Number of compounds bioaccumulating in tissues of test species.

FIGURE 4.2. Summary Matrix of Eastchester Sediment Toxicity and Bioaccumulation in Comparison with the Central Long Island Sound Reference Site

4.4 Bioaccumulation

Results of *N. virens* and *M. nasuta* tissue analyses from test sediment bioaccumulation studies were compared with action levels for poisonous or deleterious substances in fish and shellfish for human consumption published by the FDA and with USACE-NYD (USACE 1981) bioaccumulation matrix levels. Concentrations of As, Cd, Cr, Ni, and Pb were also compared with the FDA level of concern for chronic shellfish consumption (FDA 1993a, 1993b, 1993c, 1993d, 1993e) for each of these metals. Results of tissue analyses from test sediment bioaccumulation studies were also compared with contaminant concentrations in tissues of organisms similarly exposed to Mud Dump Reference Site and Central Long Island Sound Reference Site sediment.

When *N. virens* and *M. nasuta* were exposed to Eastchester sediment composites in 28-day bioaccumulation tests, concentrations of some contaminants were elevated in tissues of both species relative to levels in organisms exposed to the Mud Dump Reference Site. Concentrations of all metals (except Cd) were higher in *M. nasuta* than in *N. virens*. Pesticide and PCB concentrations were similar in the two species, with some analytes higher in the *N. virens*, and others higher in the *M. nasuta*. Concentrations of PAHs were higher in *M. nasuta*, many compounds by factors of 4 to 10 or more times, than in *N. virens*. Table 4.1 compares the NYD bioaccumulation matrix guidance levels (USACE 1981), FDA action levels for poisonous or deleterious substances in fish and shellfish for human consumption for selected pesticides, and FDA levels of concern for chronic shellfish consumption for selected metals with the mean concentration of these contaminants found in tissues of each test species. The *N. virens* and *M. nasuta* tissues exposed to Eastchester sediment had tissue body burdens that were lower than the FDA levels for each of these selected contaminants.

When tissue burdens of organisms exposed to Eastchester sediment were compared with those exposed to either Mud Dump Reference Site or Central Long Island Sound Reference Site sediment, the tissue burdens were statistically significantly higher for metals, pesticides, PCBs, and PAHs. Therefore, Eastchester sediment requires further evaluation to determine LPC and benthic effects compliance. Figures 4.1 and 4.2 (for the Mud Dump Reference Site and Central Long Island Sound Reference Site, respectively) show bioaccumulation potential as the number of contaminants that were elevated in the tissues of *M. nasuta* and *N. virens* at certain magnitudes (i.e., 2, 5, or 10 times) above tissues of each species exposed to the reference sediment. This format clearly indicates where and to what degree similar classes of contaminants were accumulated by both *M. nasuta* and *N. virens*.

Table 4.1. Comparison of Contaminant Concentrations in *N. virens* and *M. Nasuta* Tissues Exposed to Proposed Dredged Material for Eastchester Project Area with FDA Action Levels and Levels of Concern

Substance	FDA Level (mg/kg wet wt)	Mean Concentration[a] in *N. virens* Tissues (mg/kg wet wt) COMP EC-A	COMP EC-B	Mean Concentration[a] in *M. nasuta* Tissues (mg/kg wet wt) COMP EC-A	COMP EC-B
Chlordane[b]	0.3[c]	0.002	0.005	0.001	0.003
Total DDT[d]	5.0[c]	0.017	0.020	0.019	0.015
Dieldrin + Aldrin	0.3[c]	0.004	0.004	0.003	0.003
Heptachlor+ Heptachlor epoxide	0.3[c]	0.0003	0.0009	0.0002 U[e]	0.0003 U
Total PCBs[f]	2.0[c]	0.114	0.155	0.108	0.103
Arsenic	86[g]	1.95	1.97	2.80	2.90
Cadmium	3.7[g]	0.068	0.064	0.042	0.041
Chromium	13[g]	0.132	0.175	0.672	0.363
Lead	1.7[g]	0.540	0.806	1.72	1.36
Nickel	80[f]	0.116	0.128	0.715	0.486
Methyl Mercury	1.0[g]	0.012[h]	0.008[h]	0.018[h]	0.014[h]
Total DDT[d]	0.04[i]	0.017	0.020	0.019	0.015
Total PCBs[e]	0.40[i]	0.114	0.155	NA[i]	NA
Total PCBs[e]	0.10[i]	NA[j]	NA	0.108	0.103
Total Mercury	0.20[i]	0.012	0.008	0.018	0.014
Cadmium	0.30[i]	0.068	0.064	0.042	0.041

(a) Concentration shown is the mean of five replicate tissue analysis. If any constituents were undetected, one-half of the detection limit was used in calculation of the mean concentration.
(b) Sum of α-chlordane and *trans*-nonachlor only, whereas FDA action level is a sum of nine chlordane analytes.
(c) FDA Action Levels for Poisonous and Deleterious Substances in Fish and Shellfish for Human Food.
(d) Sum of mean values for 2,4'-DDT, 4,4'-DDT, 2,4'-DDE, and 4,4'-DDE, 2,4'-DDD, and 4,4'-DDD. One-half of the detection limit was used in the summation when mean values were undetected in a replicate.
(e) U Undetected at or above the given concentration.
(f) Total PCBs= 2.0(x), where x equals the sum of the 22 congeners. One-half of the detection limit was used in summation when mean values were undetected in a replicate.
(g) FDA Level of concern for chronic shellfish consumption.
(h) Value reported here is for total mercury.
(i) NYD bioaccumulation matrix value designated in 1981 (USACE 1981).
(j) NA Not applicable.

5.0 References

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Appendix A

Quality Assurance/Quality Control Data for Sediment Physical/Chemical Analyses, Eastchester Project

[illegible]

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Grain Size, Bulk Density, Specific Gravity and Total Solids

LABORATORY: Soil Technology, Bainbridge Island, Washington

MATRIX: Sediment

QA/QC DATA QUALITY OBJECTIVES

	Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Detection Limit (dry wt)
Grain Size	ASTM D-2217 and D-422	N/A	N/A	≤20%	1.0%
Bulk Density	ASTM D-854	N/A	N/A	≤20%	N/A
Specific Gravity	EM 1110-2-1906	N/A	N/A	≤20%	N/A
Total Solids	Plumb 1981	N/A	N/A	N/A	1.0%

METHOD Grain size was measured for four fractions using a combination of sieve and pipet techniques, following ASTM method D-2217 and D-422 for wet sieving. Bulk density was measured in accordance with ASTM method D-854. Specific gravity was measured in accordance with USACE Method EM 1110-2-1906. Total solids was measured gravimetrically following Plumb (1981).

HOLDING TIMES Samples were analyzed within the 6 month holding time.

DETECTION LIMITS Target detection limits of 1.0% by weight for each fraction were met for all samples.

METHOD BLANKS Not applicable.

MATRIX SPIKES Not applicable.

REPLICATES Six samples were analyzed in triplicate for grain size. Precision was measured by calculating the relative standard deviation (RSD) among triplicate results. The RSD's ranged from 0% to 10%, indicating acceptable precision. Two samples were analyzed in duplicate for bulk density and specific gravity. Precision was measured by calculating the relative percent difference (RPD) between the replicate results. The RPDs for bulk density were 0% and 2% while the RPDs for specific gravity were both 1%, indicating acceptable precision of the methods.

For total solids, three samples were analyzed in duplicate and four samples were analyzed in triplicate. All RSDs and RPDs were 0%.

SRMs Not applicable.

REFERENCES

ASTM D-2217. Standard Method for Wet Preparation of Soil Samples for Particle-size Analysis and Determination of Soil Constants.

ASTM D-422. Standard Method for Particle-Size Analysis of Soils.

ASTM D-854. Standard Method for Specific Gravity

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QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Total Organic Carbon (TOC)

LABORATORY: Global Geochemistry, Canoga Park, California

MATRIX: Sediment

QA/QC DATA QUALITY OBJECTIVES

Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Detection Limit (dry wt)
EPA 1986	N/A	≤20%	≤10%	0.1%

METHOD TOC was analyzed in accordance with EPA (1986). Analysis was performed by combustion and quantitation of evolved carbon dioxide using a LECO analyzer.

HOLDING TIMES Samples were analyzed within the 6 month holding time.

DETECTION LIMITS Target detection limits of 0.1% was met for all samples.

METHOD BLANKS Thirty-four method blanks were analyzed with the sediment samples. TOC levels detected in blanks ranged from 0.001% to 0.008% which were less than the established detection limit.

MATRIX SPIKES Not applicable.

REPLICATES Four samples were analyzed in triplicate and three samples were analyzed in duplicate. Precision was measured by calculating the relative standard deviation (RSD) or relative percent difference (RPD) between the replicate results. All RSDs and RPDs were between 1% and 10% indicating acceptable precision of the method.

SRMs Standard reference material MESS-1, obtained from the National Research Council of Canada, was analyzed at least once per batch of sediment samples. Although MESS-1 is not certified for TOC, accuracy was measured by calculating the percent difference (PD) from the in-house consensus value. PD values reported ranged from 1% to 8%.

REFERENCES

EPA (U.S. Environmental Protection Agency) 1986. Determination of Total Organic Carbon in Sediment. Environmental Protection Agency, Region II, Environmental Services Division, Monitoring Management Branch, Edison, New Jersey.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Metals

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Sediment

QA/QC DATA QUALITY OBJECTIVES

	Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Achieved Detection Limit (dry wt)
Arsenic	ICP/MS	75-125%	≤20%	≤20%	0.572
Cadmium	ICP/MS	75-125%	≤20%	≤20%	0.020
Chromium	ICP/MS	75-125%	≤20%	≤20%	0.401
Copper	ICP/MS	75-125%	≤20%	≤20%	0.525
Lead	ICP/MS	75-125%	≤20%	≤20%	0.136
Mercury	CVAA	75-125%	≤20%	≤20%	0.001
Nickel	ICP/MS	75-125%	≤20%	≤20%	0.849
Silver	ICP/MS	75-125%	≤20%	≤20%	0.119
Zinc	ICP/MS	75-125%	≤20%	≤20%	2.55

METHOD

A total of nine metals was analyzed: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn). Hg was analyzed using cold-vapor atomic absorption spectroscopy (CVAA) according to the method of Bloom and Crecelius (1983). The remaining metals were analyzed by inductively coupled plasma mass spectrometry (ICP/MS) following EPA Method 200.8 (EPA 1991)

To prepare sediment samples for analysis, samples were freeze-dried and blended in a Spex mixer-mill. Approximately 5 g of mixed sample was ground in a ceramic ball mill. For ICP/MS and CVAA analyses, 0.2- to 0.5-g aliquots of dried homogenous sample were digested using nitric acid following modified EPA Method 200.2 (EPA 1991). Sediment samples initially showed poor matrix spike recovery for Ag. (Refer to Matrix Spike section of this QA/QC Summary.) EPA Method 200.2 was modified by the addition of aqua regia to the digestion procedure and all samples were reanalyzed for Ag.

HOLDING TIMES

A total of 43 samples was received on 3/30/94 and were logged into Battelle's log-in system. Samples were frozen to -80°C and subsequently freeze dried. Samples were all analyzed within180 days of collection. The following list summarizes all analysis dates:

Task	Date Performed
Sample Digestion	5/5/94
ICP-MS	5/20/94
CVAA-Hg	5/9/94

DETECTION LIMITS Target detection limits were exceeded for some metals; however, metals were detected above the MDLs in all samples with the exception of Ag in one sample. MDLs were determined by multiplying the standard deviation of the mean of four replicate low level sediment spikes by 3.5.

METHOD BLANKS Two method blanks were analyzed. No metals were detected above the MDL in either blank with the exception of Pb in Blank-2. The value was less than three times the MDL and all sample values were detected at levels greater than five times the blank concentration, so no data were flagged. All data were blank corrected.

MATRIX SPIKES Two samples were spiked with all nine metals. In the original set of matrix spikes, recoveries of all metals, with the exception of Ag, were within the QC limits of 75% to 125%. Recoveries of Ag in the original spikes were low (3% and 10%). After reanalysis of the matrix spikes with the addition of aqua regia to the digestion procedure (see Methods section of this QA/QC Summary), matrix spike recoveries improved (93%) and concentrations of Ag in the dredging site sediments increased slightly. The low recovery of Ag appears to occur in analysis of marine sediment samples having high (in excess of approximately 5 μg/g) Ag concentrations. During the EPA Method 200.2 digestion procedure, a precipitate of AgCl can form with the Ag in the sediment and the Cl in the seawater.

REPLICATES Two samples were digested and analyzed in triplicate. Precision of triplicate analyses is reported by calculating the relative standard deviation (RSD) between the replicate results. RSD values ranged from 1% to 5%, within the QC limits of ±20%, indicating acceptable precision.

SRM Standard Reference Material (SRM) 1646 (estuarine sediment from the National Institute of Standards and Technology [NIST]), was analyzed for all metals. Only results for Cd, Cu and Hg were within ±20% of the certified value (Ag is not certified). Results for As, Ni, and Pb were between 20 and 30% of the certified values. The poorest result was for Cr, where the mean was 46% of the certified value. Values for the remaining metals were low because the digestion method used is not as strong as the method (perchloric acid) used to certify the SRM; thus, the results of this analysis should not be expected to match the SRM certified values. Therefore, no corrective actions were taken.

REFERENCES

Bloom, N. S., and E.A. Crecelius. 1983. "Determination of Mercury in Seawater at Sub-Nanogram per Liter Levels." *Mar. Chem.* 14:49-59.

EPA (U.S. Environmental Protection Agency). 1991. *Methods for the Determination of Metals in Environmental Samples.* EPA-600/4-91-010. Environmental Services Division, Monitoring Management Branch., Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Additional Metals

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Sediment

QA/QC DATA QUALITY OBJECTIVES

	Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Achieved Detection Limit (dry wt)
Antimony	ICP/MS	75-125%	≤20%	≤20%	0.03
Beryllium	ICP/MS	75-125%	≤20%	≤20%	0.5
Selenium	GFAA	75-125%	≤20%	≤20%	0.13
Thallium	ICP/MS	75-125%	≤20%	≤20%	0.024

METHOD

An additional four metals were analyzed for a subset of sediment samples: Antimony (Sb), Beryllium (Be), Selenium (Se) and Thallium (Tl).

To prepare sediment samples for analysis, samples were freeze-dried and blended in a Spex mixer-mill. Approximately 5 g of mixed sample was ground in a ceramic ball mill. For inductively coupled plasma mass spectrometry (ICP/MS) and graphite furnace atomic absorption (GFAA) analyses, 0.2- to 0.5-g aliquots of dried homogenous sample were digested according to EPA Method 200.2 (EPA 1991), modified by the addition of aqua regia to the digestion procedure. Se was analyzed using GFAA. The other three metals were analyzed by ICP/MS following EPA Method 200.8 (EPA 1991).

HOLDING TIMES

A total of 43 samples was received on 3/30/94 and was logged into Battelle's log-in system. Samples were frozen to -80°C and subsequently freeze-dried. According to instructions from the program manager, 21 samples were composited into 8 samples. A subset of 17 samples (the Port Chester and Eastchester sediment composites) were analyzed for an additional four metals as requested in a memo from the program manager dated 1/11/95. The following list summarizes all analysis dates:

QA/QC SUMMARY/ADDITIONAL METALS (continued)

Task	Date Performed
Aqua Regia	2/1/95
ICP/MS - Sb, Be, Tl	3/7/95
GFAA - Se	2/7/95

DETECTION LIMITS Target detection limits were met for Sb, Se, and Tl. The detection limit (DL) for Be exceeds the target detection limit. However, all but three values were greater than the estimated DL and these values were flagged with a J to indicate an estimation.

METHOD BLANKS Two method blanks were analyzed. Only Sb was detected in one of the blanks; however, the values were less than three times the MDL and all sample values were detected at levels greater than five times the blank concentration. Therefore, no data were flagged and all data were blank corrected.

MATRIX SPIKES One sample was spiked with all four metals. Recoveries of all metals except Sb (228%) were within the QC limits of 75% to 125%.

REPLICATES One sample was digested and analyzed in triplicate. Precision for triplicate analyses is reported by calculating the relative standard deviation (RSD) between replicate results. RSD values ranged from 2% to 12%, which is within the QC limits of ±20%, indicating acceptable precision.

SRM SRM 1646 (estuarine sediment from the National Institute of Standards and Technology [NIST]), was analyzed for all metals. None of the four additional metals are certified. However, non-certified values are reported and all four metals, with the exception of one replicate for Sb, are within 39% of the non-certified values.

REFERENCES

EPA (U.S. Environmental Protection Agency). 1991. *Methods for the Determination of Metals in Environmental Samples.* EPA-600/4-91-010. Environmental Services Division, Monitoring Management Branch, Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Chlorinated Pesticides, PCB Congeners, and 1,4-Dichlorobenzene

LABORATORY: Battelle Ocean Sciences, Duxbury, Massachusetts

MATRIX: Sediment

QA/QC DATA QUALITY OBJECTIVES

Reference Method	MS Recovery	Surrogate Recovery	SRM Accuracy	Relative Precision	Detection Limit (dry wt)
GC/ECD	50-120%	30-150%	≤30%	≤30%	1.0 - 20 ng/g

METHOD Sediment samples were extracted with methylene chloride according to a modified version of EPA Method 8080 and the National Oceanic and Atmospheric Administration (NOAA) Status and Trends cleanup procedure (Krahn et al. 1988). Extracts were analyzed using gas chromatography with electron capture detection (GC/ECD) following a modified version of EPA Method 8270. Pesticide detections were qualitatively confirmed on a secondary column.

HOLDING TIMES Samples were collected from 3/22/94 through 3/25/94, and after compositing, were held frozen at -20°C until shipment to the analytical laboratory. Sediment samples were received by Battelle Ocean Sciences on 4/22/94. Samples were held frozen at -20°C until extraction and analysis. Samples were extracted by 5/6/94 and analyzed from 6/2/94 to 6/29/94.

DETECTION LIMITS Target detection limits were exceeded for most of the analytes. Actual detection limits were determined by the Method Detection Limit (MDL) verification study. Four sediment samples with very low background concentrations of contaminants were spiked with target compounds. For each analyte, the standard deviation of the four spiked replicates was multiplied by 3.5.

METHOD BLANKS One method blank was extracted with batch of samples. No pesticides or PCB congeners were detected in the blank.

SURROGATES Two compounds, DBOFB and PCB congener 112, were added to all samples prior to extraction to assess the efficiency of the analysis. The mean recoveries of DBOFB and PCB 112 were 71% and 60%, respectively. Recoveries of these compounds were within the QC guidelines of 30% -150% for all samples analyzed.

MATRIX SPIKES

One sample in each batch was spiked with pesticides and PCB congeners. Recoveries for PCB congener CL_2 (25% and 47%) fell below the acceptable criteria of 50% to 120%. The reason for this low recovery is probably that the PCB congener CL_2 coeluted with alpha-BHC. All other PCB congener recoveries ranged from 54% to 121%. Recoveries for all pesticides and 1,4-dichlorobenzene ranged from 57% to 115%. Since >80% of all analytes were between 50% and 120%, no corrective action was taken.

REPLICATES

One sample from each batch was extracted in triplicate. Precision was measured by calculating the relative standard deviation (RSD) between the replicate results. RSDs were evaluated only when pesticides or PCB congeners were detected in all three replicates. RSDs ranged from 5% to 114%. Six of the RSDs were greater than 30% but of those six, only three were for analytes that were >10 times the MDL. These three were 31% for CL_3(18), 114% for CL_5(105) and 52% for CL_6(138).

SRMs

One SRM, 1941a, a marine sediment sample obtained from the National Institute of Science and Technology (NIST) was analyzed with each batch. Many of the values exceeded the acceptable criteria of ≤30%; however all were <10 times the MDL. Percent differences were calculated using SRM concentrations that were corrected for surrogate recovery.

REFERENCES

Krahn, M.M., C.A. Wigren, R.W. Pearce, L.K. Moore, R.G. Bogar, W.D. MacLeod, Jr., S-L Chan, and D.W. Brown. 1988. *New HPLC Cleanup and Revised Extraction Procedures for Organic Contaminants.* NOAA Technical Memorandum NMFS F/NWC-153. National Oceanic and Atmospheric Administration, National Marine Fisheries, Seattle, Washington.

EPA (U.S. Environmental Protection Agency). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* SW-846. U.S. Document No. 955-001-00000, U.S. Environmental Protection Agency, Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Polynuclear Aromatic Hydrocarbons (PAH)

LABORATORY: Battelle Ocean Sciences, Duxbury, Massachusetts

MATRIX: Sediment

QA/QC DATA QUALITY OBJECTIVES

Reference Method	MS/MSD Recovery	Surrogate Recovery	SRM Accuracy	Relative Precision	Detection Limit (dry wt)
GC/MS/SIM	50-120%	30-150%	≤30%	≤30%	10 ng/g

METHOD

Sediment samples were extracted according to a modified version of EPA Method 8080 and the NOAA Status and Trends cleanup procedure (Krahn et al. 1988). Extracts were analyzed using gas chromatography/mass spectrometry (GC/MS) in the selected ion mode (SIM) following a modified version of EPA Method 8270.

HOLDING TIMES

Samples were collected from 3/22/94 through 3/25/94, and after compositing, were held frozen at -20°C until shipment to the analytical laboratory. Sediment samples were received by Battelle Ocean Sciences, Duxbury, Massachusetts, on 4/22/94. Samples were held frozen at approximately -20°C until extraction and analysis. Samples were extracted by 5/6/94 and analyzed from 5/16/94 to 6/28/94.

DETECTION LIMITS

Target detection limits of 10 ng/g dry w. were met for most of the PAH compounds. Actual detection limits were determined by the Method Detection Limit (MDL) verification study. Four sediment samples with very low background concentrations of contaminants were spiked with target compounds. For each analyte, the standard deviation of the four spiked replicates was multiplied by 3.5. Actual detection limits ranged from 7.18 to 20.84 μg/kg.

METHOD BLANKS

One method blank was extracted with each batch of samples. No PAH compounds were detected above the MDL; however, 2 of the 17 compounds were detected below the MDL and are flagged with a "J" to indicate the values are estimates. They are pyrene in Batch 1 and naphthalene in Batch 2.

SURROGATES

Three isotopically labelled compounds, naphthalene-d_8, acenaphthene-d_{10}, and chrysene-d_{12}, were added prior to extraction to assess the efficiency of the method.

Recoveries of surrogates were within the quality control limits of 30% - 150% with one exception. For Batch 1, mean recoveries of naphthalene-d_8, acenaphthene-d_{10}, and chrysene-d_{12} were 52%, 59%, and 48%, respectively. In one sample, recovery of chrysene-d_{12} was 28%. For Batch 2, mean recoveries of naphthalene-d_8, acenaphthene-d_{10}, and chrysene-d_{12} were 62%, 64%, and 57%, respectively.

MATRIX SPIKES One sample was spiked with all PAH compounds for each batch. Matrix spike recoveries for all analytes in Batch 2 ranged from 57% to 67%. Matrix spike recoveries for all analytes in Batch 1 ranged from 26% to 73%. Six of the analytes in batch 1 fell outside the acceptable ranges of 50% to 120%. They are 48% for fluoranthene; 47% for pyrene; 44% for benzo(a)anthracene; 38% for chrysene; 26% for benzo(b)fluoranthene; and 32% for benzo(a)pyrene. These PAHs were present at naturally elevated levels in the background sample. A blank spike was prepared with this batch and had acceptable recoveries for all target PAHs. As a result, it appears that the failure of selected PAHs to meet the recovery criteria is related to the sediment sample. The recoveries of PAHs in the MS sample for batch 2 met the acceptance criteria.

REPLICATES One sample was extracted in triplicate for each batch. Precision was measured by calculating the relative standard deviation (RSD) between the replicate results. The RSDs ranged from 1% to 20%, within the target precision goal of $\leq$30%.

SRMs One SRM,1941a, a marine sediment sample obtained from the National Institute of Standards and Technology, was analyzed with each batch of samples. Twelve of the 17 PAH compounds analyzed are certified at levels above the MDLs. Of these, all compounds were detected within 30% of the certified mean, with the exception of chrysene (58% and 73%), benzo(b)fluoranthene (32% and 45%), and dibenz(a,h)anthracene (63% and 40%) in both batches. Percent differences were calculated using SRM concentrations that were corrected for surrogate recovery.

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TABLE A.1. Quality Assurance/Quality Control Data for Grain Size Analysis

Sediment Treatment	Gravimetric Water Content (%)	Batch No.	Total Percent (dry weight) Gravel >2000 µm	Sand 62.4-2000 µm	Silt 3.9-62.4 µm	Clay <3.9 µm
R-CLIS, Replicate 1	109	1	0	6	59	35
R-CLIS, Replicate 2	109	1	0	6	60	34
R-CLIS, Replicate 3	109	1	0	6	60	34
RSD			NA[a]	0%	1%	2%
EC-8, Replicate 1	151	2	0	21	39	40
EC-8, Replicate 2	151	2	0	20	40	40
EC-8, Replicate 3	151	2	1	21	38	40
RSD			NA	3%	3%	0%
HU-2, Replicate 1	124	3	1	18	47	34
HU-2, Replicate 2	124	3	0	19	47	34
HU-2, Replicate 3	124	3	2	18	47	33
RSD			NA	3%	0%	2%
HU-22, Replicate 1	139	4	0	16	48	36
HU-22, Replicate 2	139	4	0	16	48	36
HU-22, Replicate 3	139	4	0	15	47	38
RSD			NA	4%	1%	3%
BU-2, Replicate 1	171	5	0	13	42	45
BU-2, Replicate 2	171	5	0	13	40	47
BU-2, Replicate 3	171	5	0	14	41	45
RSD			NA	4%	2%	3%
BC-4, Replicate 1	222	6	0	15	55	30
BC-4, Replicate 2	222	6	0	14	56	30
BC-4, Replicate 3	222	6	0	17	55	28
RSD			NA	10%	1%	4%

(a) NA Not applicable.

TABLE A.2. Quality Assurance/Quality Control Data for Analysis of Specific Gravity and Bulk Density

Sediment Treatment	Replicate	Sample ID	Batch	Bulk Density Wet lbs/cu ft	Bulk Density Dry lbs/cu ft	Specific Gravity
COMP HU-C	1	NY2-GRA-17	1	92	45	2.61
COMP HU-C	2	NY2-GRA-17	1	ND[a]	ND	2.64
RPD				NA[b]	NA	1%
I-Stat				NA	NA	0.01
COMP SB-A	1	NY2-GRA-1	1	83	30	2.58
COMP SB-A	2	NY2-GRA-1	1	83	30	2.56
RPD				0%	0%	1%
I-Stat				0.00	0.00	0.00
COMP GR	1	NY2-GRA-9	1	116	94	2.67
COMP GR	2	NY2-GRA-9	1	118	96	ND
RPD				2%	2%	NA
I-Stat				0.01	0.01	NA

(a) ND No data; not tested.
(b) NA Not applicable.

TABLE A.3. Quality Assurance/Quality Control Data for Analysis of TOC and Percentage of Moisture

Sediment Treatment	Batch No.	TOC (% dry wt.)
Method Blanks		
Blank-1	1	0.003
Blank-2	1	0.001
Blank-1	2	0.003
Blank-2	2	0.003
Blank-1	3	0.003
Blank-2	3	0.002
Blank-3	3	0.003
Blank-4	3	0.003
Blank-5	3	0.002
Blank-1	4	0.005
Blank-2	4	0.008
Blank-3	4	0.002
Blank-4	4	0.002
Blank-5	4	0.004
Blank-6	4	0.004
Blank-1	5	0.003
Blank-2	5	0.002
Blank-3	5	0.002
Blank-4	5	0.004
Blank-5	5	0.004
Blank-1	6	0.001
Blank-2	6	0.002
Blank-3	6	0.002
Blank-4	6	0.002
Blank-5	6	0.002
Blank-6	6	0.005
Blank-7	6	0.004
Blank-8	6	0.004
Blank-9	6	0.004
Blank-10	6	0.006
Blank-11	6	0.004
Blank-12	6	0.002
Blank-13	6	0.002
Blank-14	6	0.002

TABLE A.3. (contd)

Sediment Treatment	Batch No.	TOC (% dry wt.)	Percent Difference[a]
Standard Reference Material			
Non-certified Value		2.6	
SRM MESS-1	1	2.49	4%
SRM MESS-1	2	2.44	6%
SRM MESS-1	2	2.62	1%
SRM MESS-1	3	2.56	2%
SRM MESS-1	4	2.42	7%
SRM MESS-1	5	2.40	8%
SRM MESS-1	6	2.40	8%
SRM MESS-1	6	2.39	8%
SRM MESS-1	6	2.45	6%
MESS-1Y	6	2.47	
MESS-1Y, Duplicate	6	2.48	
RPD			0%

TABLE A.3. (contd)

Sediment Treatment	Batch No.	TOC (% dry wt.)	Total Percent Solids
Analytical Replicates			
EC-2, Replicate 1	1	1.02	66
EC-2, Replicate 2	1	1.13	66
RPD		10%	0%
GR-1, Replicate 1	1	0.12	80
GR-1, Replicate 2	1	0.13	80
RPD		8%	0%
EC-3, Replicate 1	2	1.26	75
EC-3, Replicate 2	2	1.23	75
EC-3, Replicate 3	2	1.31	75
RSD		3%	0%
HU-1, Replicate 1	3	3.17	53
HU-1, Replicate 2	3	3.13	53
HU-1, Replicate 3	3	3.30	53
RSD		3%	0%
HU-21, Replicate 1	4	3.26	44
HU-21, Replicate 2	4	3.19	44
HU-21, Replicate 3	4	3.15	44
RSD		2%	0%
HU-39, Replicate 1	5	1.95	52
HU-39, Replicate 2	5	1.95	52
HU-39, Replicate 3	5	1.88	52
RSD		2%	0%
BU-4, Replicate 1	6	3.42	37
BU-4, Replicate 2	6	3.44	37
RPD		1%	0%

(a) Percent Difference between results obtained from analysis of SRM MESS-1 and non-certified value of 2.6%. SRM MESS-1 is not certified for TOC, but according to historical analyses from Battelle's records, the estimated value is 2.6% TOC.

TABLE A.4. Quality Assurance/Quality Control Data for Metals in Sediment

Sediment Treatment	Batch	Metals (µg/g dry wt) Ag (ICP/MS)	Ag (ICP/Aqua)	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Method Blanks											
Blank-1	1	0.119 U[a]	0.131	0.572 U	0.020	0.401 U	0.525 U	0.001 U	0.849 U	0.14 U	2.55 U
Blank-2	1	0.119 U	0.119 U	0.572 U	0.020	0.401 U	0.525 U	0.001 U	0.849 U	0.41	2.55 U
Blank-3	1	NA[b]	NA	NA	NA	NA	NA	0.001 U	NA	NA	NA
Mean blank		NA	NA	NA	NA	NA	NA	NA	NA	0.2	NA
Standard Reference Material											
Certified value		NC[c]	NC	11.6	0.36	76	18	0.063	32	28.2	138
Range		NC	NC	±1.3	±0.07	±3	±3	±0.012	±3	±1.8	±6
SRM 1646	1	0.119 U	0.275	8.72	0.331	42.7	16.4	0.074	25.4	22.7	93.6
SRM 1646	1	0.119 U	0.136	8.89	0.350	39.9	16.1	0.079	23.5	22.4	90.6
SRM 1646	1	NA	NA	NA	NA	NA	NA	0.077	NA	NA	NA
SRM 1646	1	NA	NA	NA	NA	NA	NA	0.070	NA	NA	NA
Percent Difference		NA	NA	25%[d]	8%	44%[d]	9%	17%	21%[d]	20%	32%[d]
Percent Difference		NA	NA	23%[d]	3%	48%[d]	11%	25%[d]	27%[d]	21%[d]	34%[d]
Percent Difference		NA	NA	NA	NA	NA	NA	22%[d]	NA	NA	NA
Percent Difference		NA	NA	NA	NA	NA	NA	11%	NA	NA	NA
Matrix Spike Results											
EC-11/CT COMP EC-B-II	1	2.91	3.38	11.1	4.15	104	250	1.21	44.1	322	379
EC-11/CT COMP EC-B-II MS	1	4.85	22.0	192	21.4	589	696	11.4	135	840	1140
Concentration Recovered		1.94	18.6	181	17.3	485	446	10.2	90.9	518	761
Amount Spiked		20.0	20.0	200	20.0	500	500	10.0	100	500	1000
Percent Recovery		10%[e]	93%	90%	86%	97%	89%	102%	91%	104%	76%

TABLE A.4. (contd)

Sediment Treatment	Batch	Metals (µg/g dry wt) Ag (ICP/MS)	Ag (ICP/Aqua)	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
COMP HU-C	1	6.22	7.02	15.2	4.06	169	174	2.55	40.0	194	252
COMP HU-C, MS	1	6.85	25.6	193	21.4	656	612	12.1	125	715	1010
Concentration Recovered		0.63	18.6	178	17.3	487	438	9.55	85.0	521	758
Amount Spiked		20.0	20.0	200	20.0	500	500	10.0	100	500	1000
Percent Recovery		3% [e]	93%	89%	87%	97%	88%	96%	85%	104%	76%
Analytical Replicates											
EC-11/CT COMP EC-B-II, Re	1	2.78	3.36	10.9	4.26	102	248	1.27	44.6	322	375
EC-11/CT COMP EC-B-II, Re	1	3.05	3.44	11.3	4.04	107	254	1.18	44.6	333	383
EC-11/CT COMP EC-B-II, Re	1	2.91	3.33	11.1	4.15	103	248	1.19	43.1	312	378
RSD		5%	2%	2%	3%	3%	1%	4%	2%	3%	1%
COMP HU-C, Replicate 1	1	6.10	7.05	15.2	4.05	171	174	2.57	40.3	196	247
COMP HU-C, Replicate 2	1	6.05	7.03	15.5	4.11	167	173	2.66	39.4	193	253
COMP HU-C, Replicate 3	1	6.51	6.98	15.0	4.02	170	175	2.42	40.3	194	257
RSD		4%	1%	2%	1%	1%	1%	5%	1%	1%	2%

(a) U Undetected at or above given concentration.
(b) NA Not applicable.
(c) NC Not certified.
(d) Outside quality control criteria (±20%) for SRMs.
(e) Outside quality control criteria (75-125%) for matrix spike recoveries.

TABLE A.5. Quality Assurance/Quality Control Data for Additional Metals in Sediment

Sediment Treatment	Metals (µg/g dry wt) Be ICP/MS	Sb ICP/MS	Se GFAA	Tl ICP/MS
Method Blanks				
Blank-1	0.5 U[(a)]	0.124	0.13 U	0.024 U
Blank-2	0.5 U	0.030 U	0.13 U	0.024 U
Standard Reference Material				
Certified Value	NC [(b)]	NC	NC	NC
Range	NA [(c)]	NA	NA	NA
Non Certified Value	1.5	0.4	0.6	0.5
1646	1.02	0.300	0.41	0.305
1646	0.912	0.200	0.42	0.322
Percent Difference from Certified value	NA	NA	NA	NA
Percent Difference from Certified value	NA	NA	NA	NA
Matrix Spike Results				
EC-11/CT COMP EC-B-II	NA	0.15	0.21	NA
EC-11/CT COMP EC-B-II MS	NA	2.43	2.89	NA
Amount Recovered	NA	2.28	2.68	NA
Amount Spiked	NS [(d)]	1.00	2.50	NS
Percent Recovery	NA	228% [(e)]	107%	NA
EC-11/CT COMP EC-B-II	0.953	NA	NA	0.461
EC-11/CT COMP EC-B-II MS	4.99	NA	NA	4.68
Amount Recovered	4.04	NA	NA	4.68
Amount Spiked	5.00	NS	NS	5.00
Percent Recovery	81%	NA	NA	94%
Analytical Replicates				
EC-11/CT COMP EC-B-II, Rep 1	0.959	1.52	0.70	0.423
EC-11/CT COMP EC-B-II, Rep 2	0.955	1.46	0.83	0.440
EC-11/CT COMP EC-B-II, Rep 3	0.903	1.48	0.89	0.445
RSD	3%	2%	12%	3%

(a) U Undetected at or above given concentration.
(b) NC Non-certified value.
(c) NA Not applicable.
(d) NS Not spiked.
(e) Outside quality control criteria (75-125%) for matrix spike recoveries.

TABLE A.6. Quality Control Data for 1,4-Dichlorobenzene, Pesticides, and PCB Congeners in Sediment

					MATRIX SPIKE				
Batch:	1		1		1	1	1	1	1
Treatment:	Blank		EC-10		EC-10, MS	Concentration Recovered	Amount Spiked	Concentration Spiked	
Sample Size (g)	9.076	[a]	6.689		2.289	NA[b]	NA	NA	Percent
Units (dry wt):	µg/kg		µg/kg		µg/kg	µg/kg	ng	µg/kg	Recovery
1,4-Dichlorobenzene	1.19	U[c]	84.46		510.36	425.91	1425	623	68
2,4-DDD	0.97	U	16.57		18.72	2.15	NS [d]	NS	NA
2,4-DDT	0.91	U	NA		NA	NA	NS	NS	NA
4,4-DDD	1.56	U	53.31		154.73	101.42	201.0	88	115
4,4-DDE	2.29	U	38.55		117.11	78.56	200.5	88	90
4,4-DDT	5.19	U	2.19	J[e]	74.76	72.56	200.5	88	83
Aldrin	0.87	U	1.18	U	58.05	58.05	200.5	88	66
alpha-Chlordane	1.27	U	14.46		85.02	70.56	200.0	87	81
Dieldrin	1.85	U	8.52		66.86	58.34	200.5	88	67
Endosulfan I /2,4-DDE	2.39	U	3.24	U	73.57	73.57	200.5	88	84
Endosulfan II	1.78	U	2.42	U	72.03	72.03	200.5	88	82
Endosulfan Sulfate	1.68	U	2.28	U	86.48	86.48	200.5	88	99
Endrin[f]	3.24	U	4.40	U	78.26	78.26	200.0	87	90
Endrin Aldehyde[f]	1.93	U	2.62	U	66.18	66.18	200.5	88	76
Heptachlor	1.96	U	2.65	U	87.96	87.96	200.5	88	100
Heptachlor Epoxide	1.09	U	1.47	U	81.04	81.04	200.5	88	93
alpha-BHC[f]	1.21	U	0.28	J	69.22	68.94	200.5	88	79
beta-BHC[f]	0.09	J	2.42	U	64.97	64.97	200.5	88	74
delta-BHC[f]	1.20	J	2.20	U	68.21	68.21	200.5	88	78
Lindane[f]	0.33	J	1.92	U	72.05	72.05	200.5	88	82
Methoxychlor[f]	2.03	U	2.75	U	94.68	94.68	200.0	87	108
Toxaphene[f]	61.41	U	83.32	U	NA	NA	NS	NS	NA
trans-Nonachlor	1.86	U	7.45		5.57	5.57	NS	NS	NA
CL2(08)	4.38	U	6.47		28.20	21.74	200.00	87	25 [g]
CL3(18)	2.78	U	26.86		98.05	71.18	200.00	87	81
CL3(28)	1.83	U	42.91		148.46	105.55	200.00	87	121 [g]
CL4(44)	2.65	U	43.52		118.73	75.21	200.00	87	86
CL4(49)	1.66	U	34.91		44.50	9.60	NS	NS	NA
CL4(52)	1.54	U	51.61		122.53	70.92	200.00	87	81
CL4(66)	1.45	U	59.60		158.19	98.58	200.00	87	113
CL5(87)	0.88	U	13.96		15.20	1.24	NS	NS	NA
CL5(101)	0.74	U	33.21		98.14	64.93	200.00	87	74
CL5(105)	0.49	U	12.92		85.99	73.07	200.00	87	84
CL5(118)	1.30	U	28.18		87.87	59.69	200.00	87	68
CL6(128)	1.38	U	5.45		82.99	77.54	200.00	87	89
CL6(138)	1.19	U	31.64		101.08	69.45	200.00	87	79
CL6(153)	5.77	U	26.37		91.20	64.83	200.00	87	74
CL7(170)	1.46	U	17.20		88.02	70.82	200.00	87	81
CL7(180)	0.98	U	31.37		96.83	65.45	200.00	87	75
CL7(183)	1.09	U	4.97		NA	NA	NS	NS	NA
CL7(184)	1.09	U	0.49	J	NA	NA	NS	NS	NA
CL7(187)	0.82	U	15.44		70.69	55.25	200.00	87	63
CL8(195)	1.24	U	6.36		76.77	70.41	200.00	87	81
CL9(206)	1.90	U	14.96		90.94	75.98	200.00	87	87
CL10(209)	1.18	U	9.42		90.27	80.85	200.00	87	93
Surrogate Recoveries (%)									
DBOFB	73		82		86	NA	NA	NA	NA
CL5(112)	64		55		67	NA	NA	NA	NA

TABLE A.6. (contd)

Batch:	2		2		2	2	2	2	2
			MATRIX SPIKE						
Treatment:	Blank		R-MUD		R-MUD, MS	Concentration Recovered	Amount Spiked	Concentration Spiked	
Sample Size (g)	8.542[a]		13.660		13.220	NA	NA	NA	Percent
Units (dry wt) :	µg/kg		µg/kg		µg/kg	µg/kg	ng	µg/kg	Recovery
1,4-Dichlorobenzene	1.27	U	0.79	U	61.78	61.78	1425.00	108	57
2,4-DDD	1.04	U	0.01	J	NA	NA	NS	NS	NA
2,4-DDT	0.97	U	0.60	U	NA	NA	NS	NS	NA
4,4-DDD	1.65	U	0.06	J	11.72	11.66	201.00	15	77
4,4-DDE	2.43	U	0.01	J	10.08	10.07	200.50	15	66
4,4-DDT	5.51	U	3.45	U	10.99	10.99	200.50	15	72
Aldrin	0.93	U	0.58	U	11.35	11.35	200.50	15	75
alpha-Chlordane	1.35	U	0.01	J	11.39	11.39	200.00	15	75
Dieldrin	1.97	U	0.21	J	11.34	11.13	200.50	15	73
Endosulfan I /2,4-DDE	2.54	U	1.59	U	13.52	13.52	200.50	15	89
Endosulfan II	1.89	U	0.05	J	13.24	13.19	200.50	15	87
Endosulfan Sulfate	1.79	U	1.12	U	10.86	10.86	200.50	15	72
Endrin[f]	NA		NA		NA	NA	NS	NS	NA
Endrin Aldehyde[f]	NA		NA		NA	NA	NS	NS	NA
Heptachlor	2.08	U	1.30	U	10.27	10.27	200.50	15	68
Heptachlor Epoxide	1.15	U	0.72	U	10.60	10.60	200.50	15	70
alpha-BHC[f]	NA		NA		NA	NA	NS	NS	NA
beta-BHC[f]	NA		NA		NA	NA	NS	NS	NA
delta-BHC[f]	NA		NA		NA	NA	NS	NS	NA
Lindane[f]	NA		NA		NA	NA	NS	NS	NA
Methoxychlor[f]	NA		NA		NA	NA	NS	NS	NA
Toxaphene[f]	NA		NA		NA	NA	NS	NS	NA
trans-Nonachlor	1.98	U	0.00	J	NA	NA	NS	NS	NA
CL2(08)	4.65	U	2.91	U	7.05	7.05	200.00	15	47 [g]
CL3(18)	2.95	U	1.85	U	8.12	8.12	200.00	15	54
CL3(28)	1.94	U	1.21	U	10.03	10.03	200.00	15	66
CL4(44)	2.82	U	0.22	J	10.29	10.07	200.00	15	67
CL4(49)	1.76	U	0.04	J	NA	NA	NS	NS	NA
CL4(52)	1.63	U	0.06	J	9.91	9.85	200.00	15	65
CL4(66)	1.54	U	0.04	J	10.43	10.39	200.00	15	69
CL5(87)	0.93	U	0.05	J	NA	NA	NS	NS	NA
CL5(101)	0.78	U	0.04	J	10.27	10.23	200.00	15	68
CL5(105)	0.52	U	0.03	J	9.12	9.09	200.00	15	60
CL5(118)	1.38	U	0.02	J	9.25	9.23	200.00	15	61
CL6(128)	1.46	U	0.92	U	9.42	9.42	200.00	15	62
CL6(138)	1.26	U	0.07	J	9.36	9.29	200.00	15	61
CL6(153)	6.13	U	0.03	J	8.56	8.53	200.00	15	56
CL7(170)	1.55	U	0.97	U	9.26	9.26	200.00	15	61
CL7(180)	1.04	U	0.65	U	9.32	9.32	200.00	15	62
CL7(183)	1.15	U	0.72	U	NA	NA	NS	NS	NA
CL7(184)	1.15	U	0.01	J	NA	NA	NS	NS	NA
CL7(187)	0.87	U	0.01	J	9.28	9.27	200.00	15	61
CL8(195)	1.32	U	0.83	U	9.35	9.35	200.00	15	62
CL9(206)	2.02	U	1.26	U	9.13	9.13	200.00	15	60
CL10(209)	1.26	U	0.79	U	9.41	9.41	200.00	15	62
Surrogate Recoveries (%)									
DBOFB	66		65		69	NA	NA	NA	
CL5(112)	72		49		64	NA	NA	NA	

TABLE A.6. (contd)

	STANDARD REFERENCE MATERIAL					
Batch:	1	1	1	2	2	2
Treatment:	SRM NIST 1941a	Certified		SRM NIST 1941a	Certified	
Sample Size (g)	5.133	Value	Percent	5.057	Value	Percent
Units (dry wt) :	µg/kg	µg/kg	Difference[h]	µg/kg	µg/kg	Difference
1,4-Dichlorobenzene	NA	NC[i]	NA	NA	NC	NA
2,4-DDD	NA	NC	NA	NA	NC	NA
2,4-DDT	NA	NC	NA	NA	NC	NA
4,4-DDD	2.56 J	5.06	4	4.86	5.06	103
4,4-DDE	3.46 J	6.59	8	3.16 J	6.59	1
4,4-DDT	NA	NC	NA	NA	NC	NA
Aldrin	NA	NC	NA	NA	NC	NA
alpha-Chlordane	1.01 J	2.33	44	1.06 J	2.33	14
Dieldrin	NA	NC	NA	NA	NC	NA
Endosulfan I /2,4-DDE	C[j]	0.73	NA	ND	0.73	NA
Endosulfan II	NA	NC	NA	NA	NC	NA
Endosulfan Sulfate	NA	NC	NA	NA	NC	NA
Endrin[f]	NA	NC	NA	NA	NC	NA
Endrin Aldehyde[f]	NA	NC	NA	NA	NC	NA
Heptachlor	NA	NC	NA	NA	NC	NA
Heptachlor Epoxide	NA	NC	NA	NA	NC	NA
alpha-BHC[f]	NA	NC	NA	NA	NC	NA
beta-BHC[f]	NA	NC	NA	NA	NC	NA
delta-BHC[f]	NA	NC	NA	NA	NC	NA
Lindane[f]	NA	NC	NA	NA	NC	NA
Methoxychlor[f]	NA	NC	NA	NA	NC	NA
Toxaphene[f]	NA	NC	NA	NA	NC	NA
trans-Nonachlor	0.39 J	1.26	61	0.60 J	1.26	10
CL2(08)	NA	NC	NA	NA	NC	NA
CL3(18)	NA	NC	NA	NA	NC	NA
CL3(28)	NA	NC	NA	NA	NC	NA
CL4(44)	3.88 J	4.80	4	3.92 J	4.80	54
CL4(49)	3.03	9.50	59	3.14 J	9.50	38
CL4(52)	3.20	6.89	40	3.89	6.89	6
CL4(66)	7.11	6.80	34	6.07	6.80	68
CL5(87)	1.45 J	6.70	55	1.72	6.70	46
CL5(101)	9.02	11.00	5	6.94	11.00	19
CL5(105)	1.18	3.65	33	1.05	3.65	39
CL5(118)	3.29	10.00	32	3.55	10.00	25
CL6(128)	3.07	1.87	238	1.82 J	1.87	106
CL6(138)	4.96	13.38	24	6.05	13.38	4
CL6(153)	5.21 J	17.60	39	5.21 J	17.60	37
CL7(170)	4.82	3.00	230	C	3.00	NA
CL7(180)	5.47	5.83	93	5.10	5.83	85
CL7(183)	NA	NC	NA	NA	NC	NA
CL7(184)	NA	NC	NA	NA	NC	NA
CL7(187)	NA	NC	NA	NA	NC	NA
CL8(195)	NA	NC	NA	NA	NC	NA
CL9(206)	C	3.67	NA	2.93 J	3.67	69
CL10(209)	7.52	8.34	85	5.26	8.34	33
Surrogate Recoveries (%)						
DBOFB	78	NA	NA	53	NA	NA
CL5(112)	49	NA	NA	47	NA	NA

TABLE A.6. (contd)

	TRIPLICATE ANALYSES							
Batch:	1	1	1		2	2	2	
Treatment:	EC-15 Replicate 1	EC-15 Replicate 2	EC-15 Replicate 3		GR-10 Replicate 1	GR-10 Replicate 2	GR-10 Replicate 3	
Sample Size (g)	9.854	9.442	9.339		8.182	8.594	8.657	
Units (dry wt) :	µg/kg	µg/kg	µg/kg	RSD(%)	µg/kg	µg/kg	µg/kg	RSD(%)
1,4-Dichlorobenzene	10.65	8.00	7.52	19	17.73	25.25	19.82	19
2,4-DDD	10.32	13.52	10.13	17	6.58	9.27	6.64	21
2,4-DDT	0.84 U	0.87 U	0.88 U	NA	1.01 U	0.96 U	0.95 U	NA
4,4-DDD	41.51	47.84	42.18	8	5.56	6.05	5.52	5
4,4-DDE	13.20	12.90	10.14	14	4.58	5.53	5.01	9
4,4-DDT	2.35 J	4.25 J	2.57 J	34	0.38 J	0.19 J	0.16 J	48
Aldrin	0.80 U	0.84 U	0.85 U	NA	0.97 U	0.92 U	0.91 U	NA
alpha-Chlordane	18.62	23.16	22.52	11	1.02 J	1.41	1.09 J	18
Dieldrin	7.09	7.58	6.22	10	1.27 J	1.35 J	1.46 J	7
Endosulfan I /2,4-DDE	2.20 U	2.30 U	2.32 U	NA	2.65 U	2.52 U	2.51 U	NA
Endosulfan II	1.64 U	1.71 U	1.73 U	NA	1.38 J	1.77 J	0.97 J	29
Endosulfan Sulfate	1.55 U	1.62 U	1.64 U	NA	0.31 J	0.44 J	0.28 J	25
Endrin[f]	2.98 U	3.11 U	3.15 U	NA	NA	NA	NA	NA
Endrin Aldehyde[f]	1.78 U	1.86 U	1.88 U	NA	NA	NA	NA	NA
Heptachlor	1.80 U	1.88 U	1.90 U	NA	2.17 U	2.07 U	2.05 U	NA
Heptachlor Epoxide	1.00 U	1.04 U	1.05 U	NA	1.20 U	1.15 U	1.14 U	NA
alpha-BHC[f]	1.11 U	1.16 U	1.17 U	NA	NA	NA	NA	NA
beta-BHC[f]	1.64 U	1.71 U	1.73 U	NA	NA	NA	NA	NA
delta-BHC[f]	1.49 U	1.56 U	1.58 U	NA	NA	NA	NA	NA
Lindane[f]	1.30 U	1.36 U	1.37 U	NA	NA	NA	NA	NA
Methoxychlor[f]	1.87 U	1.95 U	1.97 U	NA	NA	NA	NA	NA
Toxaphene[f]	56.56 U	59.03 U	59.68 U	NA	NA	NA	NA	NA
trans-Nonachlor	11.31	14.64	14.13	13	0.54 J	0.66 J	0.53 J	12
CL2(08)	7.98	8.19	6.21	15	2.53 J	2.95 J	2.64 J	8
CL3(18)	19.18	23.08	22.08	9	3.81	4.43	4.15	7
CL3(28)	51.14	30.02	31.95	31 [k]	13.08	17.79	14.05	17
CL4(44)	24.24	31.36	29.22	13	5.15	6.44	5.42	12
CL4(49)	23.21	27.19	24.75	8	5.38	7.00	6.50	13
CL4(52)	29.20	41.52	36.00	17	6.66	8.07	6.98	10
CL4(66)	88.09	103.82	92.36	9	10.53	11.61	9.40	10
CL5(87)	5.33	7.44	6.83	17	1.78	2.11	1.90	8
CL5(101)	24.93	29.25	28.42	8	5.15	6.22	5.24	11
CL5(105)	4.86	41.07	7.37	114 [k]	2.29	2.35	1.85	13
CL5(118)	13.11	16.42	15.16	11	4.74	6.11	5.26	13
CL6(128)	4.50	6.23	7.30	24	2.96	3.47	3.17	8
CL6(138)	67.37	36.36	24.29	52 [k]	5.60	7.00	6.08	11
CL6(153)	12.25	10.68	12.57	9	4.21 J	5.46 J	5.04 J	13
CL7(170)	9.06	9.86	8.44	8	2.11	2.81	2.31	15
CL7(180)	9.43	12.62	10.25	15	3.04	3.82	3.20	12
CL7(183)	1.45	2.28	2.07	22	0.60 J	0.89 J	0.73 J	19
CL7(184)	1.19	0.79 J	0.42 J	48	0.38 J	0.36 J	0.45 J	11
CL7(187)	3.29	4.79	3.73	20	1.61	2.04	1.72	12
CL8(195)	1.57	2.03	1.59	15	0.35 J	0.41 J	0.37 J	8
CL9(206)	4.73	5.62	4.95	9	0.74 J	1.07 J	0.86 J	19
CL10(209)	4.10	5.87	4.75	18	1.27 J	1.49	1.49	9
Surrogate Recoveries (%)								
DBOFB	84	94	85	NA	50	63	58	NA
CL5(112)	34	43	34	NA	39	50	44	NA

TABLE A.6. (contd)

Qualifiers

(a) Sample concentration of the procedural blank adjusted for the average sample size of the batch.
(b) NA Not applicable.
(c) U Undetected at or above given concentration.
(d) NS Not spiked.
(e) J Concentration estimated; analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(f) Analyte required only in samples designated for Central Long Island Disposal Testing Site.
(g) Outside quality control criteria (50-120%) for matrix spike recoveries.
(h) Percent Difference from certified
= absolute value [(certified value ,µg/kg - value detected corrected for surrogate recovery, µg/kg) / certified value, µg/kg].
(i) NC No certified value available.
(j) C Analyte not determined due to co-eluting peak.
(k) Outside quality control criteria (±30%) for replicates.

TABLE A.7. MDL Verification Study for Analysis of Pesticides and PCBs in Sediment

Battelle ID:	OG99	OH01	OH02	OH03	OH04	OH05	OH06	OH07	Standard Deviation STD (n-1)	Method Detection Limit MDL[a]	Method Detection Limit MDL
Sample Size (g):	20.919	19.455	19.201	18.645	19.087	19.434	18.896	18.612			
Units (dry wt):	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg		µg/kg	(ng)
1,4-Dichlorobenzene	1.934	1.589	1.642	1.966	1.820	1.483	1.965	2.685	0.372	1.114	21.485
2,4-DDD	NS[b]	NS	NS	NS	NS	NS	NS	NS	NA[c]	NA	NA
2,4-DDT	NS	NS	NS	NS	NS	NS	NS	NS	NA	NA	NA
4,4-DDD	0.494	0.516	0.533	0.637	0.526	0.570	0.453	0.503	0.055	0.165	3.180
4,4-DDE	0.380	0.433	0.422	0.477	0.464	0.462	0.451	0.456	0.031	0.093	1.791
4,4-DDT	0.853	0.455	0.487	0.474	0.515	0.546	0.498	0.499	0.129	0.387	7.460
Aldrin	0.379	0.460	0.443	0.502	0.459	0.431	0.450	0.477	0.036	0.108	2.077
Alpha-chlordane	0.344	0.427	0.375	0.471	0.435	0.413	0.438	0.440	0.040	0.121	2.328
Dieldrin	0.400	0.451	0.478	0.493	0.456	0.499	0.465	0.441	0.032	0.095	1.836
Endosulfan I	0.423	0.556	0.480	0.562	0.531	0.506	0.517	0.540	0.045	0.136	2.628
Endosulfan II	0.500	0.538	0.544	0.575	0.552	0.558	0.529	0.526	0.023	0.068	1.319
Endosulfan Sulfate	0.416	0.426	0.448	0.476	0.463	0.489	0.473	0.462	0.025	0.076	1.458
Endrin[d]	0.381	0.490	0.512	0.557	0.552	0.550	0.540	0.549	0.059	0.178	3.439
Endrin Aldehyde[d]	0.425	0.534	0.532	0.619	0.568	0.526	0.558	0.578	0.056	0.169	3.256
Heptachlor	0.445	0.516	0.476	0.561	0.527	0.480	0.528	0.549	0.040	0.119	2.296
Heptachlor epoxide	0.442	0.542	0.495	0.572	0.549	0.514	0.543	0.560	0.042	0.127	2.444
A-BHC[d]	0.342	0.415	0.428	0.450	0.433	0.384	0.415	0.433	0.034	0.103	1.985
B-BHC[d]	0.442	0.547	0.539	0.541	0.495	0.493	0.513	0.504	0.035	0.104	1.996
D-BHC[d]	0.429	0.537	0.489	0.510	0.532	0.473	0.491	0.485	0.034	0.103	1.989
Lindane[d]	0.386	0.477	0.457	0.482	0.458	0.431	0.452	0.460	0.030	0.091	1.745
Methoxychlor[d]	0.319	0.446	0.497	0.489	0.530	0.553	0.561	0.554	0.081	0.242	4.673
Toxaphene[d]	NS	NS	NS	NS	NS	NS	NS	NS	NA	NA	NA
Trans-nonachlor	NS	NS	NS	NS	NS	NS	NS	NS	NA	NA	NA

<u>TABLE A.7.</u> (contd)

Battelle ID:	OG99	OH01	OH02	OH03	OH04	OH05	OH06	OH07	Standard Deviation STD (n-1)	Method Detection Limit MDL[a] µg/kg	Method Detection Limit MDL (ng)
Sample Size (g):	20.919	19.455	19.201	18.645	19.087	19.434	18.896	18.612			
Units (dry wt):	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg			
CL2(08)	0.273	0.302	0.289	0.319	0.244	0.312	0.319	0.378	0.039	0.117	2.265
CL3(18)	0.376	0.447	0.416	0.489	0.452	0.415	0.423	0.445	0.034	0.100	1.937
CL3(28)	0.376	0.491	0.465	0.482	0.439	0.463	0.459	0.486	0.037	0.112	2.155
CL4(44)	0.425	0.529	0.478	0.551	0.506	0.470	0.489	0.511	0.039	0.116	2.243
CL4(49)	NS	NS	NS	NS	NS	NS	NS	NS	NA	NA	NA
CL4(52)	0.418	0.491	0.442	0.522	0.471	0.426	0.450	0.473	0.035	0.104	2.000
CL4(66)	0.423	0.526	0.487	0.519	0.493	0.436	0.477	0.490	0.036	0.108	2.087
CL5(87)	NS	NS	NS	NS	NS	NS	NS	NS	NA	NA	NA
CL5(101)	0.459	0.587	0.530	0.597	0.551	0.501	0.519	0.532	0.045	0.134	2.581
CL5(105)	0.373	0.381	0.416	0.459	0.405	0.435	0.423	0.421	0.028	0.084	1.618
CL5(118)	0.399	0.479	0.454	0.486	0.463	0.469	0.460	0.467	0.027	0.080	1.534
CL6(128)	0.363	0.414	0.401	0.394	0.400	0.404	0.385	0.401	0.015	0.046	0.887
CL6(138)	0.379	0.422	0.411	0.421	0.418	0.410	0.407	0.417	0.014	0.042	0.806
CL6(153)	0.359	0.416	0.418	0.437	0.430	0.414	0.402	0.414	0.024	0.071	1.378
CL7(170)	0.343	0.402	0.376	0.407	0.394	0.384	0.378	0.380	0.020	0.060	1.149
CL7(180)	0.341	0.384	0.380	0.430	0.426	0.397	0.395	0.390	0.028	0.084	1.622
CL7(183)	NS	NS	NS	NS	NS	NS	NS	NS	NA	NA	NA
CL7(184)	NS	NS	NS	NS	NS	NS	NS	NS	NA	NA	NA
CL7(187)	0.329	0.384	0.358	0.421	0.400	0.403	0.391	0.378	0.029	0.086	1.654
CL8(195)	0.328	0.367	0.364	0.397	0.390	0.382	0.381	0.371	0.021	0.064	1.227
CL9(206)	0.267	0.303	0.314	0.326	0.328	0.305	0.277	0.299	0.022	0.065	1.256
CL10(209)	0.359	0.399	0.402	0.448	0.447	0.430	0.437	0.425	0.030	0.090	1.738
<u>Surrogate Recoveries (%)</u>											
DBOFB	55	67	58	66	64	61	63	65			
CL5(112)	58	63	61	67	64	67	62	61			

(a) MDL The Method Detection Limit (2.998 x standard deviation).
(b) NS Not spiked.
(c) NA Not applicable.
(d) Analyte required only in samples designated for Central Long Island Disposal Testing Site.

TABLE A.8. Quality Control Data for Polynuclear Aromatic Hydrocarbons (PAH) in Sediment

	BLANKS		MATRIX SPIKE							
Batch:	1	2	1	1			2	2		
Treatment:	Blank	Blank	EC-10	EC-10, MS			R-MUD	R-MUD, MS		
Percent Moisture:	NA[a]	NA	56.369	19.842	Concentration				Concentration	
Dry Weight (g)	9.076[b]	8.542	6.689	2.289	Spiked	Percent	13.655	13.216	Spiked	Percent
Units (dry wt):	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	Recovery	µg/kg	µg/kg	µg/kg	Recovery
naphthalene	12.36 U[c]	0.73 J[d]	293.40	1949.96	2595.02	64	1.13 J	280.30	449	62
1-methylnaphthalene[e]	13.00 U	NA	95.73	1781.30	2575.36	65	NA	NA	NS [f]	NA
2-methylnaphthalene[e]	10.96 U	NA	190.08	1754.99	NS	NA	NA	NA	NS	NA
biphenyl	10.45 U	11.10 U	64.14	1699.62	2588.69	63	6.94 U	285.69	448	64
2,6-dimethylnaphthalene[e]	10.21 U	NA	89.93	1798.88	2579.29	66	NA	NA	NS	NA
acenaphthylene	9.94 U	10.57 U	392.81	2109.65	2484.93	69	6.61 U	275.33	430	64
acenaphthene	12.93 U	13.74 U	199.96	1884.07	2681.52	63	8.59 U	299.51	464	64
fluorene	10.69 U	11.36 U	234.41	1876.21	2570.55	64	7.11 U	271.59	445	61
phenanthrene	10.78 U	11.45 U	1129.33	2727.93	2584.10	62	0.72 J	285.68	448	64
anthracene	10.46 U	11.12 U	839.49	2036.08	1956.09	61	6.96 U	211.15	339	62
1-methylphenanthrene[e]	9.57 U	NA	343.98	2220.41	2555.70	73	NA	NA	NS	NA
fluoranthene	9.72 U	10.32 U	4118.64	5351.78	2594.15	48 [g]	0.53 J	288.99	449	64
pyrene	2.83 J	12.46 U	4171.38	5396.57	2590.65	47 [g]	0.55 J	286.47	449	64
benz[a]anthracene	11.56 U	12.29 U	2017.45	3005.59	2245.09	44 [g]	0.62 J	230.70	389	59
chrysene	14.17 U	15.06 U	2535.99	3529.16	2602.88	38 [g]	9.42 U	291.13	451	65
benzo[b]fluoranthene	10.68 U	11.34 U	3396.16	4074.64	2582.35	26 [g]	0.50 J	277.16	447	62
benzo[k]fluoranthene	12.66 U	13.46 U	780.34	2498.31	2572.30	67	8.42 U	296.83	446	67
benzo[e]pyrene[e]	7.98 U	NA	1244.09	2852.72	2582.79	62	NA	NA	NS	NA
benzo[a]pyrene	9.90 U	10.52 U	2397.66	3136.38	2332.46	32 [g]	6.58 U	231.13	404	57
perylene[e]	20.84 U	NA	381.92	1587.57	1953.69	62	NA	NA	NS	NA
indeno[1,2,3-c,d]pyrene	8.55 U	9.08 U	1408.83	2781.05	2292.27	60	5.68 U	239.58	397	60
dibenz[a,h]anthracene	8.68 U	9.22 U	355.49	1583.39	1938.40	63	5.77 U	205.26	336	61
benzo[g,h,i]perylene	7.18 U	7.63 U	1349.43	2656.07	2307.99	57	4.77 U	231.76	400	58
Surrogate Recoveries (%)										
naphthalene-d8	59	69	53	55	NA	NA	54	66	NA	NA
acenaphthene-d10	63	66	60	59	NA	NA	56	63	NA	NA
chrysene-d12	65	63	52	55	NA	NA	58	64	NA	NA

TABLE A.8. (contd)

	STANDARD REFERENCE MATERIAL					
Batch:	1	1		2	2	
Treatment:	NIST 1941a Certified	NIST 1941a		NIST 1941a Certified	NIST 1941a	
Dry Weight (g)	Value	5.133	Percent	Value	5.057	Percent
Units (dry wt):	µg/kg	µg/kg	Difference[h]	µg/kg	µg/kg	Difference[h]
naphthalene	1010	446.35	2	1010	461.60	10
1-methylnaphthalene[e]	NC[f]	69.83	NA	NA	NA	NA
2-methylnaphthalene[e]	NC	149.85	NA	NA	NA	NA
biphenyl	NC	45.65	NA	NC	45.92	NA
2,6-dimethylnaphthalene[e]	NC	33.39	NA	NA	NA	NA
acenaphthylene	NC	50.40	NA	NC	43.38	NA
acenaphthene	NC	23.36	NA	NC	24.71	NA
fluorene	97.3	49.71	18	97	47.87	3
phenanthrene	489	274.57	12	489	275.27	6
anthracene	184	115.14	24	184	114.23	17
1-methylphenanthrene[e]	NC	59.14	NA	NA	NA	NA
fluoranthene	981	558.33	13	981	523.89	1
pyrene	811	465.23	14	811	439.33	2
benz[a]anthracene	427	228.99	7	427	208.24	8
chrysene	380	330.74	73 [i]	380	318.66	58 [i]
benzo[b]fluoranthene	740	540.68	45 [i]	740	519.11	32 [i]
benzo[k]fluoranthene	361	186.68	3	361	192.57	1
benzo[e]pyrene[e]	553	291.70	5	NA	NA	NA
benzo[a]pyrene	628	277.29	12	628	291.97	12
perylene[e]	452	202.39	11	NA	NA	NA
indeno[1,2,3-c,d]pyrene	501	264.41	5	501	248.25	6
dibenz[a,h]anthracene	73.9	60.42	63 [i]	74	54.65	40 [i]
benzo[g,h,i]perylene	525	249.44	6	525	233.31	16
Surrogate Recoveries (%)						
naphthalene-d8	NA	43	NA	NA	51	NA
acenaphthene-d10	NA	50	NA	NA	53	NA
chrysene-d12	NA	51	NA	NA	55	NA

TABLE A.8. (contd)

	ANALYTICAL REPLICATES							
Batch:	1	1	1		2	2	2	
Treatment:	EC-15 Replicate 1	EC-15 Replicate 2	EC-15 Replicate 3		GR-10 Replicate 1	GR-10 Dup. Replicate 2	GR-10 Trip. Replicate 3	
Dry Weight (g)	9.854	9.442	9.339		8.182	8.594	8.657	
Units (dry wt):	µg/kg	µg/kg	µg/kg	RSD(%)	µg/kg	µg/kg	µg/kg	RSD(%)
naphthalene	413.07	383.64	346.57	9	97.15	122.54	106.28	12
1-methylnaphthalene[e]	230.13	293.43	294.48	14	NA	NA	NA	NA
2-methylnaphthalene[e]	220.96	269.92	256.05	10	NA	NA	NA	NA
biphenyl	67.60	81.01	101.32	20	21.24	27.72	23.89	13
2,6-dimethylnaphthalene[e]	141.18	161.94	151.86	7	ND	ND	ND	NA
acenaphthylene	350.59	356.12	360.45	1	72.16	85.43	82.68	9
acenaphthene	393.29	494.18	516.99	14	27.42	37.65	34.18	16
fluorene	496.91	588.49	564.89	9	51.78	69.28	58.58	15
phenanthrene	2775.86	3308.85	2624.88	12	293.40	391.80	305.88	16
anthracene	784.75	917.38	820.41	8	228.03	286.56	241.40	12
1-methylphenanthrene[e]	480.83	521.03	513.57	4	NA	NA	NA	NA
fluoranthene	4967.01	5744.20	5225.88	7	809.42	996.86	801.60	13
pyrene	4698.65	5597.13	5124.00	9	877.93	1063.72	851.74	12
benz[a]anthracene	2158.28	2538.62	2480.41	9	492.12	601.96	493.70	12
chrysene	2530.60	2939.22	2913.86	8	502.85	603.94	493.96	11
benzo[b]fluoranthene	2953.82	3554.01	3284.14	9	572.66	705.11	577.73	12
benzo[k]fluoranthene	678.98	661.98	723.19	5	221.94	269.23	228.73	11
benzo[e]pyrene[e]	1586.76	1869.29	1743.18	8	NA	NA	NA	NA
benzo[a]pyrene	2154.13	2586.21	2437.45	9	518.39	627.31	524.96	11
perylene[e]	380.77	395.37	445.44	8	NA	NA	NA	NA
indeno[1,2,3-c,d]pyrene	1507.35	1811.51	1634.00	9	276.94	335.32	284.94	11
dibenz[a,h]anthracene	371.68	394.28	398.09	4	71.13	90.76	75.94	13
benzo[g,h,i]perylene	1365.92	1673.81	1530.19	10	249.71	298.49	254.12	10
Surrogate Recoveries (%)								
naphthalene-d8	52	61	55	NA	41	52	46	NA
acenaphthene-d10	57	68	59	NA	47	58	51	NA
chrysene-d12	39	44	41	NA	46	56	49	NA

TABLE A.8. (contd)

Qualifiers

(a) NA Not applicable.
(b) Sample concentration of the procedural blank adjusted for the average sample size of the batch.
(c) U Undetected at or above given concentration.
(d) J Concentration estimated; analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(e) Analyte required only in samples designated for Central Long Island Disposal Testing Site.
(f) NS Not spiked.
(g) Outside quality control criteria (50-120%) for matrix spike recoveries.
(h) Percent Difference from certified
= absolute value [(certified value ,µg/kg - value detected corrected for surrogate recovery, µg/kg) / certified value, µg/kg].
(i) NC No certified value available.
(j) Outside SRM quality control acceptable criteria (≤30%).

TABLE A.9. MDL Verification Study for Analysis of Polynuclear Aromatic Hydrocarbons (PAH) in Sediment

Sample Number: Percent Moisture (%): Sample Dry Weight (g): Units (dry wt):	OG99 38.233 20.919 (µg/kg)	OH01 38.160 19.455 (µg/kg)	OH02 38.160 19.201 (µg/kg)	OH03 38.160 18.645 (µg/kg)	OH04 38.098 19.087 (µg/kg)	OH05 38.160 19.434 (µg/kg)	OH06 38.160 18.896 (µg/kg)	OH07 38.161 18.612 (µg/kg)	Standard Deviation STD	Method Detection Limit MDL[a] (µg/kg)	Method Detection Limit MDL (ng)
naphthalene	1.61	1.85	1.88	1.86	1.66	1.72	1.75	1.97	0.12	0.36	7.03
biphenyl	1.30	1.55	1.49	1.61	1.56	1.50	1.57	1.67	0.11	0.33	6.35
acenaphthylene	0.93	1.06	1.09	1.15	1.01	1.18	1.09	1.16	0.08	0.25	4.87
acenaphthene	1.12	1.41	1.16	1.41	1.38	1.21	1.34	1.56	0.15	0.44	8.55
fluorene	1.07	1.31	1.12	1.17	1.09	0.99	1.27	1.25	0.11	0.34	6.48
phenanthrene	1.25	1.41	1.35	1.58	1.42	1.38	1.43	1.59	0.11	0.34	6.52
anthracene	0.73	0.87	0.78	0.88	0.87	0.78	0.77	0.99	0.08	0.25	4.80
fluoranthene	1.10	1.24	1.08	1.24	1.11	1.13	1.13	1.11	0.06	0.19	3.64
pyrene	1.16	1.34	1.21	1.21	1.14	1.15	1.19	1.19	0.06	0.19	3.64
benz[a]anthracene	0.82	1.08	0.94	0.96	0.92	0.89	0.88	0.95	0.08	0.23	4.38
chrysene	0.95	1.12	0.98	1.14	1.01	1.16	0.95	1.02	0.09	0.26	4.98
benzo[b]fluoranthene	0.97	1.02	0.93	1.03	0.89	0.88	0.85	0.86	0.07	0.21	4.03
benzo[k]fluoranthene	0.93	0.92	0.93	1.01	0.89	0.92	1.01	0.69	0.10	0.30	5.72
benzo[a]pyrene	0.67	0.77	0.61	0.79	0.81	0.70	0.71	0.60	0.08	0.24	4.54
indeno[1,2,3-c,d]pyrene	0.85	0.84	0.70	0.75	0.75	0.58	0.66	0.61	0.10	0.30	5.79
dibenz[a,h]anthracene	0.70	0.71	0.53	0.62	0.45	0.53	0.44	0.40	0.12	0.36	6.90
benzo[g,h,i]perylene	0.95	0.87	0.86	0.99	0.73	0.84	0.85	0.76	0.09	0.26	4.99
Surrogate Recoveries (%)											
naphthalene-d8	66	74	69	74	68	74	70	71			
acenaphthene-d10	65	71	69	73	68	73	71	70			
chrysene-d12	58	65	61	65	61	64	62	58			

(a) MDL = STD * 2.998, Average Sample Dry Weight (g) = 19.281.

Appendix B

Site Water and Elutriate Chemical Analyses and Quality Control/Quality Assurance Data, Eastchester Project

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Metals

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Site Water and Elutriate

QA/QC DATA QUALITY OBJECTIVES

	Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Target Detection Limit (µg/L)
Cadmium	ICP/MS	75-125%	≤20%	≤20%	0.025
Chromium	GFAA	75-125%	≤20%	≤20%	1.0
Copper	ICP/MS	75-125%	≤20%	≤20%	0.35
Lead	ICP/MS	75-125%	≤20%	≤20%	0.35
Mercury	CVAA	75-125%	≤20%	≤20%	0.002
Nickel	ICP/MS	75-125%	≤20%	≤20%	0.3
Silver	ICP/MS	75-125%	≤20%	≤20%	0.25
Zinc	GFAA	75-125%	≤20%	≤20%	0.15

METHOD

A total of eight metals was analyzed in water and elutriate samples: silver (Ag), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn). Hg was analyzed using cold-vapor atomic absorption spectroscopy (CVAA) according to the method of Bloom and Crecelius (1983). Cr and Zn were analyzed by Graphite Furnace Atomic Absorption (GFAA) spectrometry following the EPA Method 200.9 (EPA 1991). The remaining metals were analyzed by inductively coupled plasma mass spectrometry (ICP/MS) following a procedure based on EPA Method 200.8 (EPA 1991).

All water and elutriate samples were acidified to pH <2 upon receipt in the laboratory. Five metals, Cd, Cu, Pb, Ni and Ag, were extracted from the water according to a procedure based on EPA Method 218.3 (EPA 1979). This preconcentration involves addition of a chelating agent which results in precipitation of the metals from solution, followed by filtration, and digestion of the filter in concentrated acid in order to achieve low detection limits. The digestates were then analyzed by ICP/MS as described above.

HOLDING TIMES

Twelve site water samples (for triplicate analysis) were received on 3/24/94. Five elutriate samples (for triplicate analysis) were received on 4/11/94, and another five elutriate samples (for triplicate analysis) were received on 4/16/94. All samples were received in good condition, assigned ID numbers according to Battelle's log-in system, acidified to pH<2 with concentrated nitric acid, and held at ambient temperature until analysis.

QA/QC SUMMARY/METALS (continued)

Mercury in water has a holding time of 28 days from collection to analysis. All samples were analyzed within this holding time. Samples were analyzed for the remaining metals within 180 days of collection. Samples were received, digested, and analyzed in two batches, Batch 1a/1b (site waters), and Batch 2 (elutriate). The following table summarizes analysis dates:

Task	Date Batch 1a/1b	Date Batch 2
APDC Extraction	6/13/94	5/24/94
ICP-MS	7/14/94	7/14/94
CVAA-Hg	4/26-28/94	5/9/94
GFAA-Cr	1a: 5/5/94 1b: 5/6/94	5/9/94
GFAA-Zn	5/16/94	5/16/94

DETECTION LIMITS

Target detection limits were met for all metals except Zn. Detection limits for Zn exceeded the target limits; however, all sample values were well above the detection limits achieved. Method Detection Limits (MDLs) for Ag, Cd, Cu, Hg, Ni and Pb were determined by spiking eight replicates of laboratory deionized water and multiplying the standard deviation of the resulting analysis by the Student's t value for n=8. MDLs reported for Cr and Zn were determined by taking the standard deviation of three replicate analyses of the method blank and multiplying the standard deviation by 3. An MDL verification study was performed within the previous year by spiking four replicates of Sequim Bay seawater and multiplying the standard deviation of the resulting analysis by 4.451. All sample MDLs were lower than the MDL verification values.

METHOD BLANKS

Method blanks were generated during the APDC extraction step and analyzed for the metals that were preconcentrated (Ag, Cd, Cu, Ni and Pb.) The blanks reported for Hg, Cr and Zn (the metals analyzed by direct injection of water samples) consist of a dilute nitric acid solution used to dilute all samples for analysis. For Batch 1a/1b, two APDC procedural blanks were analyzed and no APDC metals were detected in the blanks. Cr and Zn were detected in the blank; Cr at levels less than three times the MD, and Zn at levels greater than three times the MDL. All data were corrected for the blank concentrations, and no data were flagged. For Batch 2, two APDC procedural blanks were analyzed and no APDC metals were detected in the blanks. Zn and Cr were detected in the blank at levels less than three times the MDL. All data were corrected for the blank concentrations.

MATRIX SPIKES

Two samples were spiked in duplicate with all metals except Hg, which was spiked on two single samples. The APDC metals (Ag, Cd, Cu, Ni and Pb) were spiked prior to sample processing and the other metals were spiked just prior to analysis. For Batch 1a/1b, all recoveries were within the QC limits of 75% -125%, with the exception of Ag, Cd, and Cu in some of the spikes. Spike recoveries for these metals ranged from 70% to 74%, just below the lower QC limit. No action was taken. For Batch 2, all recoveries were within the QC limits of 75% -125% with the exception of Pb and Ni in one direct spike. Because Pb and

QA/QC SUMMARY/METALS (continued)

Ni values for the other spikes were acceptable, no further action was taken.

REPLICATES

Each sample was analyzed in triplicate. Precision for triplicate analyses was reported by calculating the relative standard deviation (RSD) of the replicate results. For Batch 1a/1b, RSD values were within the QC limits of ±20%, with the exception of Hg, Pb, and Ni on one sample. For Batch 2, RSD values were all within the QC limits of ±20%, with the exception of Cd in one sample and Ag in two samples.

SRMs

Standard Reference Material (SRM), CASS-2, a certified seawater sample from the National Institute of Standards and Technology, (NIST), was analyzed for all metals with the exception of Ag and Hg, which are not certified in this SRM. Results for all metals were within ±20% of mean certified value. Cd and Pb are certified below the MDL and were not detected.

A second SRM, 1641b, a freshwater sample from NIST, was analyzed twice for Hg. Results were within ±20% of mean certified value. No salt water SRMs certified for Ag are available.

A third SRM, 1643c, a freshwater sample from NIST, was analyzed for all metals except Hg. All metals were recovered within ±20% of mean certified value.

REFERENCES

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EPA (U.S. Environmental Protection Agency). 1979. (Revised 1983). Methods for the Chemical Analysis of Water and Wastes. EPA-600/4-79-020. Environmental Monitoring Systems Laboratory, Cincinnati, Ohio.

EPA (U.S. Environmental Protection Agency). 1991 Methods for the Determination of Metals in Environmental Samples. EPA-600/4-91-010. Environmental Services Division, Monitoring Management Branch, Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Chlorinated Pesticides and PCB Congeners

LABORATORY: Battelle Ocean Sciences

MATRIX: Site Water and Elutriate

QA/QC DATA QUALITY OBJECTIVES

Reference Method	Surrogate Recovery	MS Recovery	Relative Precision	Detection Limit
GC/ECD	30-150%	50-120%	≤30%	2-20 ng/L

SAMPLE CUSTODY

Twelve site water samples (in triplicate) were received on 3/31/94. Five elutriate samples (in triplicate) were received on 4/15/94, and another six elutriate samples (in triplicate) were received on 4/19/94. All samples were received in good condition, assigned ID numbers according to Battelle's log-in system, and stored at approximately 4°C until extraction.

METHOD

Water samples were extracted with methylene chloride in a separatory funnel under ambient conditions following a procedure based on the National Oceanic and Atmospheric Administration (NOAA) Status and Trends Program method (Krahn et al. 1988). Sample extracts were passed through a silica/alumina (5% deactivated) chromatography column followed by high performance liquid chromatography (HPLC) cleanup (Krahn et al. 1988). Extracts were analyzed for 15 chlorinated pesticides using gas chromatography with electron capture detection (GC/ECD) following a procedure based on EPA Method 8080 (EPA 1986). The GC column used was a J&W DB-17 capillary column (30-m x 0.25-mm I.D.) with confirmatory analysis on a DB-1701 column (also 30-m x 0.25-mm I.D.).

HOLDING TIMES

Samples were extracted in four batches: Batches 1 and 2 consisted of site waters; Batches 3 and 4 were elutriate samples. The following table summarizes sample extraction and analysis dates for each batch:

Batch No.	Receipt	Extraction	Analysis
1	3/31/94	4/5/94	4/22-26/94
2	3/31/94	4/5/94	4/26-28/94
3	4/15/94	4/19/94	5/5-7/94
4	4/19/94	4/22/94	5/13-15/94

DETECTION LIMITS

Target detection limits (DLs) were met for all pesticides except endosulfan II in some samples (target DL for endosulfan II was 4 ng/L; achieved DL was 11 ng/L).

METHOD BLANKS One method blank (Sequim Bay seawater) was extracted with each extraction batch for a total of four method blanks. No pesticides or PCBs were detected in any of the method blanks.

SURROGATES Two compounds, dibromooctafluorobiphenyl (DBOFB) and PCB congener 112, were added to all samples to assess the efficiency of the analysis. Sample surrogate recoveries were all within the QC guidelines of 30% -150%.

MATRIX SPIKES One water sample in each batch (for a total of four) was spiked with 11 pesticides and 19 PCB congeners. Matrix spike recoveries were within the control limit range of 50-120% with the following exceptions: In the Batch 1, 2, 3, and 4 spike, recovery of PCB 8 was unacceptable due to interference from coelution of the non-target pesticide, alpha-BHC. In the batch 2 matrix spike, recovery of PCB 18 was 48%. In the Batch 3 matrix spike, recovery of endosulfan I/2,4'DDE was 123% and recovery of heptachlor epoxide was 125%. No action was taken.

REPLICATES Each sample was extracted and analyzed in triplicate. Precision was measured by calculating the relative standard deviation (RSD) of the replicate results. The target precision goal was ≤30% RSD for analytes >10 times the Method Detection Limit (MDL). RSDs ranged from 6% to 79%, however, the majority of mean concentrations of all analytes (in each set of triplicate samples) were <10 times the detection limit. Twenty-five PCB/pesticides had a mean >10 times the detection limit and had an RSD of >30%. These RSDs ranged from 31% to 64%.

REFERENCES

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EPA (U.S. Environmental Protection Agency). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* SW-846. U.S. Document No. 955-001-00000, U.S. Environmental Protection Agency, Washington D.C.

TABLE B.1. Metals in Site Water and Elutriate

Sediment Treatment	Replicate	Ag ICP/MS	Cd ICP/MS	Cr GFAA	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn GFAA
		Concentrations in µg/L							
Target detection limit		0.25	0.025	1.0	0.35	0.002	0.30	0.35	0.15
MDL verification [(a)]		0.007	0.025	0.163	0.143	0.0007	0.253	0.035	0.582
EC-A Site Water	1	0.092	0.503	6.47	13.4	0.0685	4.43	20.5	58.9
EC-A Site Water	2	0.091	0.519	6.71	14.1	0.0640	4.64	22.1	64.5
EC-A Site Water	3	0.087	0.542	6.35	18.6	0.0619	4.43	21.7	64.5
EC-A Elutriate	1	0.007 U[(b)]	0.025 U	0.66	0.590	0.0010	0.711	0.971	1.13
EC-A Elutriate	2	0.007 U	0.025 U	0.60	0.640	0.0006 U	0.750	0.935	1.41
EC-A Elutriate	3	0.007 U	0.025 U	0.55	0.661	0.0005	0.771	0.992	1.41
EC-B Site Water	1	0.152	0.411	4.49	19.0	0.212	4.76	18.7	64.5
EC-B Site Water	2	0.167	0.396	4.61	18.9	0.155	4.58	17.6	69.2
EC-B Site Water	3	0.159	0.419	4.44	18.7	0.182	4.69	18.0	71.1
EC-B Elutriate	1	0.0270	0.083	1.62	3.54	0.0263	1.75	5.82	5.35
EC-B Elutriate	2	0.0230	0.236	1.66	3.57	0.0249	1.73	5.28	5.06
EC-B Elutriate	3	0.0350	0.121	1.83	3.67	0.0275	1.74	5.34	3.94
Mud Dump Site Water	1	0.023	0.063	0.26	2.09	0.0097	1.29	0.942	9.35
Mud Dump Site Water	2	0.020	0.058	0.32	1.99	0.0093	1.22	0.904	12.2
Mud Dump Site Water	3	0.024	0.060	0.23	2.10	0.0097	1.30	0.947	9.35
Sequim Bay Control	1	0.007 U	0.054	0.180	0.468	0.0006 U	0.465	0.035 U	7.88
Sequim Bay Control	2	0.007 U	0.056	0.180	0.452	0.0003	0.456	0.094	8.72
Sequim Bay Control	3	0.007 U	0.057	0.180	0.492	0.0006 U	0.486	0.035 U	11.0

(a) MDL Method detection limit based on standard deviation of 4 replicates of spiked control water x 4.541.
(b) U Not detected at or above concentration shown.

TABLE B.2. Quality Control Data (Method Blanks and Recovery of Matrix Spikes) for Metals in Site Water and Elutriate

Sediment Treatment	Batch	Ag ICP/MS	Cd ICP/MS	Cr GFAA	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn GFAA
		Concentrations in µg/L							
METHOD BLANKS									
Site Water									
Blank-1	1a	0.007 U [(a)]	0.025 U	0.33	0.143 U	0.0009	0.253 U	0.035 U	7.48
Blank-2	1b	0.007 U	0.025 U	0.41	0.143 U	0.0011	0.253 U	0.035 U	8.42
Blank-3	1b	NS [(b)]	NS	0.45	NS	NS	NS	NS	NS
Elutriate									
Blank-4	2	0.007 U	0.025 U	0.18	0.143 U	0.0009	0.253 U	0.035 U	0.75
Blank-5	2	0.007 U	0.025 U	0.16	0.143 U	0.0009	0.253 U	0.035 U	0.75
MATRIX SPIKES									
PC Site Water	1a	NA [(c)]	NA	1.79	NA	NA	NA	NA	27.2
PC Site Water, MS [(d)]	1a	NA	NA	2.81	NA	NA	NA	NA	67.3
Concentration Recovered		NA	NA	1.02	NA	NA	NA	NA	40.1
Amount Spiked		NS	NS	0.97	NS	NS	NS	NS	44.8
Percent Recovery		NA	NA	105%	NA	NA	NA	NA	90%
PC Site Water	1a	NA	NA	1.79	NA	NA	NA	NA	27.2
PC Site Water, MSD [(e)]	1a	NA	NA	6.47	NA	NA	NA	NA	114
Concentration Recovered		NA	NA	4.68	NA	NA	NA	NA	86.8
Amount Spiked		NS	NS	4.67	NS	NS	NS	NS	89.2
Percent Recovery		NA	NA	100%	NA	NA	NA	NA	97%
RPD [(f)]		NA	NA	5%	NA	NA	NA	NA	8%
SB-A Site Water	1a	0.143	0.112	NA	5.15	0.0165	1.95	2.96	NA
SB-A Site Water, MS	1a	0.945	0.903	NA	5.89	0.0511	2.73	4.19	NA
Concentration Recovered		0.802	0.791	NA	0.74	0.0346	0.78	1.23	NA
Amount Spiked		1.00	1.00	NS	1.00	0.0364	1.00	1.00	NS
Percent Recovery		80%	79%	NA	74% [(g)]	95%	78%	123%	NA
SB-A Site Water	1a	0.143	0.112	NA	5.15	NA	1.95	2.96	NA
SB-A Site Water, MSD	1a	4.49	3.83	NA	9.67	NA	5.94	7.4	NA
Concentration Recovered		4.35	3.72	NA	4.52	NA	3.99	4.44	NA
Amount Spiked		5.00	5.00	NS	5.00	NS	5.00	5.00	NS
Percent Recovery		87%	74% [(g)]	NA	90%	NA	80%	89%	NA
RPD		8%	6%	NA	20%	NA	2%	32%	NA
HU-B Site Water	1b	NA	NA	1.81	NA	NA	NA	NA	NA
HU-B Site Water, MS	1b	NA	NA	2.94	NA	NA	NA	NA	NA
Concentration Recovered		NA	NA	1.13	NA	NA	NA	NA	NA
Amount Spiked		NS	NS	0.97	NS	NS	NS	NS	NS
Percent Recovery		NA	NA	116%	NA	NA	NA	NA	NA
HU-B Site Water	1b	NA	NA	1.81	NA	NA	NA	NA	NA
HU-B Site Water, MSD	1b	NA	NA	6.24	NA	NA	NA	NA	NA
Concentration Recovered		NA	NA	4.43	NA	NA	NA	NA	NA
Amount Spiked		NS	NS	4.67	NS	NS	NS	NS	NS
Percent Recovery		NA	NA	95%	NA	NA	NA	NA	NA
RPD		NA	NA	20%	NA	NA	NA	NA	NA

TABLE B.2. (contd)

Sediment Treatment	Batch	Ag ICP/MS	Cd ICP/MS	Cr GFAA	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn GFAA
		Concentrations in µg/L							
Mud Dump Site Water	1b	0.022	0.060	NA	2.06	0.0096	1.27	0.931	NA
Mud Dump Site Water, MS	1b	0.743	0.763	NA	3.00	0.0469	20.8	1.86	NA
Concentration Recovered		0.721	0.703	NA	0.94	0.0373	0.810	0.929	NA
Amount Spiked		1.00	1.00	NS	1.00	0.0347	1.00	1.00	NS
Percent Recovery		72% (g)	70% (g)	NA	94%	107%	81%	93%	NA
Mud Dump Site Water	1b	0.022	0.060	NA	2.06	NA	1.27	0.931	NA
Mud Dump Site Water, MSD	1b	4.13	3.56	NA	6.56	NA	5.3	5.60	NA
Concentration Recovered		4.11	3.50	NA	4.50	NA	4.03	4.67	NA
Amount Spiked		5.00	5.00	NS	5.00	NS	5.00	5.00	NS
Percent Recovery		82%	70% (g)	NA	90%	NA	81%	93%	NA
RPD		13%	0.4%	NA	4%	NA	0.5%	1%	NA
PC Elutriate	2	NA	NA	0.78	NA	NA	NA	NA	6.51
PC Elutriate, MS	2	NA	NA	1.70	NA	NA	NA	NA	54.7
Concentration Recovered		NA	NA	0.92	NA	NA	NA	NA	48.2
Amount Spiked		NS	NS	0.97	NS	NS	NS	NS	44.8
Percent Recovery		NA	NA	95%	NA	NA	NA	NA	108%
PC Elutriate	2	NA	NA	0.78	NA	NA	NA	NA	6.51
PC Elutriate, MSD	2	NA	NA	5.44	NA	NA	NA	NA	102
Concentration Recovered		NA	NA	4.66	NA	NA	NA	NA	95.5
Amount Spiked		NS	NS	4.67	NS	NS	NS	NS	89.2
Percent Recovery		NA	NA	100%	NA	NA	NA	NA	107%
RPD		NA	NA	5%	NA	NA	NA	NA	0.5%
SB-B Elutriate	2	0.018	0.025 U	NA	0.741	0.0034	3.02	0.681	NA
SB-B Elutriate, MS	2	0.824	0.856	NA	1.72	0.0245	4.31	2.32	NA
Concentration Recovered		0.806	0.856	NA	0.982	0.0211	1.29	1.64	NA
Amount Spiked		1.00	1.00	NS	1.00	0.0211	1.00	1.00	NS
Percent Recovery		81%	86%	NA	98%	100%	129% (g)	164% (g)	NA
SB-B Elutriate	2	0.018	0.025 U	NA	0.741	NA	3.02	0.681	NA
SB-B Elutriate, MSD	2	4.34	3.79	NA	5.57	NA	8.10	5.11	NA
Concentration Recovered		4.32	3.79	NA	4.83	NA	5.08	4.43	NA
Amount Spiked		5.00	5.00	NS	5.00	NS	5.00	5.00	NS
Percent Recovery		86%	76%	NA	97%	NA	102%	89%	NA
RPD		7%	12%	NA	2%	NA	24%	60%	NA
EC-B Elutriate	2	NA	NA	NA	NA	0.0275	NA	NA	NA
EC-B Elutriate, MS	2	NA	NA	NA	NA	0.0470	NA	NA	NA
Concentration Recovered		NA	NA	NA	NA	0.0195	NA	NA	NA
Amount Spiked		NS	NS	NS	NS	0.0212	NS	NS	NS
Percent Recovery		NA	NA	NA	NA	92%	NA	NA	NA
HU-B Elutriate	2	NA	NA	0.18	NA	NA	NA	NA	11.0
HU-B Elutriate, MS	2	NA	NA	1.15	NA	NA	NA	NA	59.9
Concentration Recovered		NA	NA	0.97	NA	NA	NA	NA	48.9
Amount Spiked		NS	NS	0.97	NS	NS	NS	NS	44.8
Percent Recovery		NA	NA	100%	NA	NA	NA	NA	109%

TABLE B.2. (contd)

Sediment Treatment	Batch	Ag ICP/MS	Cd ICP/MS	Cr GFAA	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn GFAA
		Concentrations in µg/L							
HU-B Elutriate	2	NA	NA	0.18	NA	NA	NA	NA	11.0
HU-B Elutriate, MSD	2	NA	NA	5.77	NA	NA	NA	NA	111
Concentration Recovered		NA	NA	5.59	NA	NA	NA	NA	100
Amount Spiked		NS	NS	4.67	NS	NS	NS	NS	89.2
Percent Recovery		NA	NA	120%	NA	NA	NA	NA	112%
RPD		NA	NA	18%	NA	NA	NA	NA	3%
EC-A Elutriate	2	0.007 U	0.025 U	NA	0.661	0.0005	0.771	0.992	NA
EC-A Elutriate, MS	2	0.831	0.805	NA	1.55	0.0319	1.59	1.85	NA
Concentration Recovered		0.831	0.805	NA	0.892	0.0314	0.816	0.857	NA
Amount Spiked		1.00	1.00	NS	1.00	0.0316	1.00	1.00	NS
Percent Recovery		83%	81%	NA	89%	99%	82%	86%	NA
EC-A Elutriate	2	0.004	0.012	NA	0.661	NA	0.771	0.992	NA
EC-A Elutriate, MSD	2	4.34	3.82	NA	5.34	NA	5.11	5.48	NA
Concentration Recovered		4.33	3.81	NA	4.68	NA	4.31	4.49	NA
Amount Spiked		5.00	5.00	NS	5.00	NS	5.00	5.00	NS
Percent Recovery		87%	76%	NA	94%	NA	86%	90%	NA
RPD		4%	6%	NA	5%	NA	5%	5%	NA

(a) U Undetected at or above concentration shown.
(b) NS Not spiked.
(c) NA Not applicable.
(d) MS Matrix spike
(e) MSD Matrix spike duplicate
(f) RPD Relative percent difference.
(g) Outside data quality criteria of 75%-125%.

TABLE B.3. Quality Control Data (Triplicate Analyses) for Metals in Site Water and Elutriate

Sediment Treatment	Replicate	Batch	Ag ICP/MS	Cd ICP/MS	Cr GFAA	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn GFAA
			Concentrations in µg/L							
PC Site Water	1	1a	0.079	0.325	1.83	8.13	0.0261	2.36	9.83	25.3
PC Site Water	2	1a	0.080	0.360	1.87	8.38	0.0232	2.36	10.1	28.1
PC Site Water	3	1a	0.099	0.336	1.67	8.32	0.0253	2.45	10.5	18.1
RSD (a)			13%	5%	6%	2%	6%	2%	3%	22% (b)
EC-A Site Water	1	1a	0.092	0.503	6.47	13.4	0.0685	4.43	20.5	58.9
EC-A Site Water	2	1a	0.091	0.519	6.71	14.1	0.0640	4.64	22.1	64.5
EC-A Site Water	3	1a	0.087	0.542	6.35	18.6	0.0619	4.43	21.7	64.5
RSD			3%	4%	3%	18%	5%	3%	4%	5%
EC-B Site Water	1	1a	0.152	0.411	4.49	19.0	0.212	4.76	18.7	64.5
EC-B Site Water	2	1a	0.167	0.396	4.61	18.9	0.155	4.58	17.6	69.2
EC-B Site Water	3	1a	0.159	0.419	4.44	18.7	0.182	4.69	18.0	71.1
RSD			5%	3%	2%	1%	16%	2%	3%	5%
HU-A Site Water	1	1a	0.107	0.102	0.83	4.53	0.0178	1.67	3.37	12.2
HU-A Site Water	2	1a	0.082	0.114	0.85	4.59	0.0189	1.79	3.60	14.0
HU-A Site Water	3	1a	0.120	0.114	0.88	4.87	0.0188	1.80	3.78	13.1
RSD			19%	6%	3%	4%	3%	4%	6%	7%
SB-A Site Water	1	1a	0.145	0.108	1.02	5.04	0.0190	1.92	2.85	19.6
SB-A Site Water	2	1a	0.141	0.118	1.15	5.09	0.0160	1.96	3.03	18.7
SB-A Site Water	3	1a	0.142	0.110	1.32	5.33	0.0145	1.97	2.99	21.5
RSD			1%	5%	13%	3%	14%	1%	3%	7%
SB-B Site Water	1	1a	0.075	0.094	0.71	3.53	0.0066	1.67	1.30	9.35
SB-B Site Water	2	1a	0.075	0.093	0.59	3.56	0.0061	1.81	1.32	10.3
SB-B Site Water	3	1a	0.073	0.088	0.68	3.49	0.0062	1.58	1.27	11.2
RSD			2%	4%	9%	1%	4%	7%	2%	9%
BU Site Water	1	1b	0.104	0.090	0.81	4.16	0.0233	1.82	2.79	12.2
BU Site Water	2	1b	0.109	0.080	0.85	4.38	0.0220	1.87	2.79	14.0
BU Site Water	3	1b	0.118	0.096	0.92	4.27	0.0216	1.94	2.85	13.1
RSD			6%	9%	6%	3%	4%	3%	1%	7%
Mud Dump Site Water	1	1b	0.023	0.063	0.26 J (c)	2.09	0.0097	1.29	0.942	9.35
Mud Dump Site Water	2	1b	0.020	0.058	0.32 J	1.99	0.0093	1.22	0.904	12.2
Mud Dump Site Water	3	1b	0.024	0.060	0.23 J	2.10	0.0097	1.30	0.947	9.35
RSD			9%	4%	17%	3%	2%	3%	3%	16%
HU-B Site Water	1	1b	0.192	0.105	1.75	6.73	0.0351	2.13	5.34	13.1
HU-B Site Water	2	1b	0.188	0.105	1.92	6.42	0.0369	2.09	4.95	11.2
HU-B Site Water	3	1b	0.182	0.107	1.75	6.57	0.0373	2.07	5.12	13.1
RSD			3%	1%	5%	2%	3%	1%	4%	9%
HU-C Site Water	1	1b	0.144	0.093	0.94	5.52	0.0288	1.85	4.30	30.9
HU-C Site Water	2	1b	0.139	0.087	0.83	5.25	0.0279	1.86	4.15	31.8
HU-C Site Water	3	1b	0.142	0.089	0.90	5.37	0.0296	1.79	4.02	27.1
RSD			2%	3%	6%	3%	3%	2%	3%	8%
HU-D Site Water	1	1b	0.119	0.113	1.43	5.69	0.0263	1.82	4.89	38.3
HU-D Site Water	2	1b	0.119	0.113	1.39	5.59	0.0277	1.65	4.94	37.4
HU-D Site Water	3	1b	0.121	0.111	1.26	5.81	0.0269	4.24	5.17	36.5
RSD			1%	1%	7%	2%	3%	56% (b)	3%	2%

TABLE B.3. (Contd)

Sediment Treatment	Replicate	Batch	Ag ICP/MS	Cd ICP/MS	Cr GFAA	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn GFAA
			Concentrations in µg/L							
PC Elutriate	1	2	0.018	0.535	0.76	1.64	0.0236	3.57	1.78	7.81
PC Elutriate	2	2	0.022	0.517	0.78	1.60	0.0221	3.48	1.64	6.51
PC Elutriate	3	2	0.020	0.539	0.64	1.63	0.0225	3.57	1.76	6.51
RSD			10%	2%	10%	1%	3%	1%	4%	11%
SB-B Elutriate	1	2	0.017	0.025 U (d)	0.72	0.755	0.0031	2.95	0.667	3.10
SB-B Elutriate	2	2	0.018	0.025 U	0.58	0.736	0.0032	3.02	0.676	3.47
SB-B Elutriate	3	2	0.018	0.025 U	0.64	0.741	0.0034	3.02	0.681	2.72
RSD			3%	NA (e)	11%	1%	5%	1%	1%	12%
SB-A Elutriate	1	2	0.036	0.025 U	1.15	1.28	0.0285	2.61	0.807	3.10
SB-A Elutriate	2	2	0.035	0.025 U	1.21	1.18	0.0290	2.39	0.779	2.63
SB-A Elutriate	3	2	0.030	0.025 U	1.17	1.12	0.0290	2.42	0.772	2.25
RSD			10%	NA	3%	7%	1%	5%	2%	16%
BU Elutriate	1	2	0.021	0.025 U	0.58	0.737	0.0049	2.99	0.586	2.25
BU Elutriate	2	2	0.038	0.025 U	0.62	0.700	0.0051	2.95	0.603	3.28
BU Elutriate	3	2	0.020	0.025 U	0.53	0.709	0.0051	2.85	0.564	2.44
RSD			38% (b)	NA	8%	3%	2%	2%	3%	21% (b)
EC-B Elutriate	1	2	0.027	0.083	1.62	3.54	0.0263	1.75	5.82	5.35
EC-B Elutriate	2	2	0.023	0.236	1.66	3.57	0.0249	1.73	5.28	5.06
EC-B Elutriate	3	2	0.035	0.121	1.83	3.67	0.0275	1.74	5.34	3.94
RSD			22% (b)	54% (b)	7%	2%	5%	1%	5%	16%
HU-B Elutriate	1	2	0.075	0.033	2.44	1.90	0.0198	1.39	1.18	1.78
HU-B Elutriate	2	2	0.061	0.034	2.16	1.92	0.0187	1.43	1.11	2.16
HU-B Elutriate	3	2	0.064	0.035	2.42	1.95	0.0179	1.42	1.09	1.88
RSD			11%	3%	7%	1%	5%	1%	4%	10%
HU-A Elutriate	1	2	0.025	0.028	1.44	1.24	0.0130	1.53	0.994	6.19
HU-A Elutriate	2	2	0.022	0.028	1.25	1.22	0.0110	1.50	1.03	6.10
HU-A Elutriate	3	2	0.023	0.025 U	1.17	1.14	0.0108	1.44	0.999	5.91
RSD			7%	NA	11%	4%	10%	3%	2%	2%
EC-A Elutriate	1	2	0.007 U	0.025 U	0.66	0.590	0.0010	0.711	0.971	1.13
EC-A Elutriate	2	2	0.007 U	0.025 U	0.60	0.640	0.0006 U	0.750	0.935	1.41
EC-A Elutriate	3	2	0.007 U	0.025 U	0.55	0.661	0.0005	0.771	0.992	1.41
RSD			NA	NA	9%	6%	NA	4%	3%	12%
HU-C Elutriate	1	2	0.035	0.031	1.73	1.25	0.0152	2.37	1.11	2.25
HU-C Elutriate	2	2	0.030	0.031	1.81	1.14	0.0132	2.24	0.994	2.34
HU-C Elutriate	3	2	0.031	0.033	1.95	1.24	0.0124	2.32	1.09	1.88
RSD			8%	4%	6%	5%	11%	3%	6%	11%
HU-D Elutriate	1	2	0.021	0.025 U	0.84	0.993	0.0125	1.41	0.847	1.69
HU-D Elutriate	2	2	0.016	0.057	0.84	1.06	0.0129	1.39	0.953	1.59
HU-D Elutriate	3	2	0.027	0.045	0.72	1.03	0.0128	1.44	0.846	1.31
RSD			26% (b)	NA	9%	3%	2%	2%	7%	13%
Control Site Water	1	2	0.007 U	0.054	0.18	0.468	0.0006 U	0.465	0.035 U	7.88
Control Site Water	2	2	0.007 U	0.056	0.18	0.452	0.0003	0.456	0.094	8.72
Control Site Water	3	2	0.007 U	0.057	0.18	0.492	0.0006 U	0.486	0.035 U	11.0
RSD			NA	3%	0%	4%	NA	3%	NA	18%

(a) RSD Relative standard deviation.
(b) Outside data quality criteria of +/-20% RSD.
(c) J Concentration estimated; analyte detected below detection limit.
(d) U Undetected at or above concentration shown.
(e) NA Not applicable.

TABLE B.4. Quality Control Data (Standard Reference Materials) for Metals in Site Water and Elutriate

Standard Reference Material	Rep-licate	Batch	Ag ICP/MS	Cd ICP/MS	Cr GFAA	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn GFAA
			Concentrations in µg/L							
Site Water										
SRM CASS-2	1	1a	0.007 U[a]	0.025 U	0.32 U	0.695	NA[b]	0.301	0.016 J[c]	2.04
SRM CASS-2	2	1a	0.007 U	0.025 U	0.32 U	0.730	NA	0.339	0.018 J	2.30
SRM CASS-2	1	1b	NA	NA	0.19 U	NA	NA	NA	NA	NA
Certified Value CASS-2			NC[d]	0.019	0.121	0.675	NC	0.298	0.019	1.97
Range			NC	±0.004	±0.016	±0.039	NC	±0.036	±0.006	±0.12
Percent Difference	1		NA	NA	NA	3	NA	1	16	4
Percent Difference	2		NA	NA	NA	8	NA	14	5	17
Percent Difference	1		NA	NA	NA	NA	NA	NA	NA	NA
SRM 1641b	1	1a	NA	NA	NA	NA	1530	NA	NA	NA
SRM 1641b	2	1a	NA	NA	NA	NA	1540	NA	NA	NA
Certified Value 1641b			NC	NC	NC	NC	1520	NC	NC	NC
Range			NC	NC	NC	NC	±40	NC	NC	NC
Percent Difference	1		NA	NA	NA	NA	1	NA	NA	NA
Percent Difference	2		NA	NA	NA	NA	1	NA	NA	NA
SRM 1643c	1	1a	2.09	11.7	20.5	20.6	NA	55.3	33.6	84.2
SRM 1643c	2	1a	2.01	11.0	19.4	19.2	NA	54.2	35.8	84.2
SRM 1643c	1	1b	NA	NA	19.5	NA	NA	NA	NA	NA
Certified Value 1643c			2.21	12.2	19.0	22.3	NC	60.6	35.3	73.9
Range			±0.30	± 1.0	±0.6	±2.8	NC	±7.3	±0.9	±0.9
Percent Difference	1		5	4	8	8	NA	9	5	14
Percent Difference	2		9	10	2	14	NA	11	1	14
Percent Difference	1		NA	NA	3	NA	NA	NA	NA	NA
Elutriate										
SRM CASS-2	1	2	0.003 U	0.025 U	0.103	0.671	NA	0.257	0.035 U	2.10
SRM CASS-2	2	2	0.003 U	0.025 U	0.103	0.668	NA	0.258	0.035 U	1.83
Certified Value CASS-2			NC	0.019	0.118	0.675	NC	0.298	0.019	1.97
Range			NC	±0.004	±0.021	±0.039	NC	±0.036	±0.006	±0.12
Percent Difference	1		NA	NA	13	1	NA	14	NA	7
Percent Difference	2		NA	NA	13	1	NA	13	NA	7
SRM 1641b	1	2	NA	NA	NA	NA	1540	NA	NA	NA
SRM 1641b	2	2	NA	NA	NA	NA	1510	NA	NA	NA
Certified Value 1641b			NC	NC	NC	NC	1520	NC	NC	NC
Range			NC	NC	NC	NC	±40	NC	NC	NC
Percent Difference	1		NA	NA	NA	NA	1	NA	NA	NA
Percent Difference	2		NA	NA	NA	NA	1	NA	NA	NA
SRM 1643c	1	2	1.89	11.3	19.3	20.4	NA	56.7	33.0	76.0
SRM 1643c	2	2	1.80	11.2	21.0	20.0	NA	56.3	32.8	71.9
Certified Value 1643c			2.21	12.2	19.0	22.3	NC	60.6	35.3	73.9
Range			±0.30	± 1.0	±0.6	±2.8	NC	±7.3	±0.9	±0.9
Percent Difference	1		15	7	2	9	NA	6	7	3
Percent Difference	2		19	8	11	10	NA	7	7	3

(a) U Undetected at or above concentration shown.
(b) NA Not applicable.
(c) J Analyte detected below detection limit; concentration estimated.
(d) NC Not certified.

TABLE B.5. Pesticides and PCBs in Site Water and Elutriate

Site/Replicate	EC-A Rep. 1	EC-A Rep. 2	EC-A Rep. 3	EC-B Rep. 1	EC-B Rep. 2	EC-B Rep. 3
Matrix	Site Water	Site Water	Site Water	Site Water	Site Water	Site Water
Sample Size (L)	1.04	1.04	1.04	1.04	1.04	1.04
Units	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
2,4-DDD	0.77 U [(a)]	0.77 U	0.70 J [(b)]	0.77 U	0.77 U	0.77 U
2,4-DDT	0.78 U	0.78 U	0.78 U	0.46 J	0.78 U	0.78 U
4,4-DDD	4.99	3.50	3.89	2.88	2.24	3.07
4,4-DDE	2.97	1.84	2.64	1.03	0.70 J	0.86 J
4,4-DDT	4.42	3.92	0.96 U	0.96 U	0.96 U	0.88 J
Aldrin	26.7	27.1	0.7 U	15.5	8.37	7.68
alpha-Chlordane	4.35	4.29	5.59	2.99	2.03	2.57
Dieldrin	3.24	1.76	2.53	1.80	1.14	2.80
Endosulfan I/2,4'-DDE	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U
Endosulfan II	10.8 U	10.8 U	10.8 U	10.8 U	10.8 U	10.8 U
Endosulfan sulfate	7.87 U	7.87 U	7.87 U	7.87 U	7.87 U	7.87 U
Heptachlor	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U
Heptachlor epoxide	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
trans-Nonachlor	1.62	1.60	3.03	1.00	1.01	1.74
CL2(08)	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U
CL3(18)	1.80	1.02 U	1.02 U	1.02 U	1.02 U	1.02 U
CL3(28)	4.25	1.15 U	1.15 U	7.34	4.16	5.59
CL4(44)	2.97	2.59	1.17 U	1.17 U	1.17 U	1.94
CL4(49)	1.01 U	1.01 U	1.01 U	1.01 U	1.01 U	1.01 U
CL4(52)	2.98	2.30	1.18 U	1.18 U	1.18 U	1.18 U
CL4(66)	0.92 U	0.92 U	0.92 U	0.92 U	0.92 U	0.92 U
CL5(87)	1.96	0.69 J	1.41	0.76 J	0.75 J	1.45
CL5(101)	1.04 U	1.04 U	1.04 U	1.04 U	1.04 U	1.04 U
CL5(105)	0.71 J	0.86 J	1.24 U	1.24 U	1.24 U	1.24 U
CL5(118)	1.50	0.98 U	1.25	0.56 J	0.52 J	0.87 J
CL6(128)	1.10 U	1.10 U	1.10 U	1.10 U	1.10 U	1.10 U
CL6(138)	1.41	1.28 J	1.31 U	1.31 U	1.31 U	1.45
CL6(153)	1.17 J	1.26	1.26 U	0.88 J	0.62 J	0.83 J
CL7(170)	1.12 U	1.12 U	1.12 U	1.12 U	1.12 U	1.12 U
CL7(180)	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
CL7(183)	1.02 U	1.02 U	1.02 U	1.02 U	1.02 U	1.02 U
CL7(184)	0.67 J	1.02 U	1.02 U	1.02 U	1.02 U	0.50 J
CL7(187)	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
CL8(195)	1.10 U	1.10 U	1.10 U	1.10 U	1.10 U	1.10 U
CL9(206)	1.08 U	1.08 U	1.08 U	1.08 U	1.08 U	1.08 U
CL10(209)	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U
<u>Surrogate Recoveries (%)</u>						
DBOFB	100	112	114	108	64	112
CL5(112)	69	71	69	69	42	67

Table B.5. (contd)

Site/Replicate	EC-A Rep. 1	EC-A Rep. 2	EC-A Rep. 3	EC-B Rep. 1	EC-B Rep. 2	EC-B Rep. 3
Matrix	Elutriate	Elutriate	Elutriate	Elutriate	Elutriate	Elutriate
Sample Size (L)	0.90	0.91	0.92	0.96	0.98	0.50
Units	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
2,4-DDD	2.33	3.20	2.49	3.30	1.82	3.07
2,4-DDT	0.90 U	0.89 U	0.88 U	0.91	0.65 J	0.93 J
4,4-DDD	5.21	4.06	4.49	12.2	6.58	12.25
4,4-DDE	7.99	7.13	6.98	6.27	2.65	6.55
4,4-DDT	1.11 U	1.10 U	1.09 U	1.04 U	1.02 U	2.00 U
Aldrin	0.82 U	0.81 U	0.81 U	14.1	14.9	22.5
alpha-Chlordane	1.43	1.24	1.38	10.0	7.93	13.2
Dieldrin	2.36	2.53	1.66	3.25	2.87	3.80
Endosulfan I/2,4'-DDE	0.94 U	0.93 U	0.92 U	0.88 U	0.86 U	1.69 U
Endosulfan II	12.4 U	12.3 U	12.2 U	11.7 U	11.4 U	22.4 U
Endosulfan sulfate	9.10 U	9.00 U	8.95 U	8.53 U	8.35 U	16.4 U
Heptachlor	0.73 U	0.72 U	0.72 U	0.68 U	0.67 U	1.31 U
Heptachlor epoxide	0.95 U	0.94 U	0.93 U	0.89 U	0.87 U	1.71 U
trans-Nonachlor	0.86 J	0.95 J	0.77 J	6.11	3.94	7.17
CL2(08)	4.26	3.54	4.44	0.91 U	0.89 U	1.75 U
CL3(18)	3.68	4.90	2.30	1.11 U	1.09 U	2.13 U
CL3(28)	9.82	6.22	6.74	6.66	4.10	15.34
CL4(44)	7.46	7.71	5.79	7.88	3.73	12.41
CL4(49)	4.76	3.71	2.83	9.33	4.65	8.62
CL4(52)	11.6	10.5	12.5	39.1	31.1	66.5
CL4(66)	35.9	40.5	33.6	19.9	20.1	17.8
CL5(87)	1.82	1.70	1.50	3.13	2.24	4.94
CL5(101)	3.93	3.82	3.90	6.84	5.66	11.63
CL5(105)	1.42 J	2.00	1.28 J	1.939	1.815	1.88 J
CL5(118)	4.42	3.69	3.70	7.55	4.74	9.71
CL6(128)	1.27 U	1.25 U	1.25 U	1.97	1.69	2.54
CL6(138)	5.12	4.29	5.01	9.97	2.83	11.14
CL6(153)	3.42	3.17	2.66	5.18	3.55	7.32
CL7(170)	2.60	2.09	2.19	1.22 U	1.19 U	2.34 U
CL7(180)	2.60	2.08	2.07	1.06 U	1.03 U	2.03 U
CL7(183)	0.71 J	0.61 J	0.60 J	1.39	0.72 J	2.09 J
CL7(184)	1.18 U	1.17 U	1.16 U	1.11 U	1.08 U	2.12 U
CL7(187)	1.79	1.10 U	1.10 U	1.04 U	1.02 U	2.01 U
CL8(195)	0.41 J	0.43 J	0.69 J	1.20 U	1.17 U	2.30 U
CL9(206)	0.87 J	0.61 J	0.61 J	1.17 U	1.14 U	2.24 U
CL10(209)	0.86 J	0.93 J	0.92 J	1.30 U	1.27 U	2.49 U
<u>Surrogate Recoveries (%)</u>						
DBOFB	70	70	64	111	115	113
CL5(112)	56	63	53	72	72	72

(a) U Undetected at or above concentration given.
(b) J Concentration estimated; analyte detected is below detection limit.

TABLE B.6. Quality Control Data (Method Blanks and Recovery of Matrix Spikes) for Pesticides and PCBs in Site Water and Elutriate

Sample:	Method Blank	SB-B Rep. 3	SB-B Rep. 3 MS	Amount Spiked	Percent Recovery
Matrix:	Control Water	Site Water	Site Water		
Sample Size (L):	1.01 [(a)]	0.53	0.51		
Batch:	1	1	1	1	1
Units:	ng/L	ng/L	ng/L	ng	%
2,4-DDD	0.79 U [(b)]	1.52 U	NS [(c)]	NS	NA [(d)]
2,4-DDT	0.80 U	1.54 U	159.31	NS	NA
4,4-DDD	1.15 U	2.21 U	142.46	80.40	90
4,4-DDE	0.98 U	1.88 U	138.23	80.20	88
4,4-DDT	0.99 U	1.90 U	135.93	80.20	86
Aldrin	0.73 U	1.41 U	134.31	80.20	85
alpha-Chlordane	0.92 U	1.77 U	129.31	80.00	82
Dieldrin	0.97 U	2.64	111.18	80.20	69
Endosulfan I/2,4'-DDE	0.84 U	1.61 U	138.52	80.20	88
Endosulfan II	11.07 U	21.33 U	131.51	80.20	84
Endosulfan sulfate	8.09 U	15.59 U	120.25	80.20	76
Heptachlor	0.65 U	1.25 U	117.33	80.20	75
Heptachlor epoxide	0.85 U	1.63 U	118.33	80.20	75
trans-Nonachlor	0.95 U	1.84 U	NS	NS	NA
CL2(08)	0.87 U	1.67 U	C [(e)]	80.00	NC [(f)]
CL3(18)	1.05 U	2.03 U	83.25	80.00	53
CL3(28)	1.18 U	2.27 U	131.73	80.00	84
CL4(44)	1.20 U	2.32 U	114.82	80.00	73
CL4(49)	1.03 U	1.99 U	NS	NS	NA
CL4(52)	1.22 U	2.34 U	108.44	80.00	69
CL4(66)	0.94 U	1.82 U	137.82	80.00	88
CL5(87)	1.06 U	2.04 U	NS	NS	NA
CL5(101)	1.06 U	2.05 U	110.62	80.00	71
CL5(105)	1.28 U	2.46 U	133.30	80.00	85
CL5(118)	1.00 U	1.94 U	121.65	80.00	78
CL6(128)	1.13 U	2.17 U	121.75	80.00	78
CL6(138)	1.35 U	2.60 U	123.58	80.00	79
CL6(153)	1.29 U	2.49 U	108.26	80.00	69
CL7(170)	1.16 U	2.23 U	127.93	80.00	82
CL7(180)	1.00 U	1.93 U	118.14	80.00	75
CL7(183)	1.05 U	2.02 U	NS	NS	NA
CL7(184)	1.05 U	2.02 U	NS	NS	NA
CL7(187)	0.99 U	1.91 U	108.34	80.00	69
CL8(195)	1.14 U	2.19 U	122.94	80.00	78
CL9(206)	1.11 U	2.14 U	117.95	80.00	75
CL10(209)	1.23 U	2.38 U	113.65	80.00	72
Surrogate Recoveries (%)					
DBOFB	86	99	94	NA	NA
CL5(112)	77	74	74	NA	NA

TABLE B.6. (Contd)

Sample:	Method Blank		HU-D Rep. 3		HU-D Rep. 3 MS	Amount Spiked	Percent Recovery
Matrix:	Control Water		Site Water		Site Water		
Sample Size (L):	1.01 [(a)]		0.52		0.52		
Batch:	2		2		2	2	2
Units:	ng/L		ng/L		ng/L	ng	%
2,4-DDD	0.79	U	1.53	U	NS	NS	NA
2,4-DDT	0.80	U	1.55	U	NS	NS	NA
4,4-DDD	1.15	U	2.23	U	132.72	80.40	86
4,4-DDE	0.98	U	1.90	U	120.53	80.20	78
4,4-DDT	0.99	U	1.92	U	125.17	80.20	81
Aldrin	0.73	U	1.43	U	113.20	80.20	73
alpha-Chlordane	0.92	U	1.72	J [(g)]	118.11	80.00	76
Dieldrin	0.98	U	1.53	J	84.92	80.20	54
Endosulfan I/2,4'-DDE	0.84	U	1.63	U	136.31	80.20	88
Endosulfan II	11.08	U	2.71	J	111.86	80.20	71
Endosulfan sulfate	8.10	U	15.74	U	98.59	80.20	64
Heptachlor	0.65	U	1.26	U	103.27	80.20	67
Heptachlor epoxide	0.85	U	1.64	U	117.22	80.20	76
trans-Nonachlor	0.95	U	1.86	U	NS	NS	NA
CL2(08)	0.87	U	1.68	U	C	80.00	NC
CL3(18)	1.05	U	2.05	U	73.37	80.00	48 [(h)]
CL3(28)	1.18	U	2.29	U	125.42	80.00	82
CL4(44)	1.20	U	2.34	U	109.8	80.00	71
CL4(49)	1.03	U	2.01	U	NS	NS	NA
CL4(52)	1.22	U	2.37	U	103.56	80.00	67
CL4(66)	0.94	U	1.83	U	147	80.00	96
CL5(87)	1.06	U	2.06	U	NS	NS	NA
CL5(101)	1.07	U	2.07	U	118.56	80.00	77
CL5(105)	1.28	U	2.48	U	138.28	80.00	90
CL5(118)	1.00	U	1.95	U	125.01	80.00	81
CL6(128)	1.13	U	2.19	U	122.64	80.00	80
CL6(138)	1.35	U	2.62	U	113.75	80.00	74
CL6(153)	1.29	U	2.52	U	103.09	80.00	67
CL7(170)	1.16	U	2.25	U	130.43	80.00	85
CL7(180)	1.00	U	1.95	U	115.48	80.00	75
CL7(183)	1.05	U	2.04	U	NS	NS	NA
CL7(184)	1.05	U	2.04	U	NS	NS	NA
CL7(187)	0.99	U	1.93	U	94.93	80.00	62
CL8(195)	1.14	U	2.21	U	112.84	80.00	73
CL9(206)	1.11	U	2.16	U	106.60	80.00	69
CL10(209)	1.23	U	2.40	U	96.54	80.00	63
<u>Surrogate Recoveries (%)</u>							
DBOFB	33		32		62	NA	NA
CL5(112)	46		49		64	NA	NA

TABLE B.6. (Contd)

Sample:	Method Blank	EC-B Rep. 3	EC-B Rep. 3 MS	Amount Spiked	Percent Recovery
Matrix:	Control Water	Elutriate	Elutriate		
Sample Size (L):	0.94 [(a)]	0.50	0.48		
Batch:	3	3	3	3	3
Units:	ng/L	ng/L	ng/L	ng	%
2,4-DDD	0.85 U	3.07	NS	NS	NA
2,4-DDT	0.86 U	0.925 J	NS	NS	NA
4,4-DDD	1.24 U	12.2	185.49	80.40	103
4,4-DDE	1.06 U	6.55	163.88	80.20	94
4,4-DDT	1.07 U	2.00 U	172.90	80.20	103
Aldrin	0.79 U	22.5	199.10	80.20	106
alpha-Chlordane	0.99 U	13.2	189.13	80.00	106
Dieldrin	1.05 U	3.80	122.35	80.20	71
Endosulfan I/2,4'-DDE	0.90 U	1.69 U	205.25	80.20	123 [(n)]
Endosulfan II	11.97 U	22.4 U	154.59	80.20	93
Endosulfan sulfate	8.75 U	16.4 U	146.38	80.20	88
Heptachlor	0.70 U	1.31 U	179.22	80.20	107
Heptachlor epoxide	0.91 U	1.71 U	209.34	80.20	125 [(n)]
trans-Nonachlor	1.03 U	7.17	7.24	NS	NA
CL2(08)	0.94 U	1.75 U	C	80.00	NC
CL3(18)	1.14 U	2.13 U	145.89	80.00	88
CL3(28)	1.28 U	15.3	203.61	80.00	113
CL4(44)	1.30 U	12.4	185.74	80.00	104
CL4(49)	1.12 U	8.62	10.64	NS	NA
CL4(52)	1.32 U	66.5	201.24	80.00	81
CL4(66)	1.02 U	17.8	215.42	80.00	119
CL5(87)	1.14 U	4.94	NS	NS	NA
CL5(101)	1.15 U	11.6	181.50	80.00	102
CL5(105)	1.38 U	1.88 J	181.11	80.00	108
CL5(118)	1.09 U	9.71	164.19	80.00	93
CL6(128)	1.22 U	2.54	155.43	80.00	92
CL6(138)	1.46 U	11.1	155.98	80.00	87
CL6(153)	1.40 U	7.32	141.71	80.00	81
CL7(170)	1.25 U	2.34 U	163.91	80.00	98
CL7(180)	1.08 U	2.03 U	152.51	80.00	92
CL7(183)	1.14 U	2.09 J	NS	NS	NA
CL7(184)	1.14 U	2.12 U	NS	NS	NA
CL7(187)	1.07 U	2.01 U	121.21	80.00	73
CL8(195)	1.23 U	2.30 U	143.07	80.00	86
CL9(206)	1.20 U	2.24 U	147.57	80.00	89
CL10(209)	1.33 U	2.49 U	131.96	80.00	79
Surrogate Recoveries (%)					
DBOFB	86	113	111	NA	NA
CL5(112)	79	72	74	NA	NA

TABLE B.6. (Contd)

Sample:	Method Blank		HU-A Rep. 3		HU-A Rep. 3 MS	Amount Spiked	Percent Recovery
Matrix:	Control Water		Elutriate		Elutriate		
Sample Size (L):	0.94 [(a)]		0.47		0.50		
Batch:	4		4		4	4	4
Units:	ng/L		ng/L		ng/L	ng	%
2,4-DDD	0.85	U	9.81		NS	NS	NA
2,4-DDT	0.86	U	1.62	U	NS	NS	NA
4,4-DDD	1.23	U	9.54		180.43	80.40	100
4,4-DDE	1.05	U	26.82		185.20	80.20	93
4,4-DDT	1.06	U	2.00	U	168.19	80.20	99
Aldrin	0.79	U	1.48	U	145.33	80.20	85
alpha-Chlordane	0.98	U	2.06		152.82	80.00	89
Dieldrin	1.05	U	4.72		129.96	80.20	73
Endosulfan I/2,4'-DDE	0.90	U	10.32		178.82	80.20	99
Endosulfan II	11.89	U	22.40	U	160.96	80.20	94
Endosulfan sulfate	8.69	U	16.37	U	167.71	80.20	98
Heptachlor	0.70	U	1.31	U	176.94	80.20	104
Heptachlor epoxide	0.91	U	0.47	J	176.62	80.20	103
trans-Nonachlor	1.02	U	1.20	J	NS	NS	NA
CL2(08)	0.93	U	1.75	U	C	80.00	NC
CL3(18)	1.13	U	7.52		107.87	80.00	59
CL3(28)	1.27	U	11.32		146.96	80.00	80
CL4(44)	1.29	U	12.98		129.37	80.00	68
CL4(49)	1.11	U	9.72		13.77	NS	NA
CL4(52)	1.31	U	17.50		127.11	80.00	64
CL4(66)	1.01	U	59.92		183.33	80.00	73
CL5(87)	1.14	U	5.12		5.28	NS	NA
CL5(101)	1.14	U	13.99		127.98	80.00	67
CL5(105)	1.37	U	2.31	J	155.08	80.00	90
CL5(118)	1.08	U	8.52		130.92	80.00	72
CL6(128)	1.21	U	4.25		146.69	80.00	84
CL6(138)	1.45	U	15.07		142.49	80.00	75
CL6(153)	1.39	U	10.27		114.82	80.00	61
CL7(170)	1.24	U	5.21		161.93	80.00	92
CL7(180)	1.08	U	8.42		152.31	80.00	85
CL7(183)	1.13	U	3.39		NS	NS	NA
CL7(184)	1.13	U	2.12	U	NS	NS	NA
CL7(187)	1.07	U	2.01	U	118.67	80.00	70
CL8(195)	1.22	U	3.11		163.38	80.00	94
CL9(206)	1.19	U	7.24		171.60	80.00	97
CL10(209)	1.32	U	6.82		153.12	80.00	86
Surrogate Recoveries (%)							
DBOFB	79		83		81	NA	NA
CL5(112)	71		71		65	NA	NA

(a) Sample concentration of the method blank adjusted for the average sample size of the batch.
(b) U Undetected at or above concetntration shown.
(c) NS Not spiked.
(d) NA Not applicable.
(e) C PCB congener 08 coeluted with non-target pesticide a-BHC. resulting in unacceptable recovery in matrix spike samples.
(f) NC Percent recovery not calculated due to coeluting peak.
(g) J Concentration estimated; analyte detected below method detection limit (MDL) and above instrument detection limit (IDL).
(h) Outside quality control criteria (50-120%) for matrix spike recovery.

TABLE B.7. Quality Control Data (Triplicate Analyses) for Pesticides and PCBs in Site Water and Elutriate

Matrix	PC Rep. 1 Site Water	PC Rep. 2 Site Water	PC Rep. 3 Site Water	RSD[a]	EC-A Rep. 1 Site Water	EC-A Rep. 2 Site Water	EC-A Rep. 3 Site Water	RSD
Sample Size (L)	1.04	1.04	1.04		1.04	1.04	1.04	
Batch	1	1	1		1	1	1	
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	0.77 U[b]	0.77 U	0.77 U	NA[c]	0.77 U	0.77 U	0.70 J	NA
2,4-DDT	0.78 U	0.78 U	0.78 U	NA	0.78 U	0.78 U	0.78 U	NA
4,4-DDD	1.95	1.71	1.90	7%	4.99	3.50	3.89	19%
4,4-DDE	0.63 J[d]	0.60 J	0.81 J	16%	2.97	1.84	2.64	23%
4,4-DDT	0.96 U	1.70	0.90 J	NA	4.42	3.92	0.96 U	NA
Aldrin	0.71 U	0.71 U	0.71 U	NA	26.7	27.1	0.71 U	NA
alpha-Chlordane	1.80	1.94	1.76	5%	4.35	4.29	5.59	16%
Dieldrin	1.80	1.55	1.56	9%	3.24	1.76	2.53	30%
Endosulfan I/2,4'-DDE	0.81 U	0.81 U	0.81 U	NA	0.81 U	0.81 U	0.81 U	NA
Endosulfan II	1.57 J	10.8 U	10.8 U	NA	10.8 U	10.8 U	10.8 U	NA
Endosulfan sulfate	7.87 U	7.87 U	7.87 U	NA	7.87 U	7.87 U	7.87 U	NA
Heptachlor	0.63 U	0.63 U	0.63 U	NA	0.63 U	0.63 U	0.63 U	NA
Heptachlor epoxide	0.82 U	0.82 U	0.82 U	NA	0.82 U	0.82 U	0.82 U	NA
trans-Nonachlor	0.93 U	0.93 U	0.93 U	NA	1.62	1.60	3.03	39%
CL2(08)	0.84 U	0.84 U	0.84 U	NA	0.84 U	0.84 U	0.84 U	NA
CL3(18)	1.02 U	1.02 U	1.02 U	NA	1.80	1.02 U	1.02 U	NA
CL3(28)	4.20	2.69	3.05	24%	4.25	1.15 U	1.15 U	NA
CL4(44)	1.17 U	1.17 U	1.17 U	NA	2.97	2.59	1.17 U	NA
CL4(49)	1.01 U	1.01 U	1.01 U	NA	1.01 U	1.01 U	1.01 U	NA
CL4(52)	1.18 U	1.18 U	1.18 U	NA	2.98	2.30	1.18 U	NA
CL4(66)	0.92 U	0.92 U	0.92 U	NA	0.92 U	0.92 U	0.92 U	NA
CL5(87)	0.82 J	0.52 J	0.73 J	23%	1.96	0.69 J	1.41	47%
CL5(101)	1.04 U	1.04 U	1.04 U	NA	1.04 U	1.04 U	1.04 U	NA
CL5(105)	1.24 U	1.24 U	1.24 U	NA	0.71 J	0.86 J	1.24 U	NA
CL5(118)	0.98 U	0.98 U	0.98 U	NA	1.50	0.98 U	1.25	NA
CL6(128)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL6(138)	1.31 U	1.31 U	0.66 J	NA	1.41	1.28 J	1.31 U	NA
CL6(153)	1.26 U	1.26 U	0.96 J	NA	1.17 J	1.26	1.26 U	NA
CL7(170)	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	1.12 U	NA
CL7(180)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	0.98 U	NA
CL7(183)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(184)	1.02 U	1.02 U	1.02 U	NA	0.67 J	1.02 U	1.02 U	NA
CL7(187)	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA
CL8(195)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL9(206)	1.08 U	1.08 U	1.08 U	NA	1.08 U	1.08 U	1.08 U	NA
CL10(209)	1.20 U	1.20 U	1.20 U	NA	1.20 U	1.20 U	1.20 U	NA
Surrogate Recoveries (%)								
DBOFB	108	105	103	NA	100	112	114	NA
CL5(112)	72	72	71	NA	69	71	69	NA

TABLE B.7. (Contd)

Matrix	EC-B Rep. 1 Site Water	EC-B Rep. 2 Site Water	EC-B Rep. 3 Site Water	RSD	HU-A Rep 1 Site Water	HU-A Rep 2 Site Water	HU-A Rep 3 Site Water	RSD
Sample Size (L)	1.04	1.04	1.04		1.04	1.04	1.04	
Batch	1	1	1	1	1	1	1	
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	0.77 U	0.77 U	0.77 U	NA	0.77 U	0.77 U	0.77 U	NA
2,4-DDT	0.46 J	0.78 U	0.78 U	NA	0.78 U	0.78 U	0.78 U	NA
4,4-DDD	2.88	2.24	3.07	16%	1.12 U	1.12 U	1.12 U	NA
4,4-DDE	1.03	0.70 J	0.86 J	19%	0.95 U	0.95 U	0.95 U	NA
4,4-DDT	0.96 U	0.96 U	0.88 J	NA	0.96 U	0.96 U	0.96 U	NA
Aldrin	15.5	8.37	7.68	41%	0.71 U	0.71 U	0.71 U	NA
alpha-Chlordane	2.99	2.03	2.57	19%	0.89 U	0.68 J	0.89 U	NA
Dieldrin	1.80	1.14	2.80	44%	2.28	1.42	1.21	35%
Endosulfan I/2,4'-DDE	0.81 U	0.81 U	0.81 U	NA	0.81 U	0.81 U	0.81 U	NA
Endosulfan II	10.8 U	10.8 U	10.8 U	NA	10.8 U	10.8 U	10.8 U	NA
Endosulfan sulfate	7.87 U	7.87 U	7.87 U	NA	7.87 U	7.87 U	7.87 U	NA
Heptachlor	0.63 U	0.63 U	0.63 U	NA	0.63 U	0.63 U	0.63 U	NA
Heptachlor epoxide	0.82 U	0.82 U	0.82 U	NA	0.82 U	0.82 U	0.82 U	NA
trans-Nonachlor	1.00	1.01	1.74	34%	0.93 U	0.93 U	0.93 U	NA
CL2(08)	0.84 U	0.84 U	0.84 U	NA	0.84 U	0.84 U	0.84 U	NA
CL3(18)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL3(28)	7.34	4.16	5.59	28%	1.15 U	1.15 U	1.15 U	NA
CL4(44)	1.17 U	1.17 U	1.94	NA	1.17 U	1.17 U	1.17 U	NA
CL4(49)	1.01 U	1.01 U	1.01 U	NA	1.01 U	1.01 U	1.01 U	NA
CL4(52)	1.18 U	1.18 U	1.18 U	NA	1.18 U	1.18 U	1.18 U	NA
CL4(66)	0.92 U	0.92 U	0.92 U	NA	0.92 U	0.92 U	0.92 U	NA
CL5(87)	0.76 J	0.75 J	1.45	40%	1.56	2.51	2.32	24%
CL5(101)	1.04 U	1.04 U	1.04 U	NA	1.33	0.96 J	1.13	16%
CL5(105)	1.24 U	1.24 U	1.24 U	NA	1.24 U	1.24 U	1.24 U	NA
CL5(118)	0.56 J	0.52 J	0.87 J	29%	0.98 U	0.98 U	0.98 U	NA
CL6(128)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL6(138)	1.31 U	1.31 U	1.45	NA	1.31 U	1.31 U	1.31 U	NA
CL6(153)	0.88 J	0.62 J	0.83 J	18%	1.26 U	1.26 U	1.26 U	NA
CL7(170)	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	1.12 U	NA
CL7(180)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	0.98 U	NA
CL7(183)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(184)	1.02 U	1.02 U	0.50 J	NA	1.02 U	1.02 U	1.02 U	NA
CL7(187)	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA
CL8(195)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL9(206)	1.08 U	1.08 U	1.08 U	NA	1.08 U	1.08 U	1.08 U	NA
CL10(209)	1.20 U	1.20 U	1.20 U	NA	1.20 U	1.20 U	1.20 U	NA
Surrogate Recoveries (%)								
DBOFB	108	64	112	NA	86	75	90	NA
CL5(112)	69	42	67	NA	72	69	70	NA

TABLE B.7. (Contd)

Matrix	SB-A Rep 1 Site Water	SB-A Rep 2 Site Water	SB-A Rep 3 Site Water	RSD	SB-B Rep 1 Water	SB-B Rep 2 Water	SB-B Rep 3 Water	RSD
Sample Size (L)	1.04	1.04	1.04		1.04	1.04	0.53	
Batch	1	1	1	1	1	1	1	1
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	0.77 U	0.77 U	0.77 U	NA	0.77 U	0.77 U	1.52 U	NA
2,4-DDT	0.78 U	0.78 U	0.78 U	NA	0.78 U	0.78 U	1.54 U	NA
4,4-DDD	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	2.21 U	NA
4,4-DDE	0.95 U	0.95 U	0.95 U	NA	0.95 U	0.95 U	1.88 U	NA
4,4-DDT	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	1.90 U	NA
Aldrin	0.71 U	0.71 U	0.71 U	NA	0.71 U	0.71 U	1.41 U	NA
alpha-Chlordane	0.89 U	0.89 U	0.89 U	NA	0.89 U	0.89 U	1.77 U	NA
Dieldrin	0.95 U	1.41	0.95 U	NA	0.95 U	2.18	2.64	NA
Endosulfan I/2,4'-DDE	0.81 U	0.81 U	0.81 U	NA	0.81 U	0.81 U	1.61 U	NA
Endosulfan II	10.8 U	10.8 U	10.8 U	NA	10.8 U	10.8 U	21.3 U	NA
Endosulfan sulfate	7.87 U	7.87 U	7.87 U	NA	7.87 U	7.87 U	15.6 U	NA
Heptachlor	0.63 U	0.63 U	0.63 U	NA	0.63 U	0.63 U	1.25 U	NA
Heptachlor epoxide	0.82 U	0.82 U	0.82 U	NA	0.82 U	0.82 U	1.63 U	NA
trans-Nonachlor	0.93 U	0.93 U	0.93 U	NA	0.93 U	0.93 U	1.84 U	NA
CL2(08)	0.84 U	0.84 U	0.84 U	NA	0.84 U	0.84 U	1.67 U	NA
CL3(18)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	2.03 U	NA
CL3(28)	1.15 U	1.15 U	1.15 U	NA	1.15 U	1.15 U	2.27 U	NA
CL4(44)	1.17 U	1.17 U	1.17 U	NA	1.17 U	1.17 U	2.32 U	NA
CL4(49)	1.01 U	1.01 U	1.01 U	NA	1.01 U	1.01 U	1.99 U	NA
CL4(52)	1.18 U	1.18 U	1.18 U	NA	1.18 U	2.48	2.34 U	NA
CL4(66)	0.92 U	0.92 U	0.92 U	NA	0.92 U	0.92 U	1.82 U	NA
CL5(87)	1.03 U	1.03 U	1.03 U	NA	1.03 U	2.15	2.04 U	NA
CL5(101)	1.04 U	1.23	1.04 U	NA	1.04 U	0.99 J	2.05 U	NA
CL5(105)	1.24 U	1.24 U	1.24 U	NA	1.24 U	1.24 U	2.46 U	NA
CL5(118)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	1.94 U	NA
CL6(128)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	2.17 U	NA
CL6(138)	1.31 U	1.31 U	1.31 U	NA	1.31 U	1.31 U	2.60 U	NA
CL6(153)	1.26 U	1.26 U	1.26 U	NA	1.26 U	1.26 U	2.49 U	NA
CL7(170)	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	2.23 U	NA
CL7(180)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	1.93 U	NA
CL7(183)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	2.02 U	NA
CL7(184)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	2.02 U	NA
CL7(187)	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	1.91 U	NA
CL8(195)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	2.19 U	NA
CL9(206)	1.08 U	1.08 U	1.08 U	NA	1.08 U	1.08 U	2.14 U	NA
CL10(209)	1.20 U	1.20 U	1.20 U	NA	1.20 U	1.20 U	2.38 U	NA
Surrogate Recoveries (%)								
DBOFB	82	94	104	NA	73	97	99	NA
CL5(112)	58	72	74	NA	61	67	74	NA

TABLE B.7. (Contd)

Matrix	BU Rep. 1 Site Water	BU Rep. 2 Site Water	BU Rep. 3 Site Water	RSD	Mud Dump Site Rep. 1 Site Water	Mud Dump Site Rep. 2 Site Water	Mud Dump Site Rep. 3 Site Water	RSD
Sample Size (L)	1.04	1.04	1.04		1.04	1.04	1.04	
Batch	2	2	2	2	2	2	2	2
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	0.77 U	0.77 U	0.77 U	NA	0.77 U	0.77 U	0.77 U	NA
2,4-DDT	0.78 U	0.78 U	0.78 U	NA	0.78 U	0.78 U	0.78 U	NA
4,4-DDD	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	1.12 U	NA
4,4-DDE	0.95 U	0.95 U	0.95 U	NA	0.95 U	0.95 U	0.95 U	NA
4,4-DDT	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA
Aldrin	0.71 U	0.71 U	0.71 U	NA	0.71 U	0.71 U	0.71 U	NA
alpha-Chlordane	0.89 U	0.89 U	0.89 U	NA	0.89 U	0.89 U	0.89 U	NA
Dieldrin	0.95 U	0.95 U	0.95 U	NA	0.95 U	0.95 U	0.95 U	NA
Endosulfan I/2,4'-DDE	0.81 U	0.81 U	0.81 U	NA	0.81 U	0.81 U	0.81 U	NA
Endosulfan II	10.8 U	10.8 U	10.8 U	NA	10.8 U	10.8 U	10.8 U	NA
Endosulfan sulfate	7.87 U	7.87 U	7.87 U	NA	7.87 U	7.87 U	7.87 U	NA
Heptachlor	0.63 U	0.63 U	0.63 U	NA	0.63 U	0.63 U	0.63 U	NA
Heptachlor epoxide	0.82 U	0.82 U	0.82 U	NA	0.82 U	0.82 U	0.82 U	NA
trans-Nonachlor	0.93 U	0.93 U	0.93 U	NA	0.93 U	0.93 U	0.93 U	NA
CL2(08)	0.84 U	0.84 U	0.84 U	NA	0.84 U	0.84 U	0.84 U	NA
CL3(18)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL3(28)	1.15 U	1.15 U	1.15 U	NA	1.15 U	1.15 U	1.15 U	NA
CL4(44)	1.17 U	1.17 U	1.17 U	NA	1.17 U	1.17 U	1.17 U	NA
CL4(49)	4.25	1.01 U	1.01 U	NA	1.01 U	1.01 U	1.01 U	NA
CL4(52)	1.18 U	1.18 U	1.18 U	NA	1.18 U	1.18 U	1.18 U	NA
CL4(66)	0.92 U	0.92 U	0.92 U	NA	0.92 U	0.92 U	0.92 U	NA
CL5(87)	1.03 U	1.03 U	1.03 U	NA	1.03 U	1.03 U	1.03 U	NA
CL5(101)	1.04 U	1.04 U	1.04 U	NA	1.04 U	1.04 U	1.04 U	NA
CL5(105)	1.24 U	1.24 U	1.24 U	NA	1.24 U	1.24 U	1.24 U	NA
CL5(118)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	0.98 U	NA
CL6(128)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL6(138)	1.31 U	1.31 U	1.31 U	NA	1.31 U	1.31 U	1.31 U	NA
CL6(153)	1.26 U	1.26 U	1.26 U	NA	1.26 U	1.26 U	1.26 U	NA
CL7(170)	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	1.12 U	NA
CL7(180)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	0.98 U	NA
CL7(183)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(184)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(187)	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA
CL8(195)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL9(206)	1.08 U	1.08 U	1.08 U	NA	1.08 U	1.08 U	1.08 U	NA
CL10(209)	1.20 U	1.20 U	1.20 U	NA	1.20 U	1.20 U	1.20 U	NA
Surrogate Recoveries (%)								
DBOFB	30	51	44	NA	45	49	44	NA
CL5(112)	47	57	58	NA	52	56	56	NA

TABLE B.7. (Contd)

Matrix	HU-B Rep. 1 Site Water	HU-B Rep. 2 Site Water	HU-B Rep. 3 Site Water	RSD	HU-C Rep. 1 Site Water	HU-C Rep. 2 Site Water	HU-C Rep. 3 Site Water	RSD
Sample Size (L)	1.04	1.04	1.04		1.04	1.04	1.04	
Batch	2	2	2	2	2	2	2	2
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	0.77 U	0.77 U	0.77 U	NA	0.77 U	0.77 U	0.77 U	NA
2,4-DDT	0.78 U	0.78 U	0.78 U	NA	0.78 U	0.78 U	0.78 U	NA
4,4-DDD	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	1.12 U	NA
4,4-DDE	0.95 U	0.95 U	0.95 U	NA	0.95 U	0.95 U	0.95 U	NA
4,4-DDT	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA
Aldrin	14.7	0.71 U	0.71 U	NA	0.71 U	0.71 U	0.71 U	NA
alpha-Chlordane	0.89 U	0.89 U	0.89 U	NA	0.89 U	0.89 U	0.89 U	NA
Dieldrin	0.95 U	0.95 U	0.95 U	NA	0.95 U	0.95 U	0.95 U	NA
Endosulfan I/2,4'-DDE	0.81 U	0.81 U	0.81 U	NA	0.81 U	0.81 U	0.81 U	NA
Endosulfan II	10.8 U	10.8 U	10.8 U	NA	10.8 U	10.8 U	10.8 U	NA
Endosulfan sulfate	7.87 U	7.87 U	7.87 U	NA	7.87 U	7.87 U	7.87 U	NA
Heptachlor	0.63 U	0.63 U	0.63 U	NA	0.63 U	0.63 U	0.63 U	NA
Heptachlor epoxide	0.82 U	0.82 U	0.82 U	NA	0.82 U	0.82 U	0.82 U	NA
trans-Nonachlor	0.93 U	0.93 U	0.93 U	NA	0.93 U	0.93 U	0.93 U	NA
CL2(08)	0.84 U	0.84 U	0.84 U	NA	0.84 U	0.84 U	0.84 U	NA
CL3(18)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL3(28)	1.15 U	1.15 U	1.15 U	NA	1.15 U	1.15 U	1.15 U	NA
CL4(44)	1.17 U	1.17 U	1.17 U	NA	1.17 U	1.17 U	1.17 U	NA
CL4(49)	1.88	2.22	2.27	10%	1.01 U	1.01 U	1.01 U	NA
CL4(52)	1.18 U	2.08	2.02	NA	1.95	2.10	1.87	6%
CL4(66)	0.92 U	0.81 J	0.92 U	NA	0.92 U	0.92 U	0.92 U	NA
CL5(87)	1.03 U	1.03 U	1.03 U	NA	1.03 U	1.03 U	1.03 U	NA
CL5(101)	1.04 U	1.04 U	1.04 U	NA	1.04 U	1.04 U	1.04 U	NA
CL5(105)	1.24 U	1.24 U	1.24 U	NA	1.24 U	1.24 U	1.24 U	NA
CL5(118)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	0.98 U	NA
CL6(128)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL6(138)	1.31 U	1.31 U	1.31 U	NA	1.31 U	1.31 U	1.31 U	NA
CL6(153)	1.26 U	1.26 U	1.26 U	NA	1.26 U	1.26 U	1.26 U	NA
CL7(170)	1.12 U	1.12 U	1.12 U	NA	1.12 U	1.12 U	1.12 U	NA
CL7(180)	0.98 U	0.98 U	0.98 U	NA	0.98 U	0.98 U	0.98 U	NA
CL7(183)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(184)	1.02 U	1.02 U	1.02 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(187)	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA
CL8(195)	1.10 U	1.10 U	1.10 U	NA	1.10 U	1.10 U	1.10 U	NA
CL9(206)	1.08 U	1.08 U	1.08 U	NA	1.08 U	1.08 U	1.08 U	NA
CL10(209)	1.20 U	1.20 U	1.20 U	NA	1.20 U	1.20 U	1.20 U	NA
Surrogate Recoveries (%)								
DBOFB	47	51	49	NA	49	41	53	NA
CL5(112)	57	63	57	NA	61	57	59	NA

TABLE B.7. (Contd)

Matrix	HU-D Rep. 1 Site Water	HU-D Rep. 2 Site Water	HU-D Rep. 3 Site Water	RSD	GR Rep. 1 Water	GR Rep. 2 Water	GR Rep. 3 Water	RSD
Sample Size (L)	1.04	1.04	0.52		1.04	1.04	1.04	
Batch	2	2	2	2	2	2	2	2
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	0.77 U	0.77 U	1.53 U	NA	0.77 U	0.77 U	0.77 U	NA
2,4-DDT	0.78 U	0.78 U	1.55 U	NA	0.78 U	0.78 U	0.78 U	NA
4,4-DDD	1.12 U	1.12 U	2.23 U	NA	1.12 U	1.12 U	1.12 U	NA
4,4-DDE	0.95 U	0.95 U	1.90 U	NA	0.95 U	0.95 U	0.95 U	NA
4,4-DDT	0.96 U	0.96 U	1.92 U	NA	0.96 U	0.96 U	0.96 U	NA
Aldrin	0.71 U	0.71 U	1.43 U	NA	0.71 U	0.71 U	0.71 U	NA
alpha-Chlordane	0.89 U	0.89 U	1.72 J	NA	0.89 U	0.89 U	0.89 U	NA
Dieldrin	0.95 U	0.95 U	1.53 J	NA	0.95 U	0.95 U	0.95 U	NA
Endosulfan I/2,4'-DDE	0.81 U	0.81 U	1.63 U	NA	0.81 U	0.81 U	0.81 U	NA
Endosulfan II	10.8 U	10.8 U	2.71 J	NA	10.8 U	10.8 U	10.8 U	NA
Endosulfan sulfate	7.87 U	7.87 U	15.7 U	NA	7.87 U	7.87 U	7.87 U	NA
Heptachlor	0.63 U	0.63 U	1.26 U	NA	0.63 U	0.63 U	0.63 U	NA
Heptachlor epoxide	0.82 U	0.82 U	1.64 U	NA	0.82 U	0.82 U	0.82 U	NA
trans-Nonachlor	0.93 U	0.93 U	1.86 U	NA	0.93 U	0.93 U	0.93 U	NA
CL2(08)	0.84 U	0.84 U	1.68 U	NA	0.84 U	0.84 U	0.84 U	NA
CL3(18)	1.02 U	1.02 U	2.05 U	NA	1.02 U	1.02 U	1.02 U	NA
CL3(28)	1.15 U	1.15 U	2.29 U	NA	1.15 U	1.15 U	1.15 U	NA
CL4(44)	1.17 U	1.17 U	2.34 U	NA	1.17 U	1.17 U	1.17 U	NA
CL4(49)	1.01 U	1.01 U	2.01 U	NA	3.46	2.79	3.21	11%
CL4(52)	1.16 J	1.51	2.37 U	NA	1.18 U	1.18 U	1.18 U	NA
CL4(66)	0.92 U	0.92 U	1.83 U	NA	0.92 U	0.92 U	0.92 U	NA
CL5(87)	1.03 U	1.03 U	2.06 U	NA	1.03 U	1.03 U	1.03 U	NA
CL5(101)	1.04 U	1.04 U	2.07 U	NA	1.04 U	1.04 U	1.04 U	NA
CL5(105)	1.24 U	1.24 U	2.48 U	NA	1.24 U	1.24 U	1.24 U	NA
CL5(118)	0.98 U	0.98 U	1.95 U	NA	0.98 U	0.98 U	0.98 U	NA
CL6(128)	1.10 U	1.10 U	2.19 U	NA	1.10 U	1.10 U	1.10 U	NA
CL6(138)	1.31 U	1.31 U	2.62 U	NA	1.31 U	1.31 U	1.31 U	NA
CL6(153)	1.26 U	1.26 U	2.52 U	NA	1.26 U	1.26 U	1.26 U	NA
CL7(170)	1.12 U	1.12 U	2.25 U	NA	1.12 U	1.12 U	1.12 U	NA
CL7(180)	0.98 U	0.98 U	1.95 U	NA	0.98 U	0.98 U	0.98 U	NA
CL7(183)	1.02 U	1.02 U	2.04 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(184)	1.02 U	1.02 U	2.04 U	NA	1.02 U	1.02 U	1.02 U	NA
CL7(187)	0.96 U	0.96 U	1.93 U	NA	0.96 U	0.96 U	0.96 U	NA
CL8(195)	1.10 U	1.10 U	2.21 U	NA	1.10 U	1.10 U	1.10 U	NA
CL9(206)	1.08 U	1.08 U	2.16 U	NA	1.08 U	1.08 U	1.08 U	NA
CL10(209)	1.20 U	1.20 U	2.40 U	NA	1.20 U	1.20 U	1.20 U	NA
Surrogate Recoveries (%)								
DBOFB	57	70	32	NA	37	36	47	NA
CL5(112)	59	63	49	NA	60	55	60	NA

TABLE B.7. (Contd)

Matrix	PC Rep. 1 Elutriate	PC Rep. 2 Elutriate	PC Rep. 3 Elutriate	RSD	SB-B Rep. 1 Elutriate	SB-B Rep. 2 Elutriate	SB-B Rep. 3 Elutriate	RSD
Sample Size (L)	0.87	0.96	0.95		0.97	0.98	0.98	
Batch	3	3	3	3	3	3	3	3
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	11.1	13.5	17.9	24%	0.82 U	0.81 U	0.81 U	NA
2,4-DDT	5.01	4.62	5.47	8%	0.83 U	0.82 U	0.82 U	NA
4,4-DDD	42.1	48.9	75.1	31% (a)	1.20 U	1.18 U	1.18 U	NA
4,4-DDE	11.6	13.8	22.0	35% (a)	1.02 U	1.01 U	1.01 U	NA
4,4-DDT	1.15 U	1.04 U	1.05 U	NA	1.03 U	1.02 U	1.02 U	NA
Aldrin	0.85 U	0.77 U	0.78 U	NA	0.76 U	0.76 U	0.76 U	NA
alpha-Chlordane	13.4	14.9	21.1	25%	0.96 U	0.95 U	0.95 U	NA
Dieldrin	9.36	11.2	14.8	24%	1.02 U	1.01 U	1.01 U	NA
Endosulfan I/2,4'-DDE	0.97 U	0.88 U	0.89 U	NA	0.87 U	0.86 U	0.86 U	NA
Endosulfan II	4.93 J	4.73 J	6.70 J	20%	11.5 U	11.4 U	11.4 U	NA
Endosulfan sulfate	11.5	13.5	18.0	23%	8.44 U	8.35 U	8.35 U	NA
Heptachlor	0.75 U	0.68 U	0.69 U	NA	0.68 U	0.67 U	0.67 U	NA
Heptachlor epoxide	0.98 U	0.89 U	0.90 U	NA	0.88 U	0.87 U	0.87 U	NA
trans-Nonachlor	6.55	7.38	10.3	25%	0.99 U	0.98 U	0.98 U	NA
CL2(08)	1.01 U	0.91 U	0.92 U	NA	0.90 U	0.89 U	0.89 U	NA
CL3(18)	1.22 U	1.11 U	1.12 U	NA	1.10 U	1.09 U	1.09 U	NA
CL3(28)	5.32	5.88	6.89	13%	1.23 U	1.22 U	1.22 U	NA
CL4(44)	12.2	14.8	19.5	24%	1.25 U	1.24 U	1.24 U	NA
CL4(49)	7.62	7.50	11.4	25%	1.08 U	1.07 U	1.07 U	NA
CL4(52)	24.5	27.5	41.4	29%	1.27 U	1.26 U	1.26 U	NA
CL4(66)	9.78	11.8	21.5	44% (a)	0.98 U	0.97 U	0.97 U	NA
CL5(87)	25.0	26.6	37.1	22%	1.10 U	1.09 U	1.09 U	NA
CL5(101)	67.2	79.1	118	30%	1.11 U	1.10 U	1.10 U	NA
CL5(105)	30.6	34.2	30.0	7%	1.33 U	1.32 U	1.32 U	NA
CL5(118)	47.0	52.5	79.1	29%	1.05 U	1.04 U	1.04 U	NA
CL6(128)	8.85	10.6	14.9	27%	1.18 U	1.16 U	1.16 U	NA
CL6(138)	56.4	66.1	96.5	29%	1.41 U	1.39 U	1.39 U	NA
CL6(153)	35.9	39.0	67.7	37% (a)	1.35 U	1.33 U	1.33 U	NA
CL7(170)	11.3	15.7	22.3	33% (a)	1.21 U	1.19 U	1.19 U	NA
CL7(180)	26.2	29.5	44.9	30%	1.05 U	1.03 U	1.03 U	NA
CL7(183)	5.57	5.91	8.02	20%	1.09 U	1.08 U	1.08 U	NA
CL7(184)	1.22 U	1.11 U	1.12 U	NA	1.09 U	1.08 U	1.08 U	NA
CL7(187)	18.0	20.1	28.0	24%	1.03 U	1.02 U	1.02 U	NA
CL8(195)	3.00	3.41	5.39	32%	1.18 U	1.17 U	1.17 U	NA
CL9(206)	6.07	7.20	11.0	32%	1.16 U	1.14 U	1.14 U	NA
CL10(209)	1.28 J	1.37	1.97	25%	1.29 U	1.27 U	1.27 U	NA
Surrogate Recoveries (%)								
DBOFB	120	120	123	NA	102	101	98	NA
CL5(112)	71	66	58	NA	75	76	82	NA

TABLE B.7. (Contd)

	SB-A Rep. 1	SB-A Rep. 2	SB-A Rep. 3	RSD	BU Rep. 1	BU Rep. 2	BU Rep. 3	RSD
Matrix	Elutriate	Elutriate	Elutriate		Elutriate	Elutriate	Elutriate	
Sample Size (L)	1.00	0.995	0.995		0.95	0.96	0.98	
Batch	3	3	3	3	3	3	3	3
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	0.80 U	0.80 U	0.80 U	NA	0.84 U	0.83 U	0.81 U	NA
2,4-DDT	0.81 U	0.81 U	0.81 U	NA	0.85 U	0.84 U	0.82 U	NA
4,4-DDD	1.16 U	1.17 U	1.17 U	NA	1.22 U	1.21 U	1.18 U	NA
4,4-DDE	0.99 U	0.99 U	0.99 U	NA	1.04 U	1.03 U	1.01 U	NA
4,4-DDT	1.00 U	1.01 U	1.01 U	NA	1.05 U	1.04 U	1.02 U	NA
Aldrin	0.74 U	0.74 U	0.74 U	NA	0.78 U	0.77 U	0.76 U	NA
alpha-Chlordane	0.93 U	0.93 U	0.93 U	NA	0.98 U	0.97 U	0.95 U	NA
Dieldrin	0.99 U	0.99 U	0.99 U	NA	1.04 U	1.03 U	1.01 U	NA
Endosulfan I/2,4'-DDE	0.85 U	0.85 U	0.85 U	NA	0.89 U	0.88 U	0.86 U	NA
Endosulfan II	11.2 U	11.3 U	11.3 U	NA	11.8 U	11.7 U	11.4 U	NA
Endosulfan sulfate	8.19 U	8.23 U	8.23 U	NA	8.62 U	8.53 U	8.35 U	NA
Heptachlor	0.66 U	0.66 U	0.66 U	NA	0.69 U	0.68 U	0.67 U	NA
Heptachlor epoxide	0.86 U	0.86 U	0.86 U	NA	0.90 U	0.89 U	0.87 U	NA
trans-Nonachlor	0.97 U	0.97 U	0.97 U	NA	1.02 U	1.01 U	0.98 U	NA
CL2(08)	0.88 U	0.88 U	0.88 U	NA	0.92 U	0.91 U	0.89 U	NA
CL3(18)	1.07 U	1.07 U	1.07 U	NA	1.12 U	1.11 U	1.09 U	NA
CL3(28)	1.19 U	1.20 U	1.20 U	NA	1.26 U	1.24 U	1.22 U	NA
CL4(44)	1.22 U	1.22 U	1.22 U	NA	1.28 U	1.27 U	1.24 U	NA
CL4(49)	1.05 U	1.05 U	0.74 J	NA	1.10 U	1.09 U	1.07 U	NA
CL4(52)	1.23 U	1.24 U	2.12	NA	1.29 U	1.28 U	1.26 U	NA
CL4(66)	0.95 U	0.96 U	0.96 U	NA	1.00 U	0.99 U	0.97 U	NA
CL5(87)	1.07 U	1.07 U	1.07 U	NA	1.13 U	1.11 U	1.09 U	NA
CL5(101)	1.08 U	1.08 U	1.22	NA	1.13 U	1.12 U	1.10 U	NA
CL5(105)	1.29 U	1.30 U	1.30 U	NA	1.36 U	1.34 U	1.32 U	NA
CL5(118)	1.02 U	1.02 U	1.02 U	NA	1.07 U	1.06 U	1.04 U	NA
CL6(128)	1.14 U	1.15 U	1.15 U	NA	1.20 U	1.19 U	1.16 U	NA
CL6(138)	1.36 U	1.37 U	1.37 U	NA	1.43 U	1.42 U	1.39 U	NA
CL6(153)	1.31 U	1.31 U	1.31 U	NA	1.38 U	1.36 U	1.33 U	NA
CL7(170)	1.17 U	1.17 U	1.17 U	NA	1.23 U	1.22 U	1.19 U	NA
CL7(180)	1.01 U	1.02 U	1.02 U	NA	1.07 U	1.06 U	1.03 U	NA
CL7(183)	1.06 U	1.07 U	1.07 U	NA	1.12 U	1.11 U	1.08 U	NA
CL7(184)	1.06 U	1.07 U	1.07 U	NA	1.12 U	1.11 U	1.08 U	NA
CL7(187)	1.00 U	1.01 U	1.01 U	NA	1.06 U	1.04 U	1.02 U	NA
CL8(195)	1.15 U	1.15 U	1.15 U	NA	1.21 U	1.20 U	1.17 U	NA
CL9(206)	1.12 U	1.13 U	1.13 U	NA	1.18 U	1.17 U	1.14 U	NA
CL10(209)	1.25 U	1.25 U	1.25 U	NA	1.31 U	1.30 U	1.27 U	NA
Surrogate Recoveries (%)								
DBOFB	101	94	98	NA	96	88	95	NA
CL5(112)	75	80	77	NA	74	75	81	NA

TABLE B.7. (Contd)

	EC-B Rep. 1	EC-B Rep. 2	EC-B Rep. 3	RSD	EC-A Rep. 1	EC-A Rep. 2	EC-A Rep. 3	RSD
Matrix	Elutriate	Elutriate	Elutriate		Elutriate	Elutriate	Elutriate	
Sample Size (L)	0.96	0.98	0.50		0.90	0.91	0.92	
Batch	3	3	3	3	4	4	4	4
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	3.30	1.82	3.07	29%	2.33	3.20	2.49	17%
2,4-DDT	0.912	0.647 J	0.925 J	19%	0.90 U	0.89 U	0.88 U	NA
4,4-DDD	12.2	6.58	12.2	32%	5.21	4.06	4.49	13%
4,4-DDE	6.27	2.65	6.55	42%	7.99	7.13	6.98	7%
4,4-DDT	1.04 U	1.02 U	2.00 U	NA	1.11 U	1.10 U	1.09 U	NA
Aldrin	14.1	14.9	22.5	27%	0.82 U	0.81 U	0.81 U	NA
alpha-Chlordane	10.0	7.93	13.2	26%	1.43	1.24	1.38	7%
Dieldrin	3.25	2.87	3.80	14%	2.36	2.53	1.66	21%
Endosulfan I/2,4'-DDE	0.88 U	0.86 U	1.69 U	NA	0.94 U	0.93 U	0.92 U	NA
Endosulfan II	11.7 U	11.4 U	22.4 U	NA	12.4 U	12.3 U	12.2 U	NA
Endosulfan sulfate	8.53 U	8.35 U	16.4 U	NA	9.10 U	9.00 U	8.95 U	NA
Heptachlor	0.68 U	0.67 U	1.31 U	NA	0.73 U	0.72 U	0.72 U	NA
Heptachlor epoxide	0.89 U	0.87 U	1.71 U	NA	0.95 U	0.94 U	0.93 U	NA
trans-Nonachlor	6.11	3.94	7.17	29%	0.86 J	0.95 J	0.77 J	10%
CL2(08)	0.91 U	0.89 U	1.75 U	NA	4.26	3.54	4.44	12%
CL3(18)	1.11 U	1.09 U	2.13 U	NA	3.68	4.90	2.30	36%
CL3(28)	6.66	4.10	15.3	68%	9.82	6.22	6.74	26%
CL4(44)	7.88	3.73	12.4	54%	7.46	7.71	5.79	15%
CL4(49)	9.33	4.65	8.62	33%	4.76	3.71	2.83	26%
CL4(52)	39.1	31.06	66.5	41% (a)	11.6	10.5	12.5	9%
CL4(66)	19.9	20.11	17.8	7%	35.9	40.5	33.6	10%
CL5(87)	3.13	2.24	4.94	40%	1.82	1.70	1.50	10%
CL5(101)	6.84	5.66	11.6	39%	3.93	3.82	3.90	1%
CL5(105)	1.94	1.81	1.88 J	3%	1.42 J	2.00	1.28 J	24%
CL5(118)	7.55	4.74	9.71	34%	4.42	3.69	3.70	11%
CL6(128)	1.97	1.69	2.54	21%	1.27 U	1.25 U	1.25 U	NA
CL6(138)	9.97	2.83	11.1	56%	5.12	4.29	5.01	9%
CL6(153)	5.18	3.55	7.32	35%	3.42	3.17	2.66	13%
CL7(170)	1.22 U	1.19 U	2.34 U	NA	2.60	2.09	2.19	12%
CL7(180)	1.06 U	1.03 U	2.03 U	NA	2.60	2.08	2.07	13%
CL7(183)	1.39	0.72 J	2.09 J	NA	0.71 J	0.61 J	0.60 J	9%
CL7(184)	1.11 U	1.08 U	2.12 U	NA	1.18 U	1.17 U	1.16 U	NA
CL7(187)	1.04 U	1.02 U	2.01 U	NA	1.79	1.10 U	1.10 U	NA
CL8(195)	1.20 U	1.17 U	2.30 U	NA	0.41 J	0.43 J	0.69 J	31%
CL9(206)	1.17 U	1.14 U	2.24 U	NA	0.87 J	0.61 J	0.61 J	21%
CL10(209)	1.30 U	1.27 U	2.49 U	NA	0.86 J	0.93 J	0.92 J	5%
Surrogate Recoveries (%)								
DBOFB	111	115	113	NA	70	70	64	NA
CL5(112)	72	72	72	NA	56	63	53	NA

TABLE B.7. (Contd)

	HU-A Rep 1	HU-A Rep 2	HU-A Rep 3	RSD	HU-D Rep. 1	HU-D Rep. 2	HU-D Rep. 3	RSD
Matrix	Elutriate	Elutriate	Elutriate		Elutriate	Elutriate	Elutriate	
Sample Size (L)	0.98	0.97	0.50		0.98	0.96	0.96	
Batch	4	4	4	4	4	4	4	4
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	16.6	8.38	9.81	38% [a]	3.94	6.65	8.29	35%
2,4-DDT	0.83 U	0.83 U	1.62 U	NA	0.82 U	0.84 U	0.84 U	NA
4,4-DDD	13.4	8.49	9.54	25%	3.50	2.37	5.01	36%
4,4-DDE	52.1	28.4	26.8	40% [a]	9.47	5.05	9.47	32%
4,4-DDT	1.03 U	1.03 U	2.00 U	NA	1.02 U	1.04 U	1.04 U	NA
Aldrin	0.76 U	0.76 U	1.48 U	NA	0.76 U	0.77 U	0.77 U	NA
alpha-Chlordane	3.45	1.81	2.06	36%	1.27	0.27 J	1.56	66%
Dieldrin	5.64	4.31	4.72	14%	5.14	2.33	4.13	37%
Endosulfan I/2,4'-DDE	17.0	10.4	10.3	31% [a]	0.86 U	0.88 U	0.88 U	NA
Endosulfan II	11.5 U	11.5 U	22.4 U	NA	11.4 U	1.70 J	11.7 U	NA
Endosulfan sulfate	8.40 U	8.44 U	16.4 U	NA	5.37 J	8.53 U	2.88 J	NA
Heptachlor	0.67 U	0.68 U	1.31 U	NA	0.67 U	0.68 U	0.68 U	NA
Heptachlor epoxide	3.25	1.59	0.47 J	79%	0.87 U	0.89 U	0.89 U	NA
trans-Nonachlor	0.85 J	0.83 J	1.20 J	21%	0.65 J	1.01 U	1.00 J	NA
CL2(08)	1.75	1.99	1.75 U	NA	0.89 U	0.91 U	0.91 U	NA
CL3(18)	16.0	9.25	7.52	41%	18.0	8.50	14.9	35% [a]
CL3(28)	19.9	11.3	11.3	35% [a]	10.7	6.75	11.1	25%
CL4(44)	17.2	11.9	13.0	20%	14.3	8.22	15.0	30%
CL4(49)	16.8	11.0	9.72	30%	13.5	6.39	12.9	36%
CL4(52)	23.4	15.6	17.5	22%	16.9	9.44	19.1	34% [a]
CL4(66)	72.7	48.4	59.9	20%	44.1	31.6	49.3	22%
CL5(87)	8.62	5.34	5.12	31%	4.08	2.38	4.89	34%
CL5(101)	21.9	13.6	14.0	28%	9.57	5.72	11.9	34%
CL5(105)	3.56	2.51	2.31 J	24%	1.98	1.36	2.70	33%
CL5(118)	14.9	8.02	8.52	37%	7.57	4.00	8.63	36%
CL6(128)	5.38	3.40	4.25	23%	2.32	0.84 J	2.46	48%
CL6(138)	24.5	14.4	15.1	31% [a]	10.3	1.42 U	1.42 U	NA
CL6(153)	19.2	10.3	10.3	39% [a]	8.70	4.21	9.28	37%
CL7(170)	7.88	4.82	5.21	28%	3.55	1.52	3.13	39%
CL7(180)	17.4	9.73	8.42	41% [a]	5.78	2.58	5.98	40%
CL7(183)	4.43	2.61	3.39	26%	1.89	0.78 J	1.57	41%
CL7(184)	1.09 U	1.09 U	2.12 U	NA	1.08 U	1.11 U	1.11 U	NA
CL7(187)	1.03 U	1.03 U	2.01 U	NA	1.02 U	1.04 U	1.04 U	NA
CL8(195)	6.76	3.81	3.11	42%	2.53	1.07 J	2.55	41%
CL9(206)	16.5	8.70	7.24	46%	5.83	2.19	5.68	45%
CL10(209)	12.8	7.77	6.82	35%	3.50	1.54	3.60	40%
Surrogate Recoveries (%)								
DBOFB	73	64	83	NA	89	70	91	NA
CL5(112)	64	56	71	NA	72	69	80	NA

TABLE B.7. (Contd)

Matrix	HU-B Rep. 1 Elutriate	HU-B Rep. 2 Elutriate	HU-B Rep. 3 Elutriate	RSD	HU-C Rep. 1 Elutriate	HU-C Rep. 2 Elutriate	HU-C Rep. 3 Elutriate	RSD
Sample Size (L)	0.98	0.96	0.96		0.96	0.98	1.00	
Batch	4	4	4	4	4	4	4	4
Units	ng/L	ng/L	ng/L		ng/L	ng/L	ng/L	
2,4-DDD	10.3	5.43	6.47	35%	6.49	5.83	5.59	8%
2,4-DDT	0.83 U	0.84 U	0.84 U	NA	0.84 U	0.82 U	0.81 U	NA
4,4-DDD	9.51	4.87	6.98	33%	7.70	6.14	7.89	13%
4,4-DDE	32.2	11.2	14.1	59% (a)	26.3	20.6	20.0	16%
4,4-DDT	1.03 U	1.04 U	1.04 U	NA	1.04 U	1.02 U	1.01 U	NA
Aldrin	0.76 U	0.77 U	0.77 U	NA	0.77 U	0.76 U	0.74 U	NA
alpha-Chlordane	3.67	1.31	0.91 J	76%	3.65	3.50	2.79	14%
Dieldrin	6.17	2.38	3.03	53%	5.78	5.50	5.62	2%
Endosulfan I/2,4'-DDE	0.87 U	0.88 U	0.88 U	NA	0.88 U	0.86 U	0.85 U	NA
Endosulfan II	11.5 U	11.7 U	11.7 U	NA	11.7 U	11.4 U	11.3 U	NA
Endosulfan sulfate	10.5	4.68 J	5.43 J	46%	13.5	10.0	10.0	18%
Heptachlor	0.67 U	0.68 U	0.68 U	NA	0.68 U	0.67 U	0.66 U	NA
Heptachlor epoxide	3.35	0.82 J	0.79 J	89%	2.95	3.11	2.72	7%
trans-Nonachlor	1.46	0.81 J	0.88 J	34%	1.39	1.45	1.55	6%
CL2(08)	3.58	4.44	3.85	11%	3.77	3.66	0.88 U	NA
CL3(18)	26.6	10.5	12.0	55% (a)	25.1	21.7	16.6	20%
CL3(28)	31.2	11.2	12.1	62% (a)	28.6	22.9	22.7	14%
CL4(44)	28.6	11.2	13.7	53% (a)	24.9	23.5	21.1	8%
CL4(49)	29.5	9.50	12.0	64% (a)	24.9	23.1	21.4	8%
CL4(52)	37.2	18.9	17.8	44% (a)	30.3	30.2	27.4	6%
CL4(66)	65.7	33.4	47.5	33% (a)	46.2	38.8	20.6	37% (a)
CL5(87)	10.2	3.64	5.01	55%	9.99	7.73	7.81	15%
CL5(101)	24.0	10.0	11.5	51% (a)	22.7	20.0	18.2	11%
CL5(105)	5.17	2.34	2.37	49%	5.82	4.17	4.82	17%
CL5(118)	1.04 U	7.03	9.63	NA	20.3	15.5	14.7	18%
CL6(128)	4.14	2.15	2.32	38%	3.82	2.92	3.32	13%
CL6(138)	25.2	9.86	12.90	51% (a)	27.1	21.7	20.8	15%
CL6(153)	21.3	7.50	10.38	56%	21.2	16.4	16.2	16%
CL7(170)	8.05	3.34	3.80	51%	7.62	5.93	5.75	16%
CL7(180)	16.0	5.53	7.56	57%	14.6	10.8	11.1	17%
CL7(183)	3.88	1.67	2.05	47%	3.94	3.14	3.74	12%
CL7(184)	1.09 U	1.11 U	1.11 U	NA	1.11 U	1.08 U	1.07 U	NA
CL7(187)	1.03 U	1.04 U	1.04 U	NA	1.04 U	1.02 U	1.01 U	NA
CL8(195)	7.19	2.09	2.80	69%	3.89	2.99	3.36	13%
CL9(206)	16.7	4.82	6.65	68%	7.23	4.95	5.10	22%
CL10(209)	9.43	3.60	4.09	57%	6.18	4.99	5.09	12%
<u>Surrogate Recoveries (%)</u>								
DBOFB	79	70	73	NA	74	77	57	NA
CL5(112)	64	63	68	NA	68	71	56	NA

Appendix C

Water-Column Toxicity Test Data, Eastchester Project

TABLE C.1. Test Results for *M. beryllina* 96-Hour Water Column Toxicity Test

Sediment Treatment	SPP Percent Concentration	Replicate	Live[a]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	0	1	10	0	1.00		
COMP EC-A	0	2	10	0	1.00		
COMP EC-A	0	3	10	0	1.00		
COMP EC-A	0	4	10	0	1.00		
COMP EC-A	0	5	10	0	1.00	1.00	0.00
COMP EC-A	10	1	10	0	1.00		
COMP EC-A	10	2	10	0	1.00		
COMP EC-A	10	3	10	0	1.00		
COMP EC-A	10	4	10	0	1.00		
COMP EC-A	10	5	9	1	0.90	0.98	0.04
COMP EC-A	50	1	10	0	1.00		
COMP EC-A	50	2	10	0	1.00		
COMP EC-A	50	3	9	1	0.90		
COMP EC-A	50	4	10	0	1.00		
COMP EC-A	50	5	10	0	1.00	0.98	0.04
COMP EC-A	100	1	8	2	0.80		
COMP EC-A	100	2	10	0	1.00		
COMP EC-A	100	3	9	1	0.90		
COMP EC-A	100	4	8	2	0.80		
COMP EC-A	100	5	9	1	0.90	0.88	0.08
COMP EC-B	0	1	10	0	1.00		
COMP EC-B	0	2	10	0	1.00		
COMP EC-B	0	3	9	1	0.90		
COMP EC-B	0	4	9	1	0.90		
COMP EC-B	0	5	10	0	1.00	0.96	0.05
COMP EC-B	10	1	10	0	1.00		
COMP EC-B	10	2	10	0	1.00		
COMP EC-B	10	3	10	0	1.00		
COMP EC-B	10	4	9	1	0.90		
COMP EC-B	10	5	10	0	1.00	0.98	0.04
COMP EC-B	50	1	5	5	0.50		
COMP EC-B	50	2	2	8	0.20		
COMP EC-B	50	3	4	6	0.40		
COMP EC-B	50	4	3	7	0.30		
COMP EC-B	50	5	7	3	0.70	0.42	0.19
COMP EC-B	100	1	0	10	0.00		
COMP EC-B	100	2	0	10	0.00		
COMP EC-B	100	3	0	10	0.00		
COMP EC-B	100	4	0	10	0.00		
COMP EC-B	100	5	0	10	0.00	0.00	0.00

(a) Survival based on initial exposure of 10 organisms per replicate.

TABLE C.2. Water Quality Summary for *M. beryllina* 96-Hour Water Column Toxicity Test

Sediment Treatment	Concentration Percent SPP	Temperature (°C) Min	Temperature (°C) Max	pH Min	pH Max	Dissolved Oxygen (mg/L) Min	Dissolved Oxygen (mg/L) Max	Salinity (o/oo) Min	Salinity (o/oo) Max
Acceptable Range		18.0	22.0	7.30	8.30	4.0	NA [(a)]	28.0	32.0
COMP EC-A	0	18.1	18.7	7.83	7.99	7.4	8.0	29.0	30.0
COMP EC-A	10	18.0	18.6	7.82	8.04	7.7	8.0	29.0	30.0
COMP EC-A	50	18.1	18.7	7.86	8.06	7.6	8.1	29.5	30.0
COMP EC-A	100	18.0	18.7	7.74	8.04	6.6	8.1	30.0	30.5
COMP EC-B	0	18.3	19.6	7.88	8.11	7.2	8.9	29.0	30.0
COMP EC-B	10	18.3	19.4	7.87	8.10	7.2	8.9	29.0	29.5
COMP EC-B	50	18.3	19.4	7.66	8.28	7.1	7.6	29.5	30.0
COMP EC-B	100	18.5	19.3	7.54	8.34 [(b)]	5.1	7.5	29.5	30.0

(a) NA Not applicable.
(b) Data point out of range.

TABLE C.3. Test Results for *M. beryllina* 96-Hour Copper Reference Toxicant Test

Copper Concentration (μg/L Cu)	Replicate	Live[(a)]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
0	1	10	0	1.00		
0	2	10	0	1.00		
0	3	10	0	1.00	1.00	0.00
16	1	10	0	1.00		
16	2	10	0	1.00		
16	3	10	0	1.00	1.00	0.00
64	1	10	0	1.00		
64	2	8	2	0.80		
64	3	8	2	0.80	0.87	0.12
160	1	1	9	0.10		
160	2	1	9	0.10		
160	3	2	8	0.20	0.13	0.06
400	1	0	10	0.00		
400	2	0	10	0.00		
400	3	0	10	0.00	0.00	0.00

(a) Survival based on initial exposure of 10 organisms per replicate.

TABLE C.4. Water Quality Summary for *M. beryllina* 96-Hour Copper Reference Toxicant Test

Copper Concentration (µg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	18.0	22.0	7.30	8.30	4.0	NA [(a)]	28.0	32.0
0	18.5	19.3	7.90	8.09	7.1	7.9	31.0	32.0
16	18.6	19.2	7.98	8.09	7.3	8.0	31.0	32.0
64	18.5	19.2	7.91	8.07	7.4	8.1	31.0	32.0
160	18.6	19.3	7.95	8.08	7.4	8.1	31.0	32.0
400	18.7	19.4	7.85	8.03	7.3	7.6	31.0	31.5

(a) NA Not applicable.

TABLE C.5. Test Results for *M. bahia* 96-Hour Water Column Toxicity Test

Sediment Treatment	Concentration (Percent SPP)	Replicate	Live(a)	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	0	1	10	0	1.00		
COMP EC-A	0	2	10	0	1.00		
COMP EC-A	0	3	10	0	1.00		
COMP EC-A	0	4	10	0	1.00		
COMP EC-A	0	5	10	0	1.00	1.00	0.00
COMP EC-A	10	1	9	1	0.90		
COMP EC-A	10	2	10	0	1.00		
COMP EC-A	10	3	9	1	0.90		
COMP EC-A	10	4	10	0	1.00		
COMP EC-A	10	5	10	0	1.00	0.96	0.05
COMP EC-A	50	1	10	0	1.00		
COMP EC-A	50	2	10	0	1.00		
COMP EC-A	50	3	10	0	1.00		
COMP EC-A	50	4	9	1	0.90		
COMP EC-A	50	5	10	0	1.00	0.98	0.04
COMP EC-A	100	1	10	0	1.00		
COMP EC-A	100	2	10	0	1.00		
COMP EC-A	100	3	10	0	1.00		
COMP EC-A	100	4	10	0	1.00		
COMP EC-A	100	5	10	0	1.00	1.00	0.00
COMP EC-B	0	1	10	0	1.00		
COMP EC-B	0	2	10	0	1.00		
COMP EC-B	0	3	10	0	1.00		
COMP EC-B	0	4	10	0	1.00		
COMP EC-B	0	5	10	0	1.00	1.00	0.00
COMP EC-B	10	1	9	1	0.90		
COMP EC-B	10	2	10	0	1.00		
COMP EC-B	10	3	9	1	0.90		
COMP EC-B	10	4	10	0	1.00		
COMP EC-B	10	5	10	0	1.00	0.96	0.05
COMP EC-B	50	1	9	1	0.90		
COMP EC-B	50	2	9	1	0.90		
COMP EC-B	50	3	9	1	0.90		
COMP EC-B	50	4	10	0	1.00		
COMP EC-B	50	5	9	1	0.90	0.92	0.04
COMP EC-B	100	1	0	10	0.00		
COMP EC-B	100	2	0	10	0.00		
COMP EC-B	100	3	0	10	0.00		
COMP EC-B	100	4	0	10	0.00		
COMP EC-B	100	5	0	10	0.00	0.00	0.00

(a) Survival based on initial exposure of 10 organisms per replicate.

TABLE C.6. Water Quality Summary for *M. bahia* 96-Hour Water Column Toxicity Test

Sediment Treatment	Concentration (Percent SPP)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
		Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range		18.0	22.0	7.30	8.30	4.0	NA [a]	28.0	32.0
COMP EC-A	0	18.7	19.3	7.93	7.99	7.3	8.0	29.0	29.5
COMP EC-A	10	18.6	19.3	7.83	8.01	7.4	7.9	29.0	29.5
COMP EC-A	50	18.7	19.3	7.86	7.97	7.4	7.8	29.5	30.0
COMP EC-A	100	18.5	19.4	7.74	8.04	7.2	7.9	30.0	30.5
COMP EC-B	0	18.3	19.2	7.83	8.22	6.9	8.2	31.5	32.0
COMP EC-B	10	18.3	19.1	7.92	8.20	7.2	8.3	31.5	32.0
COMP EC-B	50	18.4	19.1	7.81	8.41 [b]	7.0	8.3	31.0	32.0
COMP EC-B	100	18.5	18.8	7.78	8.44 [b]	7.1	8.2	30.0	30.5

(a) NA Not applicable.
(b) Data point out of range.

TABLE C.7. Test Results for *M. bahia* 96-Hour Copper Reference Toxicant Tests

Copper Concentration (μg/L)	Replicate	Live[(a)]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
Test 1[(b)]						
0	1	9	1	0.90		
0	2	10	0	1.00		
0	3	10	0	1.00	0.97	0.06
50	1	10	0	1.00		
50	2	9	1	0.90		
50	3	10	0	1.00	0.97	0.06
100	1	8	2	0.80		
100	2	9	1	0.90		
100	3	8	2	0.80	0.83	0.06
150	1	8	2	0.80		
150	2	7	3	0.70		
150	3	7	3	0.70	0.73	0.06
200	1	5	5	0.50		
200	2	5	5	0.50		
200	3	6	4	0.60	0.53	0.06
Test 2[(b)]						
0	1	10	0	1.00		
0	2	10	0	1.00		
0	3	10	0	1.00	1.00	0.00
100	1	10	0	1.00		
100	2	10	0	1.00		
100	3	10	0	1.00	1.00	0.00
150	1	10	0	1.00		
150	2	6	4	0.60		
150	3	4	6	0.40	0.67	0.31
200	1	3	7	0.30		
200	2	4	6	0.40		
200	3	4	6	0.40	0.37	0.06
300	1	1	9	0.10		
300	2	0	10	0.00		
300	3	0	10	0.00	0.03	0.06

(a) Survival based on initial exposure of 10 organisms per replicate.
(b) Test 1 was run concurrently with the water column toxicity test for Eastchester Reach B, and test 2 with the water column toxicity test for Eastchester Reach A.

TABLE C.8. Water Quality Summary for *M. bahia* 96-Hour Copper Reference Toxicant Tests

Copper Concentration (µg/L)	Temperature (°C) Min	Temperature (°C) Max	pH Min	pH Max	Dissolved Oxygen (mg/L) Min	Dissolved Oxygen (mg/L) Max	Salinity (o/oo) Min	Salinity (o/oo) Max
Acceptable Range	18.0	22.0	7.30	8.30	4.0	NA [(a)]	28.0	32.0
Test 1[(b)]								
0	19.3	19.5	7.58	8.08	5.8	8.1	30.5	32.0
50	19.2	19.6	7.81	8.05	7.1	8.0	30.5	32.0
100	19.2	19.5	7.81	8.09	7.0	7.9	30.5	32.0
150	19.2	19.6	7.83	8.08	7.1	7.9	30.5	32.0
200	19.2	19.5	7.85	8.06	7.3	8.0	30.5	32.0
Test 2[(b)]								
0	18.7	19.4	7.90	8.06	7.3	7.9	31.0	32.0
100	18.7	19.3	7.88	8.04	7.3	7.8	31.5	32.0
150	18.7	19.3	7.82	8.02	7.4	7.9	31.0	32.0
200	18.7	19.3	7.95	8.03	7.3	8.0	31.0	32.0
300	18.7	19.3	7.96	8.04	7.4	8.1	31.0	32.0

(a) NA Not applicable.
(b) Test 1 was run concurrently with the water column toxicity test for Eastchester Reach B, and test 2 with the water column toxicity test for Eastchester Reach A.

TABLE C.9. Test Results for All Replicates in 48-Hour Larval *M. galloprovincialis* Water-Column Toxicity Test

Sediment Treatment	SPP Concentration	Replicate	Mean Stocking Density	Number Normal	Abnormal	Other	Proportion Normal[(a)]	Mean Proportion Normal	Number Surviving	Proportion Surviving[(a)]	Mean Proportion Surviving	Standard Deviation[(b)]
COMP EC-A	0%	1	271	244	0	1	0.90		245	0.90		
COMP EC-A	0%	2	271	270	0	2	1.00		272	1.00		
COMP EC-A	0%	3	271	289	0	2	1.00		291	1.00		
COMP EC-A	0%	4	271	291	0	7	1.00		298	1.00		
COMP EC-A	0%	5	271	254	0	5	0.94	0.97	259	0.96	0.97	0.04
COMP EC-A	10%	1	271	292	1	7	1.00		300	1.00		
COMP EC-A	10%	2	271	251	0	5	0.93		256	0.94		
COMP EC-A	10%	3	271	221	0	3	0.82		224	0.83		
COMP EC-A	10%	4	271	314	0	1	1.00		315	1.00		
COMP EC-A	10%	5	271	219	0	3	0.81	0.91	222	0.82	0.92	0.09
COMP EC-A	50%	1	271	243	0	2	0.90		245	0.90		
COMP EC-A	50%	2	271	290	0	6	1.00		296	1.00		
COMP EC-A	50%	3	271	244	0	8	0.90		252	0.93		
COMP EC-A	50%	4	271	279	0	12	1.00		291	1.00		
COMP EC-A	50%	5	271	287	2	10	1.00	0.96	299	1.00	0.97	0.05
COMP EC-A	100%	1	271	234	0	9	0.86		243	0.90		
COMP EC-A	100%	2	271	313	0	4	1.00		317	1.00		
COMP EC-A	100%	3	271	193	2	8	0.71		203	0.75		
COMP EC-A	100%	4	271	273	4	18	1.00		295	1.00		
COMP EC-A	100%	5	271	208	8	10	0.77	0.87	226	0.83	0.90	0.11
COMP EC-B	0%	1	261	284	0	3	1.00		287	1.00		
COMP EC-B	0%	2	261	249	3	11	0.95		263	1.00		
COMP EC-B	0%	3	261	303	0	5	1.00		308	1.00		
COMP EC-B	0%	4	261	276	4	9	1.00		289	1.00		
COMP EC-B	0%	5	261	249	0	8	0.95	0.98	257	0.98	1.00	0.01

Table C.9. (contd)

Sediment Treatment	SPP Concentration	Replicate	Mean Stocking Density	Number Normal	Abnormal	Other	Proportion Normal[a]	Mean Proportion Normal	Number Surviving	Proportion Surviving[a]	Mean Proportion Surviving	Standard Deviation[b]
COMP EC-B	10%	1	261	246	0	6	0.94		252	0.97		
COMP EC-B	10%	2	261	267	5	12	1.00		284	1.00		
COMP EC-B	10%	3	261	301	0	6	1.00		307	1.00		
COMP EC-B	10%	4	261	154	11	10	0.59		175	0.67		
COMP EC-B	10%	5	261	317	0	11	1.00	0.91	328	1.00	0.93	0.14
COMP EC-B	50%	1	261	0	0	144	0.00		144	0.55		
COMP EC-B	50%	2	261	0	0	136	0.00		136	0.52		
COMP EC-B	50%	3	261	0	0	111	0.00		111	0.43		
COMP EC-B	50%	4	261	0	0	205	0.00		205	0.79		
COMP EC-B	50%	5	261	0	0	138	0.00	0.00	138	0.53	0.56	0.13
COMP EC-B	100%	1	261	0	0	60	0.00		60	0.23		
COMP EC-B	100%	2	261	0	0	10	0.00		10	0.04		
COMP EC-B	100%	3	261	0	0	48	0.00		48	0.18		
COMP EC-B	100%	4	261	0	0	39	0.00		39	0.15		
COMP EC-B	100%	5	261	0	0	26	0.00	0.00	26	0.10	0.14	0.07

(a) When number normal or number surviving exceeded the stocking density, a proportion normal and/or proportion survival of 1.00 was used for mean calculations and statistical analysis.
(b) Standard deviation is based on proportion surviving.

TABLE C.10. Water Quality Summary for *M. galloprovincialis* 48-Hour Water Column Toxicity Test

Sediment Treatment	Percent Concentration	Temperature (°C) Min	Temperature (°C) Max	pH Min	pH Max	Dissolved Oxygen (mg/L) Min	Dissolved Oxygen (mg/L) Max	Salinity (o/oo) Min	Salinity (o/oo) Max
Acceptable Range		14.0	18.0	7.30	8.30	5.0	NA [(a)]	28.0	32.0
COMP EC-A	0	14.9	17.0	8.00	8.09	7.6	8.0	30.0	30.5
COMP EC-A	10	14.9	16.9	7.99	8.09	7.6	7.9	30.0	30.5
COMP EC-A	50	14.9	17.0	7.93	8.10	7.2	8.0	30.0	30.5
COMP EC-A	100	14.9	17.0	7.84	8.12	6.2	8.0	30.0	30.5
COMP EC-B	0	16.1	16.6	7.98	8.17	7.0	8.4	30.0	30.5
COMP EC-B	10	16.1	16.6	7.93	8.18	7.4	8.2	30.0	31.0
COMP EC-B	50	16.1	16.5	7.78	8.34 [(b)]	6.5	8.0	29.5	30.5
COMP EC-B	100	16.2	16.6	7.70	8.39 [(b)]	6.4	8.0	29.0	30.0

(a) NA Not applicable.
(b) Data point out of range.

TABLE C.11. Test Results for Larval *M. galloprovincialis* 48-Hour Copper Reference Toxicant Tests

Copper Concentration (µg/L)	Replicate	Mean Stocking Density	Number Normal	Abnormal	Other	Proportion Normal[a]	Mean Proportion Normal	Number Surviving	Proportion Surviving[a]	Mean Proportion Surviving	Standard Deviation[b]
Test 1[c]											
0.00	1	285	217	0	2	0.76		219	0.77		
0.00	2	285	252	1	15	0.88		268	0.94		
0.00	3	285	232	1	13	0.81		246	0.86		
0.00	4	285	194	0	10	0.68		204	0.72		
0.00	5	285	249	1	14	0.87	0.80	264	0.93	0.84	0.10
1.00	1	285	223	0	19	0.78		242	0.85		
1.00	2	285	248	0	10	0.87		258	0.91		
1.00	3	285	265	2	9	0.93	0.86	276	0.97	0.91	0.06
4.00	1	285	0	0	7	0.00		7	0.02		
4.00	2	285	268	1	10	0.94		279	0.98		
4.00	3	285	264	1	14	0.93	0.62	279	0.98	0.66	0.55
16.00	1	285	16	38	160	0.06		214	0.75		
16.00	2	285	0	13	309	0.00		322	1.00		
16.00	3	285	0	0	242	0.00	0.02	242	0.85	0.87	0.13
64.00	1	285	2	0	1	0.01		3	0.01		
64.00	2	285	254	0	11	0.89		265	0.93		
64.00	3	285	4	0	4	0.01	0.30	8	0.03	0.32	0.53

TABLE C.11. (contd)

Copper Concentration (µg/L)	Replicate	Mean Stocking Density	Number Normal	Abnormal	Other	Proportion Normal[a]	Mean Proportion Normal	Number Surviving	Proportion Surviving[a]	Mean Proportion Surviving	Standard Deviation[b]
Test 2[c]											
0.00	1	285	297	0	3	1.00		300	1.00		
0.00	2	285	287	0	6	1.00		293	1.00		
0.00	3	285	257	0	9	0.90		266	0.93		
0.00	4	285	270	0	6	0.95		276	0.97		
0.00	5	285	264	0	9	0.93	0.96	273	0.96	0.97	0.03
1.00	1	285	298	0	6	1.00		304	1.00		
1.00	2	285	267	1	11	0.94		279	0.98		
1.00	3	285	267	0	8	0.94	0.96	275	0.96	0.98	0.02
4.00	1	285	235	0	0	0.82		235	0.82		
4.00	2	285	249	0	3	0.87		252	0.88		
4.00	3	285	255	1	7	0.89	0.86	263	0.92	0.87	0.05
16.00	1	285	20	109	122	0.07		251	0.88		
16.00	2	285	4	133	104	0.01		241	0.85		
16.00	3	285	0	177	103	0.00	0.03	280	0.98	0.90	0.07
64.00	1	285	0	0	0	0.00		0	0.00		
64.00	2	285	0	0	5	0.00		5	0.02		
64.00	3	285	0	0	0	0.00	0.00	0	0.00	0.01	0.01

(a) When number normal or number surviving exceeded the stocking density, a proportion normal and/or proportion survival of 1.00 was used for mean calculations and statistical analysis.
(b) Standard deviation is based on proportion surviving.
(c) Test 1 was run concurrently with the water column toxicity test for Eastchester Reach B, and test 2 with the water column toxicity test for Eastchester Reach A.

TABLE C.12. Water Quality Summary for *M. galloprovincialis* 48-Hour Copper Reference Toxicant Tests

Copper Concentration (µg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	14.0	18.0	7.30	8.30	5.0	NA[a]	28.0	32.0
Test 1[b]								
0.00	15.9	16.5	8.03	8.14	7.9	8.2	30.5	31.5
1.00	16.0	16.4	8.00	8.15	7.5	8.2	30.5	31.0
4.00	16.0	16.3	7.93	8.06	7.6	8.1	30.5	31.5
16.0	15.8	16.4	8.03	8.15	7.5	8.2	30.5	32.0
64.0	15.9	16.4	8.01	8.18	7.4	8.2	30.5	31.5
Test 2[b]								
0.00	16.5	17.6	7.86	8.05	6.7	7.6	30.0	30.5
1.00	16.4	17.6	7.92	8.04	7.1	7.7	30.0	30.5
4.00	16.6	17.6	8.04	8.06	7.5	7.6	30.0	30.5
16.0	16.6	17.6	7.96	8.06	7.3	7.7	30.0	30.5
64.0	16.7	17.6	7.76	8.06	6.1	7.6	30.0	30.0

(a) NA Not applicable.

(b) Test 1 was run concurrently with the water column toxicity test for Eastchester Reach B, and test with the water column toxicity test for Eastchester Reach A.

Appendix D

Benthic Acute Toxicity Test Data, Eastchester Project

TABLE D.1. Test Results for *A. abdita* 10-Day Static Renewal, Benthic Acute Toxicity Test

Sediment Treatment	Replicate	Live[a]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	1	18	2	0.90		
COMP EC-A	2	16	4	0.80		
COMP EC-A	3	16	4	0.80		
COMP EC-A	4	19	1	0.95		
COMP EC-A	5	19	1	0.95	0.88	0.08
COMP EC-B	1	3	17	0.15		
COMP EC-B	2	1	19	0.05		
COMP EC-B	3	1	19	0.05		
COMP EC-B	4	0	20	0.00		
COMP EC-B	5	2	18	0.10	0.07	0.06
R-MUD	1	17	3	0.85		
R-MUD	2	19	1	0.95		
R-MUD	3	18	2	0.90		
R-MUD	4	19	1	0.95		
R-MUD	5	20	0	1.00	0.93	0.06
R-CLIS	1	19	1	0.95		
R-CLIS	2	20	0	1.00		
R-CLIS	3	19	1	0.95		
R-CLIS	4	20	0	1.00		
R-CLIS	5	19	1	0.95	0.97	0.03
C-AM	1	20	0	1.00		
C-AM	2	20	0	1.00		
C-AM	3	19	1	0.95		
C-AM	4	18	2	0.90		
C-AM	5	20	0	1.00	0.97	0.04

(a) Survival based on initial exposure of 20 organisms per replicate.

TABLE D.2. Water Quality Summary for *A. abdita* 10-Day Static Renewal, Benthic Acute Toxicity Test

Sediment Treatment	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)		Total Ammonia[a] (mg/L)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	18.0	22.0	7.30	8.30	5.0	NA [b]	28.0	32.0	NA	30.0
COMP EC-A	17.9 [c]	19.1	7.96	8.31 [c]	7.1	8.3	30.5	31.5	<1.00	<1.00
COMP EC-B	17.8 [c]	19.3	7.94	8.56 [c]	7.2	8.3	30.0	32.0	<1.00	1.13
R-MUD	17.9 [c]	19.3	7.93	8.14	7.3	8.3	30.5	32.0	<1.00	<1.00
R-CLIS	17.5 [c]	19.3	7.95	8.30	6.9 [c]	8.4	30.0	32.0	<1.00	<1.00
C-AM	17.9 [c]	19.3	7.80	8.16	6.8 [c]	8.2	30.0	31.5	<1.00	1.30

(a) Total ammonia measured in overlying water.
(b) NA Not applicable.
(c) Data point out of range.

TABLE D.3. Water Quality Measurements of Porewater for *A. abdita* 10-Day, Static Renewal, Benthic Acute Toxicity Test

Sediment Treatment	Ammonia (mg/L)	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Salinity (o/oo)
			Day 0		
COMP EC-A	9.28	18.1	8.10	8.1	30.5
COMP EC-B	16.4	18.3	7.98	8.1	30.5
R-MUD	0.737	19.2	8.07	7.9	31.5
R-CLIS	2.57	18.2	7.99	8.0	31.0
C-AM	7.12	19.3	8.03	8.1	31.0
			Day 10		
COMP EC-A	4.13	18.8	8.15	8.2	31.0
COMP EC-B	5.15	18.9	8.23	8.2	31.0
R-MUD	ND[a]	18.9	8.01	8.2	31.0
R-CLIS	1.65	18.7	8.23	8.4	31.0
C-AM	4.61	18.4	8.12	8.1	30.0

(a) ND No data.

TABLE D.4. Test Results for *A. abdita* 96-Hour Cadmium Reference Toxicant Test

Cadmium Concentration (mg/L)	Replicate	Live(a)	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
0.00	1	20	0	1.00		
0.00	2	19	1	0.95		
0.00	3	20	0	1.00	0.98	0.03
0.25	1	13	7	0.65		
0.25	2	13	7	0.65		
0.25	3	15	5	0.75	0.68	0.06
0.50	1	12	8	0.60		
0.50	2	15	5	0.75		
0.50	3	13	7	0.65	0.67	0.08
1.00	1	4	16	0.20		
1.00	2	5	15	0.25		
1.00	3	5	15	0.25	0.23	0.03
2.00	1	0	20	0.00		
2.00	2	0	20	0.00		
2.00	3	0	20	0.00	0.00	0.00

(a) Survival based on initial exposure of 20 organisms per replicate.

TABLE D.5. Water Quality Summary for 96-Hour *A. abdita* Cadmium Reference Toxicant Test

Cadmium Concentration (mg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	18.0	22.0	7.30	8.30	5.0	NA[a]	28.0	32.0
0.00	19.3	19.5	7.97	8.14	7.3	8.0	30.5	31.0
0.25	19.3	19.5	7.92	8.10	7.5	7.9	30.5	31.5
0.50	19.3	19.6	7.91	8.10	7.5	7.8·	30.5	31.0
1.00	19.2	19.5	7.90	8.09	7.6	7.9	30.5	31.5
2.00	19.3	19.6	7.85	8.03	7.6	7.9	30.5	31.5

(a) NA Not applicable.

TABLE D.6. Results of *R. abronius* 10-Day, Static Renewal, Benthic Acute Toxicity Test

Sediment Treatment	Replicate	Live[a]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	1	16	4	0.80		
COMP EC-A	2	14	6	0.70		
COMP EC-A	3	13	7	0.65		
COMP EC-A	4	9	11	0.45		
COMP EC-A	5	13	7	0.65	0.65	0.13
COMP EC-B	1	14	6	0.70		
COMP EC-B	2	16	4	0.80		
COMP EC-B	3	13	7	0.65		
COMP EC-B	4	16	4	0.80		
COMP EC-B	5	10	10	0.50	0.69	0.12
R-MUD	1	20	0	1.00		
R-MUD	2	20	0	1.00		
R-MUD	3	20	0	1.00		
R-MUD	4	20	0	1.00		
R-MUD	5	18	2	0.90	0.98	0.04
R-CLIS	1	19	1	0.95		
R-CLIS	2	19	1	0.95		
R-CLIS	3	15	5	0.75		
R-CLIS	4	19	1	0.95		
R-CLIS	5	19	1	0.95	0.91	0.09
C-WB	1	19	1	0.95		
C-WB	2	20	0	1.00		
C-WB	3	21	0	1.00		
C-WB	4	18	2	0.90		
C-WB	5	20	0	1.00	0.97	0.04

(a) Survival based on initial exposure of 20 organisms per replicate.

TABLE D.7. Water Quality Summary for *R. abronius* 10-Day Static Renewal, Benthic Acute Toxicity Test

Sediment Treatment	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)		Total Ammonia[a] (mg/L)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	12.0	16.0	7.30	8.30	5.0	NA[b]	28.0	32.0	NA	30.0
COMP EC-A	13.8	15.0	7.87	8.10	7.4	8.8	30.5	32.0	0.037	0.450
COMP EC-B	13.9	15.0	7.80	8.45[c]	6.9	8.8	31.0	32.0	0.114	1.52
R-MUD	13.8	15.0	7.10	8.12	7.4	8.8	30.5	32.0	0.026	<1.00
R-CLIS	14.0	15.3	7.91	8.13	7.5	8.7	30.0	32.0	0.026	1.72
C-WB	13.8	15.1	7.91	8.40[c]	7.6	8.8	31.0	32.0	0.034	0.219

(a) Total ammonia measured in the overlying water.
(b) NA Not applicable.
(c) Data point out of range.

TABLE D.8. Water Quality Measurements of Porewater for *R. abronius* 10-Day, Static Renewal, Benthic Acute Toxicity Test

Sediment Treatment	Ammonia (mg/L)	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Salinity (o/oo)
			Day 0		
COMP EC-A	6.63	15.0	7.87	7.7	31.0
COMP EC-B	18.7	15.0	7.91	8.0	31.5
R-MUD	0.685	15.0	7.99	8.0	32.0
R-CLIS	2.52	14.5	7.97	7.5	31.5
C-WB	2.74	14.8	7.93	7.7	31.5
			Day 10		
COMP EC-A	2.2	14.3	8.09	8.8	31.0
COMP EC-B	4.1	14.4	8.30	8.0	31.0
R-MUD	ND[a]	14.5	8.10	8.8	31.0
R-CLIS	1.3	14.4	8.12	8.7	30.5
C-WB	ND	14.3	8.09	8.8	31.0

(a) ND No data.

TABLE D.9. Test Results for *R. abronius* 96-Hour Cadmium Reference Toxicant Test

Cadmium Concentration (mg/L)	Rep	Live[a]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
0.00	1	18	2	0.90		
0.00	2	20	0	1.00		
0.00	3	20	0	1.00	0.97	0.06
0.38	1	15	5	0.75		
0.38	2	5	5	0.25		
0.38	3	20	0	1.00	0.67	0.38
0.75	1	15	5	0.75		
0.75	2	17	3	0.85		
0.75	3	12	8	0.60	0.73	0.13
1.50	1	8	12	0.40		
1.50	2	2	18	0.10		
1.50	3	9	11	0.45	0.32	0.19
3.00	1	1	19	0.05		
3.00	2	4	16	0.20		
3.00	3	1	19	0.05	0.10	0.09

TABLE D.10. Water Quality Summary for *R.abronius* 96-Hour Cadmium Reference Toxicant Test

Cadmium Concentration (mg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	12.0	16.0	7.30	8.30	5.0	NA [(a)]	28.0	32.0
0.00	14.9	15.6	7.91	8.10	7.9	8.3	30.5	32.0
0.38	14.9	15.2	7.90	8.07	8.0	8.4	30.5	32.0
0.75	14.8	15.3	7.90	8.06	8.0	8.3	30.5	31.5
1.50	14.9	15.2	7.87	8.02	8.0	8.3	30.5	32.0
3.00	14.9	15.2	7.66	7.92	7.9	8.2	30.5	32.0

(a) NA Not applicable.

TABLE D.11. Test Results for 10-Day, Static Renewal, Benthic Acute Toxicity Test with *E. estuarius*

Sediment Treatment	Replicate	Live[(a)]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	1	15	5	0.75		
COMP EC-A	2	18	2	0.90		
COMP EC-A	3	17	3	0.85		
COMP EC-A	4	16	4	0.80		
COMP EC-A	5	15	5	0.75	0.81	0.07
R-MUD	1	20	0	1.00		
R-MUD	2	20	0	1.00		
R-MUD	3	19	1	0.95		
R-MUD	4	17	3	0.85		
R-MUD	5	20	0	1.00	0.96	0.07
Eoh Control	1	20	0	1.00		
Eoh Control	2	20	0	1.00		
Eoh Control	3	20	0	1.00		
Eoh Control	4	20	0	1.00		
Eoh Control	5	19	1	0.95	0.99	0.02

(a) Survival based on initial exposure of 20 organisms per replicate.

TABLE D.12. Water Quality Summary for 10-Day, Static Renewal Test with *E. estuarius*

Sediment Treatment	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)		Total Ammonia[a] (mg/L)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	12.0	16.0	7.30	8.30	5.0	NA [b]	28.0	32.0	NA	60.0
COMP EC-A	14.5	15.8	7.78	8.27	7.0	8.1	30.5	31.5	<1.00	2.04
R-MUD	14.3	15.7	7.94	8.11	7.3	8.3	30.5	31.5	<1.00	4.94
Eoh Control	14.9	15.8	7.62	8.10	7.6	8.2	30.5	31.5	<1.00	1.42

(a) Total ammonia measured in the overlying water.
(b) NA Not applicable.

TABLE D.13. Water Quality Measurements of Porewater for 10-Day *E. estuarius* Static Renewal Test

Sediment Treatment	Ammonia (mg/L)	Temperature[a] (°C)	pH	Dissolved Oxygen[a] (mg/L)	Salinity o/oo)
			Day 0		
COMP EC-A	12.8	15.2	7.60	8.1	30.0
R-MUD	ND[b]	ND	ND	ND	ND
Eoh Control	<1.00	15.1	ND	8.1	ND
			Day 10		
COMP EC-A	9.56	21.2	7.48	7.6	30.5
R-MUD	1.22	ND	ND	7.9	30.5
Eoh Control	1.11	ND	ND	7.8	30.5

(a) Values are a mean of the five replicates, rather than values from the porewater dummy jars.
(b) ND No data.

TABLE D.14. Test Results for 96-Hour *E. estuarius* Cadmium Reference Toxicant Test

Cadmium Concentration (mg/L)	Replicate	Live[a]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
0	1	18	2	0.90		
0	2	19	1	0.95		
0	3	17	3	0.85	0.90	0.05
5	1	16	4	0.80		
5	2	14	6	0.70		
5	3	15	5	0.75	0.75	0.05
10	1	6	14	0.30		
10	2	5	15	0.25		
10	3	9	11	0.45	0.33	0.10
20	1	2	18	0.10		
20	2	1	19	0.05		
20	3	3	17	0.15	0.10	0.05
30	1	0	20	0.00		
30	2	0	20	0.00		
30	3	0	20	0.00	0.00	0.00

(a) Survival based on initial exposure of 20 organisms per replicate.

TABLE D.15. Water Quality Summary for 96-Hour Cadmium Reference Toxicant Test with *E. estuarius*

Cadmium Concentration (mg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	12.0	16.0	7.30	8.30	5.0	NA[a]	28.0	32.0
0.0	14.0	15.5	8.00	8.10	7.5	8.2	30.5	31.5
5.0	14.2	15.7	7.98	8.10	7.4	8.3	30.5	31.5
10.0	14.2	15.6	7.90	8.10	7.4	8.4	30.5	31.5
20.0	14.1	15.5	7.90	8.10	7.4	8.3	30.5	31.5
30.0	14.1	15.7	7.93	8.10	7.5	8.3	31.0	31.5

(a) NA Not applicable.

TABLE D.16. Test Results for 10-Day, Static, Benthic Acute Toxicity Test with *M. bahia*

Sediment Treatment	Replicate	Live[a]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	1	16	4	0.80		
COMP EC-A	2	16	4	0.80		
COMP EC-A	3	16	4	0.80		
COMP EC-A	4	14	6	0.70		
COMP EC-A	5	12	8	0.60	0.74	0.09
COMP EC-B	1	18	2	0.90		
COMP EC-B	2	18	2	0.90		
COMP EC-B	3	18	2	0.90		
COMP EC-B	4	20	0	1.00		
COMP EC-B	5	18	2	0.90	0.92	0.04
R-MUD	1	17	3	0.85		
R-MUD	2	17	3	0.85		
R-MUD	3	13	7	0.65		
R-MUD	4	13	7	0.65		
R-MUD	5	16	4	0.80	0.76	0.10
R-CLIS	1	16	4	0.80		
R-CLIS	2	12	8	0.60		
R-CLIS	3	19	1	0.95		
R-CLIS	4	13	7	0.65		
R-CLIS	5	14	6	0.70	0.74	0.14
C-SB[b]	1	19	1	0.95		
C-SB	2	16	4	0.80		
C-SB	3	19	1	0.95		
C-SB	4	20	0	1.00		
C-SB	5	19	1	0.95	0.93	0.08

(a) Survival based on initial exposure of 20 organisms per replicate.

(b) Control exposures were run approximately three weeks after the Eastchester sediments were run.

TABLE D.17. Water Quality Summary for 10-Day, Static, Benthic Acute Toxicity Test with *M. bahia*

Sediment Treatment	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)		Ammonia (mg/L)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	18.0	22.0	7.30	8.30	4.0	NA [a]	28.0	32.0	NA	20.0
COMP EC-A	18.7	19.5	7.70	8.09	6.1	7.8	30.5	31.5	0.397	2.96
COMP EC-B	18.6	19.6	7.74	8.23	5.5	7.7	30.0	31.5	4.49	15.7
R-MUD	18.5	19.5	7.57	7.99	6.0	7.8	30.5	32.0	0.070	3.6
R-CLIS	18.6	19.6	7.64	8.09	5.3	7.7	30.0	32.0	0.069	1.95
C-SB[c]	18.6	19.5	7.73	8.24	5.9	7.4	30.0	32.0	3.36	82.0 [c]

(a) NA Not applicable.
(b) Control exposures were run approximately three weeks after the Eastchester sediments were run.
(c) Data point out of range.

TABLE D.18. Test Results for 96-Hour, Benthic Acute Toxicity, Copper Reference Toxicant Test with *M. bahia*

Copper Concentration (µg/L)	Replicate	Live[(a)]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
0	1	9	1	0.90		
0	2	10	0	1.00		
0	3	10	0	1.00	0.97	0.06
50	1	10	0	1.00		
50	2	9	1	0.90		
50	3	10	0	1.00	0.97	0.06
100	1	8	2	0.80		
100	2	7	3	0.70		
100	3	8	2	0.80	0.77	0.06
150	1	6	4	0.60		
150	2	5	5	0.50		
150	3	6	4	0.60	0.57	0.06
200	1	1	9	0.10		
200	2	2	8	0.20		
200	3	2	8	0.20	0.17	0.06

(a) Survival based on initial exposure of 10 organisms per replicate.

TABLE D.19. Water Quality Summary for 96-Hour, Benthic Acute Toxicity, Copper Reference Toxicant Test with *M. bahia*

Copper Concentration (µg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	18.0	22.0	7.30	8.30	4.0	NA [(a)]	28.0	32.0
0.00	18.6	19.3	7.91	8.08	6.5	8.9	30.5	32.0
50.0	18.7	19.3	7.88	8.13	6.6	9.1	30.0	31.5
100	18.7	19.3	7.87	8.08	6.4	9.0	30.5	32.0
150	18.7	19.4	7.86	8.16	6.8	8.9	30.5	32.0
200	18.7	19.4	7.84	8.14	6.7	8.9	30.0	31.5

(a) NA Not applicable.

Appendix E

Bioaccumulation Test Data, Eastchester Project

TABLE E.1. Test Results for 28-Day Bioaccumulation Test with *M. nasuta*

Sediment Treatment	Replicate	Number Live[a]	Number Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	1	25	0	1.00		
COMP EC-A	2	25	0	1.00		
COMP EC-A	3	24	1	0.96		
COMP EC-A	4	25	0	1.00		
COMP EC-A	5	25	0	1.00	0.99	0.02
COMP EC-B	1	23	2	0.92		
COMP EC-B	2	24	1	0.96		
COMP EC-B	3	23	2	0.92		
COMP EC-B	4	25	0	1.00		
COMP EC-B	5	23	2	0.92	0.94	0.04
R-MUD	1	22	3	0.88		
R-MUD	2	20	5	0.80		
R-MUD	3	23	2	0.92		
R-MUD	4	21	4	0.84		
R-MUD	5	24	1	0.96	0.88	0.06
R-CLIS	1	23	2	0.92		
R-CLIS	2	25	0	1.00		
R-CLIS	3	22	3	0.88		
R-CLIS	4	25	0	1.00		
R-CLIS	5	25	0	1.00	0.96	0.06
C-SB	1	25	0	1.00		
C-SB	2	24	1	0.96		
C-SB	3	24	1	0.96		
C-SB	4	24	1	0.96		
C-SB	5	25	0	1.00	0.98	0.02

(a) Survival based on initial exposure of 25 organisms per replicate.

TABLE E.2. Water Quality Summary for 28-day Bioaccumulation Test with *M. nasuta*

Sediment Treatment	Temperature (°C) Min	Temperature (°C) Max	pH Min	pH Max	Dissolved Oxygen (mg/L) Min	Dissolved Oxygen (mg/L) Max	Salinity (o/oo) Min	Salinity (o/oo) Max
Acceptable Range	12.0	16.0	7.30	8.30	5.0	NA [(a)]	28.0	32.0
COMP EC-A	14.4	16.0	7.78	8.03	7.4	8.2	30.0	31.5
COMP EC-B	14.5	16.1 [(b)]	7.71	8.00	7.3	8.1	30.0	31.0
R-MUD	14.4	16.4 [(b)]	7.68	8.03	7.4	8.3	30.0	31.0
R-CLIS	14.4	15.9	7.67	8.05	7.2	8.8	30.0	31.0
C-SB	14.3	16.5 [(b)]	7.71	8.01	7.1	8.2	30.5	31.0

(a) NA Not applicable.
(b) Data point out of range.

TABLE E.3. Test Results for 96-Hour Copper Reference Toxicant Test with *M. nasuta*

Copper Concentration (mg/L)	Live[a]	Dead or Missing	Proportion Surviving
0.00	10	0	1.00
0.25	10	0	1.00
0.50	10	0	1.00
0.75	8	2	0.80
1.00	10	0	1.00
1.50	8	2	0.80
2.50	4	6	0.40

(a) Survival based on initial exposure of 10 organisms per replicate.

TABLE E.4. Water Quality Summary for 96-Hour Copper Reference Toxicant Test with *M. nasuta*

Copper Concentration (mg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	12.0	16.0	7.30	8.30	5.0	NA [(a)]	28.0	32.0
0.00	15.1	15.8	7.78	7.96	7.0	8.0	30.5	31.5
0.25	15.0	15.5	7.64	7.94	6.9	8.1	30.5	31.5
0.50	15.0	15.6	7.65	7.94	6.9	8.0	30.5	31.5
0.75	15.0	15.5	7.48	7.93	5.4	8.0	30.5	31.5
1.00	15.1	15.5	7.53	7.88	6.2	8.1	30.5	31.5
1.50	15.0	15.6	7.44	7.88	5.3	8.1	30.5	31.5
2.50	15.0	15.6	7.27 [(b)]	7.86	3.2 [(b)]	8.1	30.5	31.5

(a) NA Not applicable.
(b) Data point out of range.

TABLE E.5. Test Results for 28-Day Bioaccumulation Test with *N. virens*

Sediment Treatment	Replicate	Live[a]	Dead or Missing	Proportion Surviving	Mean Proportion Surviving	Standard Deviation
COMP EC-A	1	18	2	0.90		
COMP EC-A	2	18	2	0.90		
COMP EC-A	3	18	2	0.90		
COMP EC-A	4	15	5	0.75		
COMP EC-A	5	17	3	0.85	0.86	0.07
COMP EC-B	1	17	3	0.85		
COMP EC-B	2	15	5	0.75		
COMP EC-B	3	16	4	0.80		
COMP EC-B	4	16	4	0.80		
COMP EC-B	5	15	5	0.75	0.79	0.04
R-MUD	1	16	4	0.80		
R-MUD	2	15	5	0.75		
R-MUD	3	18	2	0.90		
R-MUD	4	15	5	0.75		
R-MUD	5	15	5	0.75	0.79	0.07
R-CLIS	1	19	1	0.95		
R-CLIS	2	14	6	0.70		
R-CLIS	3	15	5	0.75		
R-CLIS	4	18	2	0.90		
R-CLIS	5	16	4	0.80	0.82	0.10
C-NR	1	19	1	0.95		
C-NR	2	20	0	1.00		
C-NR	3	16	4	0.80		
C-NR	4	19	1	0.95		
C-NR	5	15	5	0.75	0.89	0.11

(a) Survival based on initial exposure of 20 organisms per replicate.

TABLE E.6. Water Quality Summary for 28-Day Bioaccumulation Test with *N. virens*

Sediment Treatment	Temperature (°C) Min	Temperature (°C) Max	pH Min	pH Max	Dissolved Oxygen (mg/L) Min	Dissolved Oxygen (mg/L) Max	Salinity (o/oo) Min	Salinity (o/oo) Max
Acceptable Range	18.0	22.0	7.30	8.30	5.0	NA [(a)]	28.0	32.0
COMP EC-A	17.9 [(b)]	19.9	7.70	8.01	6.3	8.2	30.0	31.5
COMP EC-B	18.0	20.0	7.64	8.03	6.3	8.3	30.0	32.0
R-MUD	18.0	19.9	7.73	8.88 [(b)]	6.5	8.3	30.5	32.0
R-CLIS	18.1	19.8	7.72	8.01	6.5	8.3	30.0	31.5
C-NR	18.0	19.9	7.70	8.01	6.3	8.2	30.0	31.5

(a) NA Not applicable.
(b) Data point out of range.

TABLE E.7. Test Results for 96-Hour Copper Reference Toxicant Test with *N. virens*

Copper Concentration (mg/L)	Live[a]	Dead or Missing	Proportion Surviving
0.00	10	0	1.00
0.05	10	0	1.00
0.075	10	0	1.00
0.15	4	6	0.40
0.20	0	10	0.00
0.25	0	10	0.00
0.30	0	10	0.00

(a) Survival based on initial exposure of 10 organisms per replicate.

TABLE E.8. Water Quality Summary for 96-Hour Copper Reference Toxicant Test with *N. virens*

Copper Concentration (mg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	18.0	22.0	7.30	8.30	5.0	NA [(a)]	28.0	32.0
0.00	18.6	19.2	7.52	7.94	5.7	7.4	30.5	31.5
0.05	18.6	19.3	7.60	7.95	6.3	7.4	30.5	31.5
0.075	18.6	19.4	7.61	7.91	5.2	7.6	30.5	31.5
0.15	18.6	19.4	7.39	7.93	4.5 [(b)]	7.4	30.5	31.5
0.20	18.7	19.4	7.00 [(b)]	7.82	0.6 [(b)]	7.5	30.5	31.5
0.25	18.6	19.4	7.14 [(b)]	7.86	2.0 [(b)]	7.5	30.5	31.5
0.30	18.6	19.4	7.21 [(b)]	7.90	3.0 [(b)]	7.6	30.5	31.5

(a) NA Not applicable.
(b) Data point out of range.

Appendix F

Macoma nasuta Tissue Chemical Analyses and Quality Assurance/Quality Control Data, Eastchester Project

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Metals

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Worm and Clam Tissue

QA/QC DATA QUALITY OBJECTIVES

	Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Detection Limit (µg/g dry wt)
Arsenic	ICP/MS	75-125%	≤20%	≤20%	1.0
Cadmium	ICP/MS	75-125%	≤20%	≤20%	0.1
Chromium	ICP/MS	75-125%	≤20%	≤20%	0.2
Copper	ICP/MS	75-125%	≤20%	≤20%	1.0
Lead	ICP/MS	75-125%	≤20%	≤20%	0.1
Mercury	CVAA	75-125%	≤20%	≤20%	0.02
Nickel	ICP/MS	75-125%	≤20%	≤20%	0.1
Silver	ICP/MS	75-125%	≤20%	≤20%	0.1
Zinc	ICP/MS	75-125%	≤20%	≤20%	1.0

METHOD

A total of nine (9) metals was analyzed for the New York Federal Projects-2 Program: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn). Hg was analyzed using cold-vapor atomic absorption spectroscopy (CVAA) according to the method of Bloom and Crecelius (1983). The remaining metals were analyzed by inductively coupled plasma mass spectrometry (ICP/MS) following a procedure based on EPA Method 200.8 (EPA 1991).

To prepare tissue for analysis, samples were freeze-dried and blended in a Spex mixer-mill. Approximately 5 g of mixed sample was ground in a ceramic ball mill. For ICP/MS and CVAA analyses, 0.2- to 0.5-g aliquots of dried homogenous sample were digested using a mixture of nitric acid and hydrogen peroxide following EPA Method 200.3 (EPA 1991).

HOLDING TIMES

A total of 68 worm and 68 clam samples was received on 6/15/94 in good condition. Samples were logged into Battelle's log-in system, frozen to -80°C and subsequently freeze dried within approximately 7 days of sample receipt. Samples were analyzed within 180 days of collection. Worms and clams were digested in two separate batches. The following table summarizes the analysis dates:

Task	Clams	Worms
Sample Digestion	8/9/94	9/9/94
ICP-MS	9/15/94	10/6/94
CVAA-Hg	8/17-8/24/94	8/17-8/24/94

QA/QC SUMMARY METALS (continued)

DETECTION LIMITS Four aliquots of a background clam tissue were analyzed as four separate replicates. The standard deviation of these results were multiplied by 4.541 to determine a method detection limits (MDL). Target detection limits were exceeded for all metals except Ag, Cd and Hg.

METHOD BLANKS One procedural blank was analyzed per 20 samples. No metals were detected in the blanks above the MDLs.

MATRIX SPIKES One sample was spiked with all metals at a frequency of 1 per 20 samples. All recoveries were within the QC limits of 75% -125% with the exception of Ag in one spiked worm sample and Zn in three of the four spiked worm samples. Zn was spiked at a level near the level found in the native samples and, in one case, Zn was spiked at a level below that detected in the native sample and no recovery was calculated.

REPLICATES One sample was analyzed in triplicate at a frequency of 1 per 20 samples. Precision for triplicate analyses is reported by calculating the relative standard deviation (RSD) between the replicate results. Only the RSDs for Zn in one of the four replicated worm analyses exceeded the QC limits of ±20%. RSDs for the rest of the metals were within the QC limits.

SRMs Standard Reference Material (SRM), 1566a (Oyster tissue from the National Institute of Standards and Technology, NIST), was analyzed for all metals. Results for all metals were within ±20 % of mean certified value with the exception of Cr and Ni. Cr values were below the lower QC limit in two of the five SRMs analyzed with the clams and for three of the four SRMs analyzed with the worms. The SRM certified value for Cr (1.43 µg/g) is close to the detection limit (1.46 µg/g). Ni was also recovered below or above the control limits in some samples.

REFERENCES

Bloom, N. S., and E.A. Crecelius. 1983. "Determination of Mercury in Seawater at Sub-Nanogram per Liter Levels." *Mar. Chem.* 14:49-59.

EPA (U.S. Environmental Protection Agency). 1991 Methods for the Determination of Metals in Environmental Samples. EPA-600/4-91-010. Environmental Services Division, Monitoring Management Branch, Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Chlorinated Pesticides/PCB Congeners

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Worm and Clam Tissue

QA/QC DATA QUALITY OBJECTIVES

Reference Method	Surrogate Recovery	Spike Recovery	Relative Precision	Detection Limit
GC/ECD	30-150%	50-120%	≤30%	0.4 ng/g wet wt.

SAMPLE CUSTODY A total of 68 worm and 68 clam samples was received on 6/15/94 in good condition. Samples were logged into Battelle's log-in system and stored frozen until extraction.

METHOD Tissues were homogenized wet using a stainless steel blade. An aliquot of tissue sample was extracted with methylene chloride using the roller technique under ambient conditions following a procedure which is based on methods used by the National Oceanic and Atmospheric Administration for its Status and Trends Program (Krahn et al. 1988). Samples were then cleaned using silica/alumina (5% deactivated) chromatography followed by HPLC cleanup (Krahn et al. 1988). Extracts were analyzed for 15 chlorinated pesticides and 22 PCB congeners using gas chromatography/electron capture detection (GC/ECD) following a procedure based on EPA Method 8080 (EPA 1986). The column used was a J&W DB-17 and the confirmatory column was a DB-1701, both capillary columns (30m x 0.25mm I.D.). All detections were quantitatively confirmed on the second column.

HOLDING TIMES Samples were extracted in seven batches. All extracts were analyzed by GC/ECD. The following summarizes the extraction and analysis dates:

Batch	Species	Extraction	Analysis
1	*M. nasuta*	7/28/94	9/9-9/12/94
2	*M. nasuta*	8/3/94	9/13-9/15/94
3	*M. nasuta*	8/17/94	9/23-9/25/94
4	*N. virens*	8/19/95	9/26-9/30/94
5	*N. virens*	8/26/94	9/8-9/11/94
6	*N. virens*	9/6/94	9/17-9/19/94
7	*M. nasuta/N. virens*	9/26/94	9/15-9/17-94
8	*M. nasuta* MDL study	10/10/94	10/25/94

DETECTION LIMITS Target detection limits of 0.4 ng/g wet weight were met for all pesticides and PCB congeners, with the exception of dieldrin, PCB 8 and PCB 18, and for the samples that were analyzed in triplicate. These elevated detection limits for the replicates were due to the limited amount of tissue available resulting in smaller aliquots used for extraction. Method detection limits (MDLs) reported were determined by multiplying the standard deviation of seven spiked replicates of clam tissue by the Student's t value (99 percentile). Actual pesticide MDLs ranged from approximately 0.1 to 1.1 ng/g wet weight and PCB congener MDLs ranged from approximately 0.1 to 0.9 ng/g wet weight, depending on the compound and the sample weight extracted. MDLs were reported corrected for individual sample wet weight extracted.

Method detection limit verification was performed by analyzing four replicates of a spiked clam sample and multiplying the standard deviation of the results by 3.5. All detection limits calculated in this way were below the target detection limit of 0.4 ng/g wet weight with the exception of 4,4'-DDD which had a DL of 0.467 ng/g.

METHOD BLANKS

One method blank was extracted with each extraction batch. No pesticides or PCBs were detected in any of the method blanks.

SURROGATES

Two compounds, PCB congeners 103 and 198, were added to all samples prior to extraction to assess the efficiency of the analysis. Sample surrogate recoveries were all within the QC guidelines of 30% - 150%, with the exception of one sample in Batch 3 and two samples in Batch 4. All of these incidents involved a high recovery of PCB 198. This was most likely due to matrix interferences with the internal Standard octachloronaphthalene (OCN) which is used to quantify the recovery of surrogate PCB 198. Since no sample data are corrected for the OCN, sample results should not be affected. One sample had low surrogate recoveries for both PCB 103 and 198. This sample was re-extracted once due to surrogate recoveries. Since the recoveries in the reextraction also exceeded control limits, the problem was determined to be matrix interferences and no additional extractions were performed. Sample results were quantified using the surrogate internal standard method.

MATRIX SPIKES

Ten out of the 15 pesticides and 5 of the 22 PCB congeners analyzed were spiked into one sample per extraction batch. Matrix spike recoveries were within the control limit range of 50-120% for all Pesticides and PCBs in Batches 1, 2, 3, 6 and 7 with the exception of PCB 138 in Batch six and three pesticides and 2 PCBs in Batch seven. In all cases, the recoveries were high and are most likely due to matrix interferences. Recoveries for the majority of pesticides and PCBs in Batches four and five exceeded control limits due to high native levels compared with the levels spiked. In most cases, the spiked concentrations were 2 to 10 times lower than the concentrations detected in the samples.

REPLICATES

One sample from each extraction batch was analyzed in triplicate. Precision was measured by calculating the relative standard deviation (RSD) between the replicate results. RSDs for all detectable values were below the target precision goal of ≤30% in Batches 1, 2, 3, 4 and 7. The RSD for Endosulfan Sulfate in Batch 5 was high due to comparison of very low concentrations, less than 1 ng/g in the replicates. RSDs for two pesticides and for two PCB congeners in Batch 6 were high due to matrix interferences associated with the first replicate sample.

SRMs Not applicable.

MISCELLANEOUS All pesticide and PCB congener results are confirmed using a second dissimilar column. RPDs between the primary and confirmation values must be less than 75% to be considered a confirmed value.

REFERENCES

Krahn, M.M., C.A. Wigren, R.W. Pearce, L.K. Moore, R.G. Bogar, W.D. MacLeod, Jr., S-L Chan, and D.W. Brown. 1988. *New HPLC Cleanup and Revised Extraction Procedures for Organic Contaminants.* NOAA Technical Memorandum NMFS F/NWC-153. National Oceanic and Atmospheric Administration, National Marine Fisheries, Seattle, Washington.

EPA (U.S. Environmental Protection Agency). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* SW-846. U.S. Document No. 955-001-00000, U.S. Environmental Protection Agency, Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Polynuclear Aromatic Hydrocarbons (PAH) and 1,4-Dichlorobenzene

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Clam and Worm Tissue

QA/QC DATA QUALITY OBJECTIVES

Reference Method	MS Recovery	Surrogate Recovery	SRM Accuracy	Relative Precision	Detection Limit (wet wt)
GC/MS/SIM	50-120%	30-150%	≤30%	≤30%	4 ng/g

SAMPLE CUSTODY A total of 68 worm and 68 clam samples was received on 6/15/94 in good condition. Samples were logged into Battelle's log-in system and stored frozen until extraction.

METHOD Tissue samples were extracted with methylene chloride using a roller under ambient conditions following a procedure which is based on methods used by the National Oceanic and Atmospheric Administration for its Status and Trends Program (Krahn et al. 1988). Samples were then cleaned using silica/alumina (5% deactivated) chromatography followed by HPLC cleanup.

Extracts were quantified using gas chromatography/mass spectrometry (GC/MS) in the selected ion mode (SIM) following a procedure based on EPA Method 8270 (EPA 1986).

HOLDING TIMES Samples were extracted in seven batches. All extracts were analyzed by GC/MS/SIM. The following summarizes the extraction and analysis dates:

Batch	Species	Extraction	Analysis
1	*M. nasuta*	7/28/94	9/9-9/12/94
2	*M. nasuta*	8/3/94	9/13-9/15/94
3	*M. nasuta*	8/17/94	9/23-9/25/94
4	*N. virens*	8/19/95	9/26-9/30/94
5	*N. virens*	8/26/94	9/8-9/11/94
6	*N. virens*	9/6/94	9/17-9/19/94
7	*M. nasuta/N. virens*	9/26/94	9/15-9/17-94
8	*M. nasuta* MDL study	10/10/94	10/25/94

DETECTION LIMITS Target detection limits of 4 ng/g wet weight were met for all PAH compounds except for fluoranthene and pyrene, which had method detection limits (MDL) between 4 and 6 ng/g wet weight. MDLs were determined by multiplying the standard deviation of seven spiked replicates of a background clam sample by the Student's t value (99 percentile). These MDLs were based on a wet weight of 20 g of tissue sample.

QA/QC SUMMARY/PAHs (continued)

Aliquots of samples that were analyzed in triplicate, used for spiking, or were re-extracted, were generally less than 20 g due to limited quantities of tissue available. Because MDLs reported are corrected for sample weight, the MDLs reported for these samples appear elevated and in some cases may exceed the target detection limit.

In addition a method detection limit verification study was performed, which consisted of analyzing four spiked aliquots of a background clam sample received with this project. The standard deviation of the results of these replicate analyses was multiplied by 3.5. Detection limits calculated in this way were all less than the target detection limit of 4 ng/g wet wt.

METHOD BLANKS

One method blank was extracted with each extraction batch. Benz[a]anthracene was detected in blanks from all batches and benzo[b]fluoranthene was detected in the blank from Batch 3. Two method blanks were analyzed with Batch 7 and in addition to benz[a]anthracene, three other compounds were detected in at least one of the two blanks; naphthalene, benzo[a]pyrene and indeno(123-cd)pyrene. All blank levels were less than three times the target MDL of 4 ng/g wet wt. Sample values that were less than five times the value of the method blank associated with that sample were flagged with a "B."

SURROGATES

Five isotopically labeled compounds were added prior to extraction to assess the efficiency of the method. These were d8-naphthalene, d10-acenaphthene, d12-chrysene, d14-dibenz[a,h]anthracene and d4-1,4 dichlorobenzene. Recoveries of all surrogates were within the quality control limits of 30% -150% with the exception of low recoveries for d4-1,4 dichlorobenzene in one sample from Batch 1 and Batch 4 and two samples in Batch seven. In addition, d8-naphthalene recovery was low in two samples in Batch seven.

MATRIX SPIKES

One sample from each batch was spiked with all PAH compounds. Matrix spike recoveries were generally, within QC limits of 50% -120%, with some exceptions. The recoveries for benzo(b)- and benzo[k]fluoranthene were variable due to the poor resolution of these two compounds. Spike recoveries quantified as the sum of these two compounds were within QC limits. Spike recoveries for a number of PAH compounds in Batches 4 and 7 were out of control due to high native levels, relative to the levels spiked. Spike concentrations were from 2 to 20 times lower than native concentrations. Recoveries for a number of compounds in Batches 4 and 6 were slightly above the upper control limit. These recoveries were all between 120% and 140%.

REPLICATES

One sample from each batch was extracted and analyzed in triplicate. Precision was measured by calculating the relative standard deviation (RSD) between the replicate results. All RSDs were within ±30%.

SRMs

Not applicable.

MISCELLANEOUS

Some of the compounds are flagged to indicate that the ion ratio for that compound was outside of the QC range. This is due primarily to low levels of the compound of interest. Because the confirmation ion is present at only a fraction of the level of the parent ion, when the native level of the compound is low, the amount of error in the concentration measurement of the confirmation ion goes up. The compound is actually quantified from the parent ion only, so most likely this will not affect the quality of the data. For sample values that are relatively high (>5 times the MDL) it may be an indication of some sort of interference.

REFERENCES

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TABLE F.1. Metals in Tissue of *M. nasuta* (Wet weight)

Sediment Treatment	Replicate	Batch	% Dry Weight	*M. nasuta* Metals (wet weight µg/g) Ag ICP/MS	As ICP/MS	Cd ICP/MS	Cr ICP/MS	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn ICP/MS
COMP EC-A	1	1	14.54%	0.042	2.734	0.041	0.816	3.272	0.020	0.787	1.992	12.912
COMP EC-A	2	1	14.35%	0.035	2.913	0.033	0.653	2.483	0.016	0.654	1.636	14.207
COMP EC-A	3-1	1	15.09%	0.037	2.882	0.039	0.703	3.169	0.020	0.724	1.750	12.238
COMP EC-A	3-2	1	15.09%	0.037	2.852	0.046	0.652	3.109	0.016	0.673	1.462	12.359
COMP EC-A	3-3	1	15.09%	0.037	3.169	0.040	0.622	2.837	0.016	0.604	1.440	12.208
COMP EC-A	4	1	13.82%	0.035	2.515	0.034	0.478	2.598	0.019	0.598	1.247	11.996
COMP EC-A	5	1	14.77%	0.044	2.865	0.059	0.752	2.939	0.019	0.867	2.186	14.563
COMP EC-B	1	1	14.06%	0.026	2.770	0.031	0.290	2.236	0.013	0.370	1.211	10.264
COMP EC-B	2	1	14.58%	0.025	2.829	0.047	0.418	2.741	0.014	0.652	1.720	12.553
COMP EC-B	3	1	14.72%	0.025	2.753	0.045	0.343	2.134	0.016	0.400	1.128	11.055
COMP EC-B	4	1	14.06%	0.023 U	3.093	0.042	0.368	2.264	0.014	0.427	1.212	11.853
COMP EC-B	5	1	13.37%	0.028	3.035	0.040	0.394	2.580	0.014	0.580	1.511	10.602
R-CLIS	1	1	15.08%	0.028	2.956	0.019	0.360	2.368	0.016	0.682	0.841	10.873
R-CLIS	2	2	14.45%	0.031	2.659	0.027	0.523	2.124	0.017	0.542	1.046	9.783
R-CLIS	3	2	14.15%	0.031	2.887	0.020	0.466	1.967	0.015	0.460	0.831	10.570
R-CLIS	4	1	14.06%	0.029	2.840	0.018	0.433	2.306	0.013	0.606	0.725	11.009
R-CLIS	5-1	1	14.57%	0.032	2.491	0.032	0.490	2.783	0.015	0.590	0.816	13.710
R-CLIS	5-2	1	14.57%	0.029	2.681	0.038	0.460	2.827	0.016	0.608	0.798	14.002
R-CLIS	5-3	1	14.57%	0.028	2.448	0.035	0.471	2.695	0.016	0.576	0.771	13.506
R-MUD	1	1	14.08%	0.031	2.126	0.028	0.404	1.478	0.014	0.322	0.282 U[(a)]	11.264
R-MUD	2	1	18.71%	0.058	4.397	0.060	0.400	2.395	0.023	0.608	0.374 U	17.194
R-MUD	3	1	13.02%	0.040	2.747	0.023	0.365	1.393	0.014	0.292	0.261 U	12.148
R-MUD	4	1	11.83%	0.040	2.449	0.027	0.285	1.125	0.012	0.299	0.237 U	9.168
R-MUD	5	1	20.96%	0.035 U	4.066	0.039	0.585	2.494	0.026	0.486	0.419 U	15.636
C-SB	1	1	12.86%	0.024	3.164	0.022	0.404	1.852	0.011	0.579	0.257 U	12.011
C-SB	2	1	12.45%	0.025	2.951	0.020	0.341	1.930	0.012	0.468	0.249 U	8.827
C-SB	3	1	13.90%	0.023 U	3.058	0.030	0.421	1.738	0.012	0.680	0.278 U	8.145
C-SB	4	1	13.16%	0.022 U	2.948	0.019	0.404	1.645	0.012	0.513	0.263 U	9.291
C-SB	5	1	13.21%	0.023	2.919	0.032	0.432	1.995	0.013	0.633	0.264 U	11.374

TABLE F.1. (contd)

Sediment Treatment	Replicate	Batch	% Dry Weight	M. nasuta Metals (wet weight µg/g) Ag ICP/MS	As ICP/MS	Cd ICP/MS	Cr ICP/MS	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn ICP/MS
M. nasuta Background	1	1	15.16%	0.025 U	2.486	0.019	0.249	1.774	0.011	0.303	0.303 U	10.218
M. nasuta Background	2	1	14.86%	0.025 U	2.690	0.034	0.337	1.516	0.012	0.355	0.297 U	11.219
M. nasuta Background	3-1	1	14.87%	0.025 U	2.379	0.021	0.232	1.740	0.011	0.311	0.298 U	10.558
M. nasuta Background	3-2	1	14.87%	0.025 U	2.543	0.025	0.256	1.725	0.013	0.311	0.298 U	10.602
M. nasuta Background	3-3	1	14.87%	0.025 U	2.483	0.026	0.238	1.784	0.011	0.338	0.298 U	10.483

(a) U Undetected at or above given concentration

TABLE F.2. Metals in Tissue of *M. nasuta* (Dry Weight)

				M. nasuta Metals (dry weight µg/g)									
Sed Code ID	Replicate	Batch	% Dry Mass	Ag ICP/MS	As ICP/MS	Cd ICP/MS	Cr ICP/MS	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn ICP/MS
COMP EC-A	1	1	14.54%	0.291	18.8	0.284	5.61	22.5	0.135	5.41	13.7	88.8
COMP EC-A	2	1	14.35%	0.243	20.3	0.231	4.55	17.3	0.109	4.56	11.4	99.0
COMP EC-A	3-1	1	15.09%	0.246	19.1	0.256	4.66	21.0	0.130	4.80	11.6	81.1
COMP EC-A	3-2	1	15.09%	0.242	18.9	0.305	4.32	20.6	0.105	4.46	9.69	81.9
COMP EC-A	3-3	1	15.09%	0.245	21.0	0.267	4.12	18.8	0.105	4.00	9.54	80.9
COMP EC-A	4	1	13.82%	0.250	18.2	0.248	3.46	18.8	0.137	4.33	9.02	86.8
COMP EC-A	5	1	14.77%	0.301	19.4	0.402	5.09	19.9	0.130	5.87	14.8	98.6
COMP EC-B	1	1	14.06%	0.182	19.7	0.224	2.06	15.9	0.090	2.63	8.61	73.0
COMP EC-B	2	1	14.58%	0.173	19.4	0.322	2.87	18.8	0.098	4.47	11.8	86.1
COMP EC-B	3	1	14.72%	0.172	18.7	0.307	2.33	14.5	0.110	2.72	7.66	75.1
COMP EC-B	4	1	14.06%	0.166 U	22.0	0.299	2.62	16.1	0.100	3.04	8.62	84.3
COMP EC-B	5	1	13.37%	0.212	22.7	0.302	2.95	19.3	0.104	4.34	11.3	79.3
R-CLIS	1	1	15.08%	0.183	19.6	0.126	2.39	15.7	0.103	4.52	5.58	72.1
R-CLIS	2	2	14.45%	0.212	18.4	0.185	3.62	14.7	0.117	3.75	7.24	67.7
R-CLIS	3	2	14.15%	0.216	20.4	0.138	3.29	13.9	0.105	3.25	5.87	74.7
R-CLIS	4	1	14.06%	0.203	20.2	0.130	3.08	16.4	0.096	4.31	5.16	78.3
R-CLIS	5-1	1	14.57%	0.219	17.1	0.217	3.36	19.1	0.103	4.05	5.60	94.1
R-CLIS	5-2	1	14.57%	0.196	18.4	0.259	3.16	19.4	0.108	4.17	5.48	96.1
R-CLIS	5-3	1	14.57%	0.193	16.8	0.238	3.23	18.5	0.111	3.95	5.29	92.7
R-MUD	1	1	14.08%	0.221	15.1	0.196	2.87	10.5	0.099	2.29	2.00 U[a]	80.0
R-MUD	2	1	18.71%	0.309	23.5	0.323	2.14	12.8	0.124	3.25	2.00 U	91.9
R-MUD	3	1	13.02%	0.307	21.1	0.180	2.80	10.7	0.111	2.24	2.00 U	93.3
R-MUD	4	1	11.83%	0.336	20.7	0.227	2.41	9.51	0.103	2.53	2.00 U	77.5
R-MUD	5	1	20.96%	0.166 U	19.4	0.186	2.79	11.9	0.126	2.32	2.00 U	74.6
C-SB	1	1	12.86%	0.184	24.6	0.174	3.14	14.4	0.082	4.50	2.00 U	93.4
C-SB	2	1	12.45%	0.203	23.7	0.158	2.74	15.5	0.097	3.76	2.00 U	70.9
C-SB	3	1	13.90%	0.166 U	22.0	0.214	3.03	12.5	0.083	4.89	2.00 U	58.6
C-SB	4	1	13.16%	0.166 U	22.4	0.146	3.07	12.5	0.093	3.90	2.00 U	70.6
C-SB	5	1	13.21%	0.171	22.1	0.242	3.27	15.1	0.102	4.79	2.00 U	86.1

TABLE F.2. (contd)

Sed Code ID	Replicate	Batch	% Dry Mass	M. nasuta Metals (dry weight µg/g) Ag ICP/MS	As ICP/MS	Cd ICP/MS	Cr ICP/MS	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn ICP/MS
M. nasuta Background	1	1	15.16%	0.166 U	16.4	0.125	1.64	11.7	0.075	2.00	2.00 U	67.4
M. nasuta Background	2	1	14.86%	0.166 U	18.1	0.229	2.27	10.2	0.079	2.39	2.00 U	75.5
M. nasuta Background	3-1	1	14.87%	0.166 U	16.0	0.140	1.56	11.7	0.071	2.09	2.00 U	71.0
M. nasuta Background	3-2	1	14.87%	0.166 U	17.1	0.165	1.72	11.6	0.085	2.09	2.00 U	71.3
M. nasuta Background	3-3	1	14.87%	0.166 U	16.7	0.175	1.60	12.0	0.073	2.27	2.00 U	70.5

(a) U Undetected at or above given concentration

TABLE F.3. Quality Control Summary for Metals in Tissue of *M. nasuta*

Sed Code ID	Replicate	Batch	*M. nasuta* Metals (µg/g dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Method Blanks											
Blank-1		1	0.166 U[a]	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Blank-2		1	0.166 U	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Blank-3		1	0.166 U	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Blank-4		1	0.166 U	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Blank-5		1	0.166 U	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Matrix Spikes											
COMP EC-A	3	1	0.244	19.7	0.276	4.37	20.1	0.113	4.42	10.3	81.3
COMP EC-A, MS	3		1.95	72.7	4.21	14.2	73.9	1.22	14.5	14.8	163
Concentration Recovered			1.71	53.0	3.93	9.83	53.8	1.11	10.1	4.52	81.7
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	100
Percent Recovery			82%	102%	94%	95%	103%	106%	97%	108%	82%
COMP HU-C	5	1	0.569	20.9	0.37	8.01	23.5	0.242	5.28	10.4	88.2
COMP HU-C, MS	5	1	2.15	74.0	3.95	17.9	76.3	1.21	15.9	14.5	175
Concentration Recovered			1.58	53.1	3.58	9.89	52.8	0.968	10.6	4.14	86.8
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	100
Percent Recovery			76%	102%	86%	95%	101%	93%	102%	99%	87%
R-CLIS	5	1	0.203	17.4	0.238	3.25	19.0	0.107	4.06	5.46	94.3
R-CLIS, MS	5	1	1.91	74.3	4.26	13.9	74.1	1.22	14.8	10.2	190
Concentration Recovered			1.71	56.9	4.02	10.65	55.1	1.11	10.7	4.74	95.7
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	100
Percent Recovery			82%	109%	96%	102%	106%	107%	103%	114%	96%
M. nasuta Background	3	1	0.166 U	16.6	0.160	1.63	11.8	0.076	2.15	2.00 U	70.9
M. nasuta Background, MS	3	1	1.78	71.7	3.90	10.9	64.7	1.12	12.6	4.75	163
Concentration Recovered			1.78	55.1	3.74	9.27	52.9	1.04	10.5	4.75	92.1
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	100
Percent Recovery			86%	106%	90%	89%	102%	100%	100%	114%	92%

TABLE F.3. (contd)

Sed Code ID	Replicate	Batch	*M. nasuta* Metals (μg/g dry weight)								
			Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Standard Reference Material											
Certified value			1.68	14.0	4.15	1.43	66.3	0.0642	2.25	0.371	830
range			±0.15	±1.2	±0.38	±0.46	±4.3	±0.0067	±0.44	±0.014	±57
SRM 1566a	1	1	1.38	13.6	4.05	1.25	62.6	0.063	1.87	0.372	762
SRM 1566a	2	1	1.41	13.6	4.08	1.23	65.4	0.063	1.61	0.368	808
SRM 1566a	3	1	1.35	13.0	3.99	1.20	64.4	0.060	2.18	0.392	755
SRM 1566a	4	1	1.42	13.8	4.19	0.931	66.9	0.068	2.50	0.382	777
SRM 1566a	5	1	1.44	13.3	3.65	1.04	67.1	0.061	1.51	0.377	765
Percent Difference	1		18	3	2	13	6	2	17	0	8
Percent Difference	2		16	3	2	14	1	2	28 [b]	1	3
Percent Difference	3		20	7	4	16	3	7	3	6	9
Percent Difference	4		15	1	1	35 [b]	1	6	11	3	6
Percent Difference	5		14	5	12	27 [b]	1	5	33 [b]	2	8
Analytical Replicates											
COMP EC-A, Replicate 1	3	1	0.246	19.1	0.256	4.66	21.0	0.130	4.80	11.6	81.1
COMP EC-A, Replicate 2	3	1	0.242	18.9	0.305	4.32	20.6	0.105	4.46	9.69	81.9
COMP EC-A, Replicate 3	3	1	0.245	21.0	0.267	4.12	18.8	0.105	4.00	9.54	80.9
RSD			1%	6%	9%	6%	6%	13%	9%	11%	1%
COMP HU-C, Replicate 1	5	1	0.565	20.5	0.396	7.80	24.1	0.242	5.28	10.6	86.3
COMP HU-C, Replicate 2	5	1	0.629	21.8	0.380	8.62	23.4	0.245	5.27	10.7	88.5
COMP HU-C, Replicate 3	5	1	0.514	20.3	0.335	7.60	22.9	0.238	5.28	9.78	89.9
RSD			10%	4%	9%	7%	3%	1%	0%	5%	2%

TABLE F.3. (contd)

Sed Code ID	Replicate	Batch	*M. nasuta* Metals (µg/g dry weight)								
			Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
R-CLIS, Replicate 1	5	1	0.219	17.1	0.217	3.36	19.1	0.103	4.05	5.60	94.1
R-CLIS, Replicate 2	5	1	0.196	18.4	0.259	3.16	19.4	0.108	4.17	5.48	96.1
R-CLIS, Replicate 3	5	1	0.193	16.8	0.238	3.23	18.5	0.111	3.95	5.29	92.7
RSD			7%	5%	9%	3%	2%	4%	3%	3%	2%
M. nasuta Background, Rep 1	3	1	0.166 U	16.0	0.140	1.56	11.7	0.071	2.09	2.00 U	71.0
M. nasuta Background, Rep 2	3	1	0.166 U	17.1	0.165	1.72	11.6	0.085	2.09	2.00 U	71.3
M. nasuta Background, Rep 3	3	1	0.166 U	16.7	0.175	1.60	12.0	0.073	2.27	2.00 U	70.5
RSD			NA (c)	3%	11%	5%	2%	10%	5%	NA	1%

(a) U Undetected at or above given concentration.
(b) Outside quality control criteria (± 20%) for SRMs.
(c) NA Not applicable.

TABLE F.4. MDL Verification Study for Metals in *M. nasuta* Tissue Chemistry

Sed Code ID	Replicate	Batch	*M. nasuta* Metals (µg/g dry weight)								
			Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
COMP SB-B, Replicate 1	3	1	0.462	22.5	0.188	4.32	20.3	0.122	3.86	6.02	90.1
COMP SB-B, Replicate 2	3	1	0.491	22.4	0.242	4.25	21.5	0.122	4.00	6.27	93.4
COMP SB-B, Replicate 3	3	1	0.392	24.5	0.212	3.41	17.5	0.126	3.19	5.00	88.1
COMP SB-B, Replicate 4	3	1	0.494	23.1	0.201	4.10	21.8	0.126	3.94	6.08	91.3
Mean			0.460	23.1	0.211	4.02	20.3	0.124	3.75	5.84	90.7
Standard Deviation			0.0474	0.967	0.0230	0.417	1.96	0.00231	0.376	0.572	2.22
Method Detection Limit (MDL)[a]			0.215	4.39	0.105	1.89	8.90	0.0105	1.71	2.60	10.1

(a) MDL calculated by multiplying the standard deviation times Students-t for four replicates (4.541).

TABLE F.5. Pesticides and PCB Congeners (Wet Weight) in Tissue of *M. nasuta*

Treatment	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A
Replicate	1	2	3	4	5
Batch	3	2	3	3	3
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.54	14.35	15.09	13.82	14.77
Heptachlor	0.18 U[(a)]	0.18 U	0.18 U	0.18 U	0.19 U
Aldrin	1.24	1.17	1.40	1.42	1.47
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.25 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.17 U	0.18 U	0.18 U
a-Chlordane	1.02	1.13	1.32	1.32	1.48
Trans Nonachlor	0.14 U	0.14 U	0.43	0.47	0.55
4,4'-DDE	8.82	9.85	10.4	11.2	11.4
Dieldrin	1.37	1.71	1.78	1.72	1.89
2,4'-DDD	1.44	1.20	2.10	1.80	2.08
2,4'-DDT	0.18 U	0.18 U	0.17 U	0.18 U	0.18 U
4,4'-DDD	4.25	4.20	5.36	5.33	5.62
Endosulfan II	0.18 U	0.18 U	0.17 U	0.18 U	0.18 U
4,4'-DDT	0.68	2.17	2.43	2.49	2.83
Endosulfan Sulfate	0.18 U	0.18 U	0.17 U	0.18 U	0.18 U
PCB 8	0.40 U	0.40 U	1.35	1.62	1.79
PCB 18	2.90	3.73	3.87	4.09	4.15
PCB 28	5.44	6.85	6.11	6.89	7.05
PCB 52	7.10	8.21	7.97	8.27	8.33
PCB 49	4.82	5.81	5.66	5.68	5.74
PCB 44	1.58	2.68	2.72	2.86	2.55
PCB 66	7.80	8.85	8.90	9.09	9.24
PCB 101	4.49	4.65	4.92	4.88	4.98
PCB 87	1.91	2.40	2.15	2.22	2.23
PCB 118	2.85	3.58	2.87	2.81	2.67
PCB 184	0.23 U	0.23 U	0.23 U	0.23 U	0.24 U
PCB 153	1.62	2.01	1.67	1.70	1.60
PCB 105	0.11 U	1.48	0.11 U	0.11 U	0.11 U
PCB 138	1.37	1.62	1.41	1.50	1.40
PCB 187	0.48	0.56	0.50	0.52	0.51
PCB 183	0.23 U	0.32	0.23 U	0.24	0.24 U
PCB 128	0.29	0.40	0.26	0.29	0.32
PCB 180	2.59	2.69	2.54	2.68	2.62
PCB 170	0.47	0.34	0.40	0.40	0.33
PCB 195	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
PCB 206	0.17	0.16	0.11 U	0.11 U	0.11 U
PCB 209	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
Surrogate Recoveries (%)					
PCB 103 (SIS)	49	77	64	75	82
PCB 198 (SIS)	80	62	106	129	146

TABLE F.5. (contd)

Treatment	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B
Replicate	1	2	3	4
Batch	2	1	1	3
Units	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.06	14.58	14.72	14.06
Heptachlor	0.18 U	1.80 U	0.19 U	0.19 U
Aldrin	2.28	1.02	2.63	1.16
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.18 U	0.18 U
a-Chlordane	2.58	3.54	3.49	2.75
Trans Nonachlor	0.91	1.52	1.57	1.14
4,4'-DDE	3.14	4.76	4.60	4.32
Dieldrin	1.55	1.85	1.61	1.69
2,4'-DDD	1.73	1.91	1.85	1.75
2,4'-DDT	0.18 U	0.18 U	0.18 U	0.18 U
4,4'-DDD	5.12	5.89	5.66	6.09
Endosulfan II	0.18 U	0.18 U	0.18 U	0.22
4,4'-DDT	1.60	5.58	4.75	1.88
Endosulfan Sulfate	0.18 U	0.18 U	0.18 U	0.18 U
PCB 8	0.40 U	0.40 U	0.41 U	2.45
PCB 18	5.65	6.43	5.85	5.35
PCB 28	7.05	7.72	7.81	7.20
PCB 52	6.51	7.70	7.01	7.02
PCB 49	4.35	5.45	5.09	4.64
PCB 44	1.95	3.50	3.62	2.36
PCB 66	6.22	7.68	7.23	6.79
PCB 101	3.19	4.04	3.63	3.59
PCB 87	1.09	1.64	1.66	1.58
PCB 118	2.52	3.11	2.78	1.99
PCB 184	0.23 U	0.23 U	0.24 U	0.24 U
PCB 153	1.43	2.10	1.68	1.21
PCB 105	0.99	1.35	1.15	0.11 U
PCB 138	1.19	1.72	1.47	1.07
PCB 187	0.48	2.85	3.08	0.40
PCB 183	0.23 U	0.23 U	0.24 U	0.24 U
PCB 128	0.32	0.43	0.36	0.25
PCB 180	0.64	0.93	0.76	0.76
PCB 170	0.16 U	0.35	0.28	0.33
PCB 195	0.10 U	0.10 U	0.10 U	0.10 U
PCB 206	0.13	0.11 U	0.16	0.20
PCB 209	0.09 U	0.09 U	0.09 U	0.09 U
Surrogate Recoveries (%)				
PCB 103 (SIS)	86	76	73	74
PCB 198 (SIS)	70	63	72	124

TABLE F.5. (contd)

Treatment	COMP EC-B	COMP EC-B, Dup	COMP EC-B, Trip
Replicate	5	5	5
Batch	1	1	1
Units	ng/g	ng/g	ng/g
Percent Dry Weight	13.4	13.37	13.37
Heptachlor	0.37 U	0.37 U	0.37 U
Aldrin	1.15	1.23	1.21
Heptachlor Epoxide	0.27 U	0.27 U	0.26 U
2,4'-DDE	0.52 U	0.52 U	0.52 U
Endosulfan I	0.36 U	0.36 U	0.36 U
a-Chlordane	2.58	2.98	2.92
Trans Nonachlor	0.75	1.06	1.01
4,4'-DDE	3.65	3.82	3.91
Dieldrin	1.77	1.95	1.92
2,4'-DDD	1.62	1.50	1.59
2,4'-DDT	0.36 U	0.36 U	0.35 U
4,4'-DDD	5.35	5.63	5.96
Endosulfan II	0.36 U	0.36 U	0.36 U
4,4'-DDT	1.86	2.54	3.15
Endosulfan Sulfate	0.36 U	0.36 U	0.36 U
PCB 8	0.82 U	0.82 U	0.82 U
PCB 18	6.73	6.77	6.82
PCB 28	7.35	7.93	7.85
PCB 52	7.26	7.29	7.44
PCB 49	4.78	4.89	4.99
PCB 44	2.17	2.65	2.54
PCB 66	6.75	7.12	7.26
PCB 101	3.35	3.42	3.73
PCB 87	1.23	1.35	1.41
PCB 118	2.48	2.49	2.70
PCB 184	0.47 U	0.47 U	0.47 U
PCB 153	1.38	1.39	1.46
PCB 105	0.93	0.97	1.03
PCB 138	1.19	1.23	1.31
PCB 187	3.47	3.11	3.41
PCB 183	0.47 U	0.47 U	0.47 U
PCB 128	0.33	0.31 U	0.34
PCB 180	0.68	0.65	0.62
PCB 170	0.33 U	0.33 U	0.33 U
PCB 195	0.20 U	0.20 U	0.20 U
PCB 206	0.23 U	0.23 U	0.23 U
PCB 209	0.19 U	0.19 U	0.19 U
Surrogate Recoveries (%)			
PCB 103 (SIS)	67	80	74
PCB 198 (SIS)	54	74	62

TABLE F.5. (contd)

Treatment	R-MUD	R-MUD	R-MUD	R-MUD	R-MUD
Replicate	1	2	3	4	5
Batch	2	3	2	3	2
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.08	18.71	13.02	11.83	20.96
Heptachlor	0.19 U	0.19 U	0.19 U	0.19 U	0.17 U
Aldrin	0.13 U	0.73	0.13 U	0.68	0.22
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U	0.13 U	0.12 U
2,4'-DDE	0.26 U	0.26 U	0.26 U	0.37	0.24 U
Endosulfan I	0.18 U	0.18 U	0.18 U	0.18 U	0.17 U
a-Chlordane	0.10 U	0.10 U	0.10 U	0.10 U	0.09 U
Trans Nonachlor	0.15 U	0.15 U	0.15 U	0.15 U	0.13 U
4,4'-DDE	0.30	0.36	0.46	0.36	0.24
Dieldrin	0.52 U	0.52 U	0.52 U	0.52 U	0.47 U
2,4'-DDD	0.25 U	0.25 U	0.25 U	0.25 U	0.23 U
2,4'-DDT	0.18 U	0.18 U	0.18 U	0.18 U	0.16 U
4,4'-DDD	0.26 U	0.26 U	0.26 U	0.26 U	0.24 U
Endosulfan II	0.18 U	0.18 U	0.18 U	0.18 U	0.17 U
4,4'-DDT	0.41	3.51	0.15 U	1.71	0.43
Endosulfan Sulfate	0.18 U	0.18 U	0.18 U	0.18 U	0.17 U
PCB 8	0.41 U	1.76	0.41 U	1.99	0.38 U
PCB 18	0.43 U	0.43 U	0.43 U	0.43 U	0.40 U
PCB 28	0.53	0.67	0.65	0.64	0.60
PCB 52	0.68	0.94	0.78	0.84	0.83
PCB 49	0.24 U	0.24	0.24 U	0.25	0.22 U
PCB 44	0.17 U	0.17 U	0.17 U	0.17 U	0.15 U
PCB 66	0.09 U	0.09 U	0.74	0.09 U	0.09 U
PCB 101	0.33	0.52	0.45	0.42	0.53
PCB 87	0.16 U	0.29	0.16 U	0.27	0.15 U
PCB 118	0.29 U	0.29 U	0.30	0.29 U	0.27 U
PCB 184	0.24 U	0.24 U	0.24 U	0.24 U	0.22 U
PCB 153	0.17	0.14	0.26	0.13	0.11 U
PCB 105	0.11 U	0.11 U	0.13	0.11 U	0.13
PCB 138	0.29 U	0.29 U	0.29 U	0.29 U	0.30
PCB 187	0.13 U	0.13 U	0.13 U	0.13 U	0.12 U
PCB 183	0.24 U	0.24 U	0.24 U	0.24 U	0.22 U
PCB 128	0.15 U	0.15 U	0.15 U	0.15 U	0.14 U
PCB 180	0.18 U	0.18 U	0.18 U	0.18 U	0.17 U
PCB 170	0.18	0.17 U	0.17 U	0.19	0.15 U
PCB 195	0.10 U	0.10 U	0.10 U	0.10 U	0.09 U
PCB 206	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U
PCB 209	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
Surrogate Recoveries (%)					
PCB 103 (SIS)	81	80	83	76	86
PCB 198 (SIS)	66	129	65	121	65

TABLE F.5. (contd)

Treatment	R-CLIS	R-CLIS	R-CLIS	R-CLIS	R-CLIS
Replicate	1	2	3	4	5
Batch	1	1	1	1	1
Wet Wt.	20.10	20.14	20.18	20.06	20.27
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	15.08	14.45	14.15	14.06	14.57
Heptachlor	0.19 U	0.19 U	0.19 U	0.19 U	0.18 U
Aldrin	0.13 U	0.13 U	0.13 U	0.13 U	0.12 U
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
a-Chlordane	0.10 U	0.10 U	0.10 U	0.10 U	0.09 U
Trans-nonachlor	0.15 U	0.15 U	0.15 U	0.15 U	0.14 U
4,4'-DDE	0.97	1.71	1.13	1.38	1.14
Dieldrin	0.52 U	0.59	0.52 U	0.52 U	0.51 U
2,4'-DDD	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4'-DDT	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
4,4'-DDD	0.26 U	0.29	0.26 U	0.26 U	0.26 U
Endosulfan II	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
4,4'-DDT	7.73	5.24	8.54	12.3	2.21
Endosulfan Sulfate	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
PCB 8	0.41 U	0.41 U	0.41 U	0.41 U	0.40 U
PCB 18	0.43 U	0.43 U	0.43 U	0.43 U	0.42 U
PCB 28	0.66	0.83	0.73	0.98	0.67
PCB 52	0.63	0.87	0.62	0.95	0.65
PCB 49	0.56	0.72	0.52	0.78	0.53
PCB 44	0.17 U	0.43	0.17 U	0.17 U	0.16 U
PCB 66	1.12	1.33	1.17	0.09 U	1.15
PCB 101	0.88	1.03	0.85	1.16	0.91
PCB 87	0.16 U	0.47	0.16 U	0.16 U	0.25
PCB 118	0.29 U	0.83	0.29 U	0.29 U	0.77
PCB 184	0.24 U	0.24 U	0.24 U	0.24 U	0.23 U
PCB 153	0.98	1.16	0.95	1.16	1.07
PCB 105	0.11 U	0.14	0.12	0.11 U	0.12
PCB 138	0.54	0.64	0.53	0.66	0.59
PCB 187	1.03	0.83	0.81	0.25	2.11
PCB 183	0.24 U	0.24 U	0.24 U	0.24 U	0.23 U
PCB 128	0.16	0.16	0.15 U	0.18	0.15 U
PCB 180	0.29	0.30	0.24	0.28	0.21
PCB 170	0.17 U	0.17	0.17 U	0.17 U	0.16 U
PCB 195	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
PCB 206	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB 209	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
Surrogate Recoveries (%)					
PCB 103 (SIS)	75	73	74	70	52
PCB 198 (SIS)	61	58	62	73	42

TABLE F.5. (contd)

Treatment	C-SB	C-SB, Dup	C-SB, Trip	C-SB	C-SB
Replicate	1	1	1	2	3
Batch	3	3	3	2	3
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	12.86	12.86	12.86	12.45	13.9
Heptachlor	0.36 U	0.36 U	0.37 U	0.19 U	0.18 U
Aldrin	0.25 U	0.25 U	0.25 U	0.13 U	0.12 U
Heptachlor Epoxide	0.26 U	0.26 U	0.26 U	0.13 U	0.13 U
2,4'-DDE	0.51 U	0.51 U	0.52 U	0.26 U	0.26 U
Endosulfan I	0.35 U	0.35 U	0.36 U	0.18 U	0.18 U
a-Chlordane	0.19 U	0.19 U	0.19 U	0.10 U	0.09 U
Trans Nonachlor	0.28 U	0.28 U	0.29 U	0.15 U	0.14 U
4,4'-DDE	0.81	0.37 U	0.37 U	0.36	0.52
Dieldrin	1.01 U	1.01 U	1.02 U	0.52 U	0.51 U
2,4'-DDD	0.50 U	0.50 U	0.50 U	0.25 U	0.25 U
2,4'-DDT	0.35 U	0.35 U	0.35 U	0.18 U	0.18 U
4,4'-DDD	0.51 U	0.51 U	0.52 U	0.26 U	0.26 U
Endosulfan II	0.35 U	0.35 U	0.36 U	0.18 U	0.18 U
4,4'-DDT	0.30 U	0.30 U	0.30 U	0.37	1.24
Endosulfan Sulfate	0.35 U	0.35 U	0.36 U	0.18 U	0.18 U
PCB 8	0.82	1.26	0.94	0.41 U	0.54
PCB 18	0.84 U	0.84 U	0.85 U	0.43 U	0.42 U
PCB 28	0.40 U	0.40 U	0.40 U	0.20 U	0.23
PCB 52	0.70 U	0.70 U	0.71 U	0.36 U	0.35 U
PCB 49	0.46 U	0.46 U	0.47 U	0.24 U	0.23 U
PCB 44	0.32 U	0.32 U	0.33 U	0.17 U	0.16 U
PCB 66	0.19 U	0.30	0.32	0.90 U	0.09 U
PCB 101	0.29 U	0.29 U	0.29 U	0.15 U	0.19
PCB 87	0.31 U	0.31 U	0.32 U	0.16 U	0.16 U
PCB 118	0.58 U	0.58 U	0.58 U	0.29 U	0.29 U
PCB 184	0.46 U	0.46 U	0.47 U	0.24 U	0.23 U
PCB 153	0.24 U	0.24 U	0.24 U	0.12 U	0.12 U
PCB 105	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U
PCB 138	0.57 U	0.57 U	0.57 U	0.29 U	0.28 U
PCB 187	0.25 U	0.25 U	0.25 U	0.13 U	0.12 U
PCB 183	0.46 U	0.46 U	0.47 U	0.24 U	0.23 U
PCB 128	0.30 U	0.30 U	0.31 U	0.15 U	0.15 U
PCB 180	0.36 U	0.36 U	0.37 U	0.18 U	0.18 U
PCB 170	0.33 U	0.34	0.33 U	0.17 U	0.16 U
PCB 195	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U
PCB 206	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U
PCB 209	0.19 U	0.19 U	0.19 U	0.09 U	0.09 U
Surrogate Recoveries (%)					
PCB 103 (SIS)	89	79	88	77	94
PCB 198 (SIS)	144	125	141	59	162 [(b)]

TABLE F.5. (contd)

Treatment	C-SB	C-SB	C-SB, Dup	C-SB, Trip
Replicate	4	5	5	5
Batch	2	2	2	2
Units	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.16	13.21	13.21	13.21
Heptachlor	0.19 U	0.36 U	0.37 U	0.36 U
Aldrin	0.13 U	0.25 U	0.25 U	0.25 U
Heptachlor Epoxide	0.13 U	0.26 U	0.26 U	0.26 U
2,4'-DDE	0.26 U	0.51 U	0.52 U	0.51 U
Endosulfan I	0.18 U	0.35 U	0.36 U	0.25 U
a-Chlordane	0.10 U	0.19 U	0.19 U	0.19 U
Trans Nonachlor	0.15 U	0.28 U	0.29 U	0.28 U
4,4'-DDE	0.45	0.54	0.37 U	0.36 U
Dieldrin	0.52 U	1.01 U	1.02 U	1.00 U
2,4'-DDD	0.25 U	0.50 U	0.50 U	0.49 U
2,4'-DDT	0.18 U	0.35 U	0.35 U	0.35 U
4,4'-DDD	0.26 U	0.51 U	0.52 U	0.51 U
Endosulfan II	0.18 U	0.35 U	0.36 U	0.35 U
4,4'-DDT	0.39	0.91	0.30 U	0.34
Endosulfan Sulfate	0.18 U	0.35 U	0.36 U	0.35 U
PCB 8	0.41 U	0.81 U	0.81 U	0.80 U
PCB 18	0.43 U	0.84 U	0.85 U	0.83 U
PCB 28	0.20 U	0.40 U	0.40 U	0.40 U
PCB 52	0.36 U	0.70 U	0.71 U	0.69 U
PCB 49	0.24 U	0.46 U	0.47 U	0.46 U
PCB 44	0.17 U	0.32 U	0.33 U	0.32 U
PCB 66	0.09 U	0.19 U	0.19 U	0.18 U
PCB 101	0.15 U	0.29 U	0.29 U	0.28 U
PCB 87	0.16 U	0.31 U	0.32 U	0.31 U
PCB 118	0.29 U	0.58 U	0.58 U	0.57 U
PCB 184	0.24 U	0.46 U	0.47 U	0.46 U
PCB 153	0.12 U	0.24 U	0.24 U	0.24 U
PCB 105	0.11 U	0.22 U	0.22 U	0.21 U
PCB 138	0.29 U	0.57 U	0.57 U	0.56 U
PCB 187	0.13 U	0.25 U	0.25 U	0.24 U
PCB 183	0.24 U	0.46 U	0.47 U	0.46 U
PCB 128	0.15 U	0.30 U	0.31 U	0.30 U
PCB 180	0.18 U	0.36 U	0.37 U	0.36 U
PCB 170	0.17 U	0.33 U	0.45	0.32 U
PCB 195	0.10 U	0.20 U	0.20 U	0.19 U
PCB 206	0.11 U	0.22 U	0.22 U	0.22 U
PCB 209	0.09 U	0.19 U	0.19 U	0.18 U
Surrogate Recoveries (%)				
PCB 103 (SIS)	84	82	76	75
PCB 198 (SIS)	66	61	57	58

TABLE F.5. (contd)

Treatment	*M. nasuta* Background	*M. nasuta* Background	*M. nasuta* Background
Replicate	1	2	3
Batch	7	7	7
Units	ng/g	ng/g	ng/g
Percent Dry Weight	15.16	14.86	14.87
Heptachlor	0.18 U	0.19 U	0.19 U
Aldrin	0.12 U	0.13 U	0.13 U
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.18 U
a-Chlordane	0.09 U	0.10 U	0.10 U
Trans Nonachlor	0.14 U	0.15 U	0.15 U
4,4'-DDE	0.58	0.19 U	0.19 U
Dieldrin	0.51 U	0.52 U	0.52 U
2,4'-DDD	0.25 U	0.25 U	0.25 U
2,4'-DDT	0.18 U	0.18 U	0.18 U
4,4'-DDD	0.26 U	0.26 U	0.26 U
Endosulfan II	0.18 U	0.18 U	0.18 U
4,4'-DDT	0.15 U	0.15 U	0.15 U
Endosulfan Sulfate	0.55	0.47	0.39
PCB 8	0.40 U	0.41 U	0.41 U
PCB 18	0.42 U	0.43 U	0.43 U
PCB 28	0.50	0.77	0.20 U
PCB 52	0.35 U	0.36 U	0.36 U
PCB 49	0.23 U	0.24 U	0.24 U
PCB 44	0.16 U	0.17 U	0.17 U
PCB 66	0.09 U	0.09 U	0.09 U
PCB 101	0.14 U	0.15 U	0.15 U
PCB 87	0.16 U	0.16 U	0.16 U
PCB 118	0.29 U	0.29 U	0.29 U
PCB 184	0.23 U	0.24 U	0.24 U
PCB 153	0.12 U	0.12 U	0.12 U
PCB 105	0.11 U	0.11 U	0.11 U
PCB 138	0.28 U	0.29 U	0.29 U
PCB 187	0.12 U	0.13 U	0.13 U
PCB 183	0.23 U	0.24 U	0.24 U
PCB 128	0.15 U	0.15 U	0.15 U
PCB 180	0.18 U	0.18 U	0.18 U
PCB 170	0.16 U	0.17 U	0.17 U
PCB 195	0.10 U	0.10 U	0.10 U
PCB 206	0.11 U	0.11 U	0.11 U
PCB 209	0.09 U	0.09 U	0.09 U
Surrogate Recoveries (%)			
PCB 103 (SIS)	61	61	62
PCB 198 (SIS)	74	76	80

(a) U Undetected at or above given concentration.
(b) Result is outside quality control range (30-150%) for surrogate internal standard.

TABLE F.6. Pesticides and PCB Congeners (Dry Weight) in Tissue of *M. nasuta*

Treatment	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A
Replicate	1	2	3	4	5
Batch	3	2	3	3	3
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.54	14.35	15.09	13.82	14.77
Heptachlor	1.2 U[a]	1.3 U	1.2 U	1.3 U	1.3 U
Aldrin	8.53	8.15	9.28	10.3	9.95
Heptachlor Epoxide	0.89 U	0.91 U	0.86 U	0.94 U	0.88 U
2,4'-DDE	1.8 U	1.8 U	1.7 U	1.9 U	1.8 U
Endosulfan I	1.2 U	1.3 U	1.1 U	1.3 U	1.2 U
a-Chlordane	7.02	7.87	8.75	9.55	10.0
Trans-nonachlor	0.96 U	0.98 U	2.8	3.4	3.7
4,4'-DDE	60.7	68.6	68.9	81.0	77.2
Dieldrin	9.42	11.9	11.8	12.4	12.8
2,4'-DDD	9.90	8.36	13.9	13.0	14.1
2,4'-DDT	1.2 U	1.3 U	1.1 U	1.3 U	1.2 U
4,4'-DDD	29.2	29.3	35.5	38.6	38.1
Endosulfan II	1.2 U	1.3 U	1.1 U	1.3 U	1.2 U
4,4'-DDT	4.7	15.1	16.1	18.0	19.2
Endosulfan Sulfate	1.2 U	1.3 U	1.1 U	1.3 U	1.2 U
PCB 8	2.8 U	2.8 U	8.9	11.7	12.1
PCB 18	19.9	26.0	25.6	29.6	28.1
PCB 28	37.4	47.7	40.5	49.9	47.7
PCB 52	48.8	57.2	52.8	59.8	56.4
PCB 49	33.1	40.5	37.5	41.1	38.9
PCB 44	10.9	18.7	18.0	20.7	17.3
PCB 66	53.6	61.7	59.0	65.8	62.6
PCB 101	30.9	32.4	32.6	35.3	33.7
PCB 87	13.1	16.7	14.2	16.1	15.1
PCB 118	19.6	24.9	19.0	20.3	18.1
PCB 184	1.6 U	1.6 U	1.5 U	1.7 U	1.6 U
PCB 153	11.1	14.0	11.1	12.3	10.8
PCB 105	0.76 U	10.3	0.73 U	0.80 U	0.74 U
PCB 138	9.42	11.3	9.34	10.9	9.48
PCB 187	3.3	3.9	3.3	3.8	3.5
PCB 183	1.6 U	2.2	1.5 U	1.7	1.6 U
PCB 128	2.0	2.8	1.7	2.1	2.2
PCB 180	17.8	18.7	16.8	19.4	17.7
PCB 170	3.2	2.4	2.7	2.9	2.2
PCB 195	0.69 U	0.70 U	0.66 U	0.72 U	0.68 U
PCB 206	1.2	1.1	0.73 U	0.80 U	0.74 U
PCB 209	0.6 U	0.6 U	0.6 U	0.7 U	0.6 U

TABLE F.6. (contd)

Treatment	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B
Replicate	1	2	3	4
Batch	2	1	1	3
Units	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.06	14.58	14.72	14.06
Heptachlor	1.3 U	12.3 U	1.3 U	1.4 U
Aldrin	16.2	7.00	17.9	8.25
Heptachlor Epoxide	0.92 U	0.89 U	0.88 U	0.92 U
2,4'-DDE	1.8 U	1.8 U	1.8 U	1.8 U
Endosulfan I	1.3 U	1.2 U	1.2 U	1.3 U
a-Chlordane	18.3	24.3	23.7	19.6
Trans Nonachlor	6.5	10.4	10.7	8.11
4,4'-DDE	22.3	32.6	31.3	30.7
Dieldrin	11.0	12.7	10.9	12.0
2,4'-DDD	12.3	13.1	12.6	12.4
2,4'-DDT	1.3 U	1.2 U	1.2 U	1.3 U
4,4'-DDD	36.4	40.4	38.5	43.3
Endosulfan II	1.3 U	1.2 U	1.2 U	1.6
4,4'-DDT	11.4	38.3	32.3	13.4
Endosulfan Sulfate	1.3 U	1.2 U	1.2 U	1.3 U
PCB 8	2.8 U	2.7 U	2.8 U	17.4
PCB 18	40.2	44.1	39.7	38.1
PCB 28	50.1	52.9	53.1	51.2
PCB 52	46.3	52.8	47.6	49.9
PCB 49	30.9	37.4	34.6	33.0
PCB 44	13.9	24.0	24.6	16.8
PCB 66	44.2	52.7	49.1	48.3
PCB 101	22.7	27.7	24.7	25.5
PCB 87	7.75	11.2	11.3	11.2
PCB 118	17.9	21.3	18.9	14.2
PCB 184	1.6 U	1.6 U	1.6 U	1.7 U
PCB 153	10.2	14.4	11.4	8.61
PCB 105	7.0	9.26	7.81	0.78 U
PCB 138	8.46	11.8	9.99	7.61
PCB 187	3.4	19.5	20.9	2.8
PCB 183	1.6 U	1.6 U	1.6 U	1.7 U
PCB 128	2.3	2.9	2.4	1.8
PCB 180	4.6	6.4	5.2	5.4
PCB 170	1.1 U	2.4	1.9	2.3
PCB 195	0.7 U	0.7 U	0.7 U	0.7 U
PCB 206	0.92	0.75 U	1.1	1.4
PCB 209	0.6 U	0.6 U	0.6 U	0.6 U

TABLE F.6. (contd)

Treatment	COMP EC-B	COMP EC-B, Dup	COMP EC-B, Trip
Replicate	5	5	5
Batch	1	1	1
Units	ng/g	ng/g	ng/g
Percent Dry Weight	13.37	13.37	13.37
Heptachlor	2.8 U	2.8 U	2.8 U
Aldrin	8.60	9.20	9.05
Heptachlor Epoxide	2.0 U	2.0 U	1.9 U
2,4'-DDE	3.9 U	3.9 U	3.9 U
Endosulfan I	2.7 U	2.7 U	2.7 U
a-Chlordane	19.3	22.3	21.8
Trans Nonachlor	5.6	7.93	7.55
4,4'-DDE	27.3	28.6	29.2
Dieldrin	13.2	14.6	14.4
2,4'-DDD	12.1	11.22	11.89
2,4'-DDT	2.7 U	2.7 U	2.6 U
4,4'-DDD	40.0	42.1	44.6
Endosulfan II	2.7 U	2.7 U	2.7 U
4,4'-DDT	13.9	19.0	23.6
Endosulfan Sulfate	2.7 U	2.7 U	2.7 U
PCB 8	6.1 U	6.1 U	6.1 U
PCB 18	50.3	50.6	51.0
PCB 28	55.0	59.3	58.7
PCB 52	54.3	54.5	55.6
PCB 49	35.8	36.6	37.3
PCB 44	16.2	19.8	19.0
PCB 66	50.5	53.3	54.3
PCB 101	25.1	25.6	27.9
PCB 87	9.20	10.1	10.5
PCB 118	18.5	18.6	20.2
PCB 184	3.5 U	3.5 U	3.5 U
PCB 153	10.3	10.4	10.9
PCB 105	7.0	7.3	7.70
PCB 138	8.90	9.20	9.80
PCB 187	26.0	23.3	25.5
PCB 183	3.5 U	3.5 U	3.5 U
PCB 128	2.5	2.3 U	2.5
PCB 180	5.1	4.9	4.6
PCB 170	2.5 U	2.5 U	2.5 U
PCB 195	1.5 U	1.5 U	1.5 U
PCB 206	1.7 U	1.7 U	1.7 U
PCB 209	1.4 U	1.4 U	1.4 U

TABLE F.6. (contd)

Treatment	R-MUD	R-MUD	R-MUD	R-MUD	R-MUD
Replicate	1	2	3	4	5
Batch	2	3	2	3	2
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.08	18.71	13.02	11.83	20.96
Heptachlor	1.3 U	1.0 U	1.5 U	1.6 U	0.81 U
Aldrin	0.92 U	3.9	1.0 U	5.7	1.0
Heptachlor Epoxide	0.92 U	0.69 U	1.0 U	1.1 U	0.57 U
2,4'-DDE	1.8 U	1.4 U	2.0 U	3.1	1.1 U
Endosulfan I	1.3 U	0.96 U	1.4 U	1.5 U	0.81 U
a-Chlordane	0.71 U	0.53 U	0.77 U	0.85 U	0.4 U
Trans Nonachlor	1.1 U	0.80 U	1.2 U	1.3 U	0.62 U
4,4'-DDE	2.1	1.9	3.5	3.0	1.1
Dieldrin	3.7 U	2.8 U	4.0 U	4.4 U	2.2 U
2,4'-DDD	1.8 U	1.3 U	1.9 U	2.1 U	1.1 U
2,4'-DDT	1.3 U	1.0 U	1.4 U	1.5 U	0.76 U
4,4'-DDD	1.8 U	1.4 U	2.0 U	2.2 U	1.1 U
Endosulfan II	1.3 U	1.0 U	1.4 U	1.5 U	0.81 U
4,4'-DDT	2.9	18.8	1.2 U	14.5	2.1
Endosulfan Sulfate	1.3 U	0.96 U	1.4 U	1.5 U	0.81 U
PCB 8	2.9 U	9.41	3.1 U	16.8	1.8 U
PCB 18	3.1 U	2.3 U	3.3 U	3.6 U	1.9 U
PCB 28	3.8	3.6	5.0	5.4	2.9
PCB 52	4.8	5.0	6.0	7.1	4.0
PCB 49	1.7 U	1.3	1.8 U	2.1	1.0 U
PCB 44	1.2 U	0.91 U	1.3 U	1.4 U	0.72 U
PCB 66	0.6 U	0.5 U	5.7	0.8 U	0.4 U
PCB 101	2.3	2.8	3.5	3.6	2.5
PCB 87	1.1 U	1.5	1.2 U	2.3	0.72 U
PCB 118	2.1 U	1.5 U	2.3	2.5 U	1.3 U
PCB 184	1.7 U	1.3 U	1.8 U	2.0 U	1.0 U
PCB 153	1.2	0.75	2.0	1.1	0.52 U
PCB 105	0.78 U	0.59 U	1.0	0.93 U	0.62
PCB 138	2.1 U	1.5 U	2.2 U	2.5 U	1.4
PCB 187	0.92 U	0.69 U	1.0 U	1.1 U	0.57 U
PCB 183	1.7 U	1.3 U	1.8 U	2.0 U	1.0 U
PCB 128	1.1 U	0.80 U	1.2 U	1.3 U	0.67 U
PCB 180	1.3 U	0.96 U	1.4 U	1.5 U	0.81 U
PCB 170	1.3	0.91 U	1.3 U	1.6	0.72 U
PCB 195	0.71 U	0.53 U	0.77 U	0.85 U	0.4 U
PCB 206	0.78 U	0.59 U	0.84 U	0.93 U	0.48 U
PCB 209	0.6 U	0.5 U	0.7 U	0.8 U	0.4 U

TABLE F.6. (contd)

Treatment	R-CLIS	R-CLIS	R-CLIS	R-CLIS	R-CLIS
Replicate	1	2	3	4	5
Batch	1	1	1	1	1
Wet Wt.	20.10	20.14	20.18	20.06	20.27
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	15.08	14.45	14.15	14.06	14.57
Heptachlor	1.3 U	1.3 U	1.3 U	1.4 U	1.2 U
Aldrin	0.86 U	0.90 U	0.92 U	0.92 U	0.82 U
Heptachlor Epoxide	0.86 U	0.90 U	0.92 U	0.92 U	0.89 U
2,4'-DDE	1.7 U	1.8 U	1.8 U	1.8 U	1.8 U
Endosulfan I	1.2 U	1.2 U	1.3 U	1.3 U	1.2 U
a-Chlordane	0.66 U	0.69 U	0.71 U	0.71 U	0.62 U
Trans-nonachlor	0.99 U	1.0 U	1.1 U	1.1 U	1.0 U
4,4'-DDE	6.4	11.8	7.99	9.82	7.82
Dieldrin	3.4 U	4.1	3.7 U	3.7 U	3.5 U
2,4'-DDD	1.7 U	1.7 U	1.8 U	1.8 U	1.7 U
2,4'-DDT	1.2 U	1.2 U	1.3 U	1.3 U	1.2 U
4,4'-DDD	1.7 U	2.0	1.8 U	1.8 U	1.8 U
Endosulfan II	1.2 U	1.2 U	1.3 U	1.3 U	1.2 U
4,4'-DDT	51.3	36.3	60.4	87.5	15.2
Endosulfan Sulfate	1.2 U	1.2 U	1.3 U	1.3 U	1.2 U
PCB 8	2.7 U	2.8 U	2.9 U	2.9 U	2.7 U
PCB 18	2.9 U	3.0 U	3.0 U	3.1 U	2.9 U
PCB 28	4.4	5.7	5.2	7.0	4.6
PCB 52	4.2	6.0	4.4	6.8	4.5
PCB 49	3.7	5.0	3.7	5.5	3.6
PCB 44	1.1 U	3.0	1.2 U	1.2 U	1.1 U
PCB 66	7.43	9.20	8.27	0.6 U	7.89
PCB 101	5.8	7.13	6.0	8.25	6.2
PCB 87	1.1 U	3.3	1.1 U	1.1 U	1.7
PCB 118	1.9 U	5.7	2.0 U	2.1 U	5.3
PCB 184	1.6 U	1.7 U	1.7 U	1.7 U	1.6 U
PCB 153	6.5	8.03	6.7	8.25	7.34
PCB 105	0.73 U	0.97	0.85	0.78 U	0.82
PCB 138	3.6	4.4	3.7	4.7	4.0
PCB 187	6.83	5.7	5.7	1.8	14.5
PCB 183	1.6 U	1.7 U	1.7 U	1.7 U	1.6 U
PCB 128	1.1	1.1	1.1 U	1.3	1.0 U
PCB 180	1.9	2.1	1.7	2.0	1.4
PCB 170	1.1 U	1.2	1.2 U	1.2 U	1.1 U
PCB 195	0.66 U	0.69 U	0.71 U	0.71 U	0.69 U
PCB 206	0.73 U	0.76 U	0.78 U	0.78 U	0.75 U
PCB 209	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U

TABLE F.6. (contd)

Treatment	C-SB	C-SB, Dup	C-SB, Trip	C-SB	C-SB
Replicate	1	1	1	2	3
Batch	3	3	3	2	3
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	12.86	12.86	12.86	12.45	13.9
Heptachlor	2.8 U	2.8 U	2.9 U	1.5 U	1.3 U
Aldrin	1.9 U	1.9 U	1.9 U	1.0 U	0.86 U
Heptachlor Epoxide	2.0 U	2.0 U	2.0 U	1.0 U	0.94 U
2,4'-DDE	4.0 U	4.0 U	4.0 U	2.1 U	1.9 U
Endosulfan I	2.7 U	2.7 U	2.8 U	1.4 U	1.3 U
a-Chlordane	1.5 U	1.5 U	1.5 U	0.80 U	0.65 U
Trans Nonachlor	2.2 U	2.2 U	2.3 U	1.2 U	1.0 U
4,4'-DDE	6.3	2.9 U	2.9 U	2.9	3.7
Dieldrin	7.85 U	7.85 U	7.93 U	4.2 U	3.7 U
2,4'-DDD	3.9 U	3.9 U	3.9 U	2.0 U	1.8 U
2,4'-DDT	2.7 U	2.7 U	2.7 U	1.4 U	1.3 U
4,4'-DDD	4.0 U	4.0 U	4.0 U	2.1 U	1.9 U
Endosulfan II	2.7 U	2.7 U	2.8 U	1.4 U	1.3 U
4,4'-DDT	2.3 U	2.3 U	2.3 U	3.0	8.92
Endosulfan Sulfate	2.7 U	2.7 U	2.8 U	1.4 U	1.3 U
PCB 8	6.4	9.80	7.3	3.3 U	3.9
PCB 18	6.5 U	6.5 U	6.6 U	3.5 U	3.0 U
PCB 28	3.1 U	3.1 U	3.1 U	1.6 U	1.7
PCB 52	5.4 U	5.4 U	5.5 U	2.9 U	2.5 U
PCB 49	3.6 U	3.6 U	3.7 U	1.9 U	1.7 U
PCB 44	2.5 U	2.5 U	2.6 U	1.4 U	1.2 U
PCB 66	1.5 U	2.3	2.5	7.2 U	0.6 U
PCB 101	2.3 U	2.3 U	2.3 U	1.2 U	1.4
PCB 87	2.4 U	2.4 U	2.5 U	1.3 U	1.2 U
PCB 118	4.5 U	4.5 U	4.5 U	2.3 U	2.1 U
PCB 184	3.6 U	3.6 U	3.7 U	1.9 U	1.7 U
PCB 153	1.9 U	1.9 U	1.9 U	0.96 U	0.86 U
PCB 105	1.7 U	1.7 U	1.7 U	0.88 U	0.79 U
PCB 138	4.4 U	4.4 U	4.4 U	2.3 U	2.0 U
PCB 187	1.9 U	1.9 U	1.9 U	1.0 U	0.86 U
PCB 183	3.6 U	3.6 U	3.7 U	1.9 U	1.7 U
PCB 128	2.3 U	2.3 U	2.4 U	1.2 U	1.1 U
PCB 180	2.8 U	2.8 U	2.9 U	1.4 U	1.3 U
PCB 170	2.6 U	2.6	2.6 U	1.4 U	1.2 U
PCB 195	1.6 U	1.6 U	1.6 U	0.80 U	0.72 U
PCB 206	1.7 U	1.7 U	1.7 U	0.88 U	0.79 U
PCB 209	1.5 U	1.5 U	1.5 U	0.7 U	0.6 U

TABLE F.6. (contd)

Treatment	C-SB	C-SB	C-SB, Dup	C-SB, Trip
Replicate	4	5	5	5
Batch	2	2	2	2
Units	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.16	13.21	13.21	13.21
Heptachlor	1.4 U	2.7 U	2.8 U	2.7 U
Aldrin	0.99 U	1.9 U	1.9 U	1.9 U
Heptachlor Epoxide	0.99 U	1.97 U	1.97 U	1.97 U
2,4'-DDE	2.0 U	3.9 U	3.9 U	3.9 U
Endosulfan I	1.4 U	2.6 U	2.7 U	1.9 U
a-Chlordane	0.76 U	1.4 U	1.4 U	1.4 U
Trans Nonachlor	1.1 U	2.1 U	2.2 U	2.1 U
4,4'-DDE	3.4	4.1	2.8 U	2.7 U
Dieldrin	4.0 U	7.65 U	7.72 U	7.57 U
2,4'-DDD	1.9 U	3.8 U	3.8 U	3.7 U
2,4'-DDT	1.4 U	2.6 U	2.6 U	2.6 U
4,4'-DDD	2.0 U	3.9 U	3.9 U	3.9 U
Endosulfan II	1.4 U	2.6 U	2.7 U	2.6 U
4,4'-DDT	3.0	6.9	2.3 U	2.6
Endosulfan Sulfate	1.4 U	2.6 U	2.7 U	2.6 U
PCB 8	3.1 U	6.1 U	6.1 U	6.1 U
PCB 18	3.3 U	6.4 U	6.4 U	6.3 U
PCB 28	1.5 U	3.0 U	3.0 U	3.0 U
PCB 52	2.7 U	5.3 U	5.4 U	5.2 U
PCB 49	1.8 U	3.5 U	3.6 U	3.5 U
PCB 44	1.3 U	2.4 U	2.5 U	2.4 U
PCB 66	0.7 U	1.4 U	1.4 U	1.4 U
PCB 101	1.1 U	2.2 U	2.2 U	2.1 U
PCB 87	1.2 U	2.3 U	2.4 U	2.3 U
PCB 118	2.2 U	4.4 U	4.4 U	4.3 U
PCB 184	1.8 U	3.5 U	3.6 U	3.5 U
PCB 153	0.91 U	1.8 U	1.8 U	1.8 U
PCB 105	0.84 U	1.7 U	1.7 U	1.6 U
PCB 138	2.2 U	4.3 U	4.3 U	4.2 U
PCB 187	1.0 U	1.9 U	1.9 U	1.8 U
PCB 183	1.8 U	3.5 U	3.6 U	3.5 U
PCB 128	1.1 U	2.3 U	2.3 U	2.3 U
PCB 180	1.4 U	2.7 U	2.8 U	2.7 U
PCB 170	1.3 U	2.5 U	3.4	2.4 U
PCB 195	0.76 U	1.5 U	1.5 U	1.4 U
PCB 206	0.84 U	1.7 U	1.7 U	1.7 U
PCB 209	0.7 U	1.4 U	1.4 U	1.4 U

TABLE F.6. (contd)

Treatment	*M. nasuta* Background	*M. nasuta* Background	*M. nasuta* Background
Replicate	1	2	3
Batch	7	7	7
Units	ng/g	ng/g	ng/g
Percent Dry Weight	15.16	14.86	14.87
Heptachlor	1.2 U	1.3 U	1.3 U
Aldrin	0.79 U	0.87 U	0.87 U
Heptachlor Epoxide	0.86 U	0.87 U	0.87 U
2,4'-DDE	1.7 U	1.7 U	1.7 U
Endosulfan I	1.2 U	1.2 U	1.2 U
a-Chlordane	0.59 U	0.67 U	0.67 U
Trans Nonachlor	0.9 U	1.0 U	1.0 U
4,4'-DDE	3.8	1.3 U	1.3 U
Dieldrin	3.4 U	3.5 U	3.5 U
2,4'-DDD	1.6 U	1.7 U	1.7 U
2,4'-DDT	1.2 U	1.2 U	1.2 U
4,4'-DDD	1.7 U	1.7 U	1.7 U
Endosulfan II	1.2 U	1.2 U	1.2 U
4,4'-DDT	1.0 U	1.0 U	1.0 U
Endosulfan Sulfate	3.6	3.2	2.6
PCB 8	2.6 U	2.8 U	2.8 U
PCB 18	2.8 U	2.9 U	2.9 U
PCB 28	3.3	5.2	1.3 U
PCB 52	2.3 U	2.4 U	2.4 U
PCB 49	1.5 U	1.6 U	1.6 U
PCB 44	1.1 U	1.1 U	1.1 U
PCB 66	0.6 U	0.6 U	0.6 U
PCB 101	0.92 U	1.0 U	1.0 U
PCB 87	1.1 U	1.1 U	1.1 U
PCB 118	1.9 U	2.0 U	2.0 U
PCB 184	1.5 U	1.6 U	1.6 U
PCB 153	0.79 U	0.81 U	0.81 U
PCB 105	0.73 U	0.74 U	0.74 U
PCB 138	1.8 U	2.0 U	2.0 U
PCB 187	0.79 U	0.87 U	0.87 U
PCB 183	1.5 U	1.6 U	1.6 U
PCB 128	1.0 U	1.0 U	1.0 U
PCB 180	1.2 U	1.2 U	1.2 U
PCB 170	1.1 U	1.1 U	1.1 U
PCB 195	0.66 U	0.67 U	0.67 U
PCB 206	0.73 U	0.74 U	0.74 U
PCB 209	0.6 U	0.6 U	0.6 U

(a) U Undetected at or above given concentration.

TABLE F.7. Quality Control Summary for Pesticides and PCB Congeners in Tissue of *M. nasuta* (Wet Weight)

Matrix Spike Results

Treatment	COMP HU-A	COMP HU-A MS			COMP HU-C	COMP HU-C MS		
Replicate	1	1			5	5		
Batch:	1	1			2	2		
Wet Wt.	20.12	20.12	Amount	Percent	10.14	10.25	Amount	Percent
Units	ng/g	ng/g	Spiked	Recovery	ng/g	ng/g	Spiked	Recovery
Heptachlor	0.19 U[(a)]	2.62	2.50	105	0.37 U	4.69	4.90	96
Aldrin	1.66	4.28	2.50	105	3.40	5.96	4.90	52
Heptachlor Epoxide	0.13 U	2.13	2.50	85	0.26 U	3.53	4.90	72
2,4'-DDE	0.26 U	NA[(b)]	NS[(c)]	NA	0.52 U	NA	NS	NA
Endosulfan I	0.18 U	2.28	2.50	91	0.36 U	3.31	4.90	68
a-Chlordane	0.10 U	NA	NS	NA	0.85	NA	NS	NA
Trans Nonachlor	0.15 U	NA	NS	NA	0.29 U	NA	NS	NA
4,4'-DDE	5.48	7.48	2.50	80	10.1	13.9	4.90	78
Dieldrin	0.91	3.12	2.50	88	2.13	5.15	4.90	62
2,4'-DDD	0.77	NS	NS	NS	1.49	NA	NS	NA
2,4'-DDT	0.18 U	NS	NS	NS	0.35 U	NA	NS	NA
4,4'-DDD	2.67	5.24	2.50	103	4.61	8.58	4.90	81
Endosulfan II	0.18 U	2.92	2.50	117	0.36 U	4.49	4.90	92
4,4'-DDT	12.6	14.1	2.50	60	0.96	6.16	4.90	106
Endosulfan Sulfate	0.18 U	2.00	2.50	80	0.65	4.51	4.90	79
PCB 8	0.41 U	NA	NS	NA	0.81 U	NA	NS	NA
PCB 18	4.09	NA	NS	NA	17.0	NA	NS	NA
PCB 28	4.92	8.51	3.19	113	24.6	30.9	6.25	101
PCB 52	4.65	10.5	6.65	88	21.1	33.0	13.0	92
PCB 49	3.33	NS	NS	NS	16.7	NA	NS	NA
PCB 44	1.37	NA	NS	NA	9.51	NA	NS	NA
PCB 66	4.11	NA	NS	NA	19.6	NA	NS	NA
PCB 101	2.54	6.73	4.51	93	9.97	17.9	8.84	90
PCB 87	0.86	NA	NS	NA	3.11	NA	NS	NA
PCB 118	1.62	NA	NS	NA	7.68	NA	NS	NA
PCB 184	0.24 U	NA	NS	NA	0.47 U	NA	NS	NA
PCB 153	1.26	3.31	2.64	78	4.43	8.76	5.17	84
PCB 105	0.63	NA	NS	NA	2.85	NA	NS	NA
PCB 138	1.02	2.75	2.04	85	3.68	7.29	3.99	90
PCB 187	1.18	NA	NS	NA	0.25 U	NA	NS	NA
PCB 183	0.24 U	NA	NS	NA	0.54	NA	NS	NA
PCB 128	0.27	NA	NS	NA	0.90	NA	NS	NA
PCB 180	0.40	NA	NS	NA	1.25	NA	NS	NA
PCB 170	0.17 U	NA	NS	NA	0.33 U	NA	NS	NA
PCB 195	0.10 U	NA	NS	NA	0.20 U	NA	NS	NA
PCB 206	0.24	NA	NS	NA	0.41	NA	NS	NA
PCB 209	0.11	NA	NS	NA	0.29	NA	NS	NA
Surrogate Recoveries (%)								
PCB 103 (SIS)	65	65	NA	NA	81	77	NA	NA
PCB 198 (SIS)	63	69	NA	NA	59	59	NA	NA

TABLE F.7. (contd)

Matrix Spike Results

Treatment	COMP SB-A	COMP SB-A MS			COMP PC	COMP PC MS		
Replicate	3	3			1	1		
Batch	3	3			7	7		
Wet Wt.	10.06	10.32	Amount	Percent	20.84	20.18	Amount	Percent
Units	ng/g	ng/g	Spiked	Recovery	ng/g	ng/g	Spiked	Recovery
Heptachlor	0.37 U	4.35	4.85	90	0.18 U	2.41	2.50	96
Aldrin	1.45	5.18	4.85	77	0.90	2.96	2.50	82
Heptachlor Epoxide	0.26 U	3.97	4.85	82	0.13 U	2.58	2.50	103
2,4'-DDE	0.52 U	NA	NS	NA	0.25 U	NA	NS	NA
Endosulfan I	0.36 U	3.62	4.85	75	0.17 U	2.11	2.50	84
a-Chlordane	0.75	NA	NS	NA	3.09	NA	NS	NA
Trans Nonachlor	0.29 U	NA	NS	NA	0.52	NA	NS	NA
4,4'-DDE	4.00	7.91	4.85	81	4.47	7.19	2.50	109
Dieldrin	1.50	4.84	4.85	69	2.94	5.83	2.50	116
2,4'-DDD	0.55	NA	NS	NA	4.01	NA	NS	NA
2,4'-DDT	0.35 U	NA	NS	NA	0.17 U	NA	NS	NA
4,4'-DDD	2.22	7.25	4.85	104	8.51	13.3	2.50	192 [e]
Endosulfan II	0.36 U	3.77	4.85	78	0.17 U	2.72	2.50	109
4,4'-DDT	2.12	7.55	4.85	112	0.15 U	3.22	2.50	129 [e]
Endosulfan Sulfate	0.36 U	4.57	4.85	94	0.17 U	3.04	2.50	122 [e]
PCB 8	1.54	NA	NS	NA	0.39 U	NA	NS	NA
PCB 18	1.63	NA	NS	NA	0.66	NA	NS	NA
PCB 28	3.31	9.60	6.18	102	0.99	4.93	3.19	124 [e]
PCB 52	3.35	14.8	12.9	89	4.18	10.9	6.65	101
PCB 49	2.63	NA	NS	NA	1.33	NA	NS	NA
PCB 44	0.84	NA	NS	NA	0.35	NA	NS	NA
PCB 66	4.44	NA	NS	NA	0.09 U	NA	NS	NA
PCB 101	3.34	11.8	8.75	97	5.90	11.0	4.51	113
PCB 87	1.12	NA	NS	NA	2.57	NA	NS	NA
PCB 118	1.71	NA	NS	NA	3.67	NA	NS	NA
PCB 184	0.47 U	NA	NS	NA	0.23 U	NA	NS	NA
PCB 153	1.61	4.95	5.12	65	1.90	4.21	2.64	88
PCB 105	0.57	NA	NS	NA	1.49	NA	NS	NA
PCB 138	1.30	4.93	3.95	92	2.42	4.63	2.04	108
PCB 187	0.37	NA	NS	NA	0.49	NA	NS	NA
PCB 183	0.47 U	NA	NS	NA	0.23 U	NA	NS	NA
PCB 128	0.31 U	NA	NS	NA	0.48	NA	NS	NA
PCB 180	0.94	NA	NS	NA	0.57	NA	NS	NA
PCB 170	0.63	NA	NS	NA	0.30	NA	NS	NA
PCB 195	0.20 U	NA	NS	NA	0.10 U	NA	NS	NA
PCB 206	0.22 U	NA	NS	NA	0.11	NA	NS	NA
PCB 209	0.19 U	NA	NS	NA	1.37	NA	NS	NA

Surrogate Recoveries (%)

PCB 103 (SIS)	86	82	NA	NA	77	82	NA	NA
PCB 198 (SIS)	154 [d]	147	NA	NA	72	67	NA	NA

TABLE F.7. (contd)

Analytical Replicate Results

Treatment	COMP EC-B	DUP COMP EC-B	TRIP COMP EC-B		Control-SB	DUP Control-SB	TRIP Control-SB	
Replicate	5	5	5		5	5	5	
Batch:	1	1	1		2	2	2	
Wet Wt.	10.04	10.02	10.11		10.16	10	10	NA
Units	ng/g	ng/g	ng/g	RSD%	ng/g	ng/g	ng/g	RSD%
Heptachlor	0.37 U	0.37 U	0.37 U	NA	0.36 U	0.37 U	0.36 U	NA
Aldrin	1.15	1.23	1.21	3	0.25 U	0.25 U	0.25 U	NA
Heptachlor Epoxide	0.27 U	0.27 U	0.26 U	NA	0.26 U	0.26 U	0.26 U	NA
2,4'-DDE	0.52 U	0.52 U	0.52 U	NA	0.51 U	0.52 U	0.51 U	NA
Endosulfan I	0.36 U	0.36 U	0.36 U	NA	0.35 U	0.36 U	0.25 U	NA
a-Chlordane	2.58	2.98	2.92	8	0.19 U	0.19 U	0.19 U	NA
Trans Nonachlor	0.75	1.06	1.01	18	0.28 U	0.29 U	0.28 U	NA
4,4'-DDE	3.65	3.82	3.91	3	0.54	0.37 U	0.36 U	NA
Dieldrin	1.77	1.95	1.92	5	1.01 U	1.02 U	1.00 U	NA
2,4'-DDD	1.62	1.50	1.59	4	0.50 U	0.50 U	0.49 U	NA
2,4'-DDT	0.36 U	0.36 U	0.35 U	NA	0.35 U	0.35 U	0.35 U	NA
4,4'-DDD	5.35	5.63	5.96	5	0.51 U	0.52 U	0.51 U	NA
Endosulfan II	0.36 U	0.36 U	0.36 U	NA	0.35 U	0.36 U	0.35 U	NA
4,4'-DDT	1.86	2.54	3.15	26	0.91	0.30 U	0.34	NA
Endosulfan Sulfate	0.36 U	0.36 U	0.36 U	NA	0.35 U	0.36 U	0.35 U	NA
PCB 8	0.82 U	0.82 U	0.82 U	NA	0.81 U	0.81 U	0.80 U	NA
PCB 18	6.73	6.77	6.82	1	0.84 U	0.85 U	0.83 U	NA
PCB 28	7.35	7.93	7.85	4	0.40 U	0.40 U	0.40 U	NA
PCB 52	7.26	7.29	7.44	1	0.70 U	0.71 U	0.69 U	NA
PCB 49	4.78	4.89	4.99	2	0.46 U	0.47 U	0.46 U	NA
PCB 44	2.17	2.65	2.54	10	0.32 U	0.33 U	0.32 U	NA
PCB 66	6.75	7.12	7.26	4	0.19 U	0.19 U	0.18 U	NA
PCB 101	3.35	3.42	3.73	6	0.29 U	0.29 U	0.28 U	NA
PCB 87	1.23	1.35	1.41	7	0.31 U	0.32 U	0.31 U	NA
PCB 118	2.48	2.49	2.70	5	0.58 U	0.58 U	0.57 U	NA
PCB 184	0.47 U	0.47 U	0.47 U	NA	0.46 U	0.47 U	0.46 U	NA
PCB 153	1.38	1.39	1.46	3	0.24 U	0.24 U	0.24 U	NA
PCB 105	0.93	0.97	1.03	5	0.22 U	0.22 U	0.21 U	NA
PCB 138	1.19	1.23	1.31	5	0.57 U	0.57 U	0.56 U	NA
PCB 187	3.47	3.11	3.41	6	0.25 U	0.25 U	0.24 U	NA
PCB 183	0.47 U	0.47 U	0.47 U	NA	0.46 U	0.47 U	0.46 U	NA
PCB 128	0.33	0.31 U	0.34	NA	0.30 U	0.31 U	0.30 U	NA
PCB 180	0.68	0.65	0.62	5	0.36 U	0.37 U	0.36 U	NA
PCB 170	0.33 U	0.33 U	0.33 U	NA	0.33 U	0.45	0.32 U	NA
PCB 195	0.20 U	0.20 U	0.20 U	NA	0.20 U	0.20 U	0.19 U	NA
PCB 206	0.23 U	0.23 U	0.23 U	NA	0.22 U	0.22 U	0.22 U	NA
PCB 209	0.19 U	0.19 U	0.19 U	NA	0.19 U	0.19 U	0.18 U	NA
Surrogate Recoveries (%)								
PCB 103 (SIS)	67	80	74	NA	82	76	75	NA
PCB 198 (SIS)	54	74	62	NA	61	57	58	NA

TABLE F.7. (contd)

Analytical Replicate Results

Treatment	C-SB	DUP C-SB	TRIP C-SB		COMP PC	DUP COMP PC	TRIP COMP PC	
Replicate	1	1	1		5	5	5	
Batch:	3	3	3		7	7	7	
Wet Wt.	10.22	10.18	10.08	NA	16.10	16.99	17.88	
Units	ng/g	ng/g	ng/g	RSD%	ng/g	ng/g	ng/g	RSD%
Heptachlor	0.36 U	0.36 U	0.37 U	NA	0.23 U	0.22 U	0.21 U	NA
Aldrin	0.25 U	0.25 U	0.25 U	NA	1.14	1.12	1.05	4
Heptachlor Epoxide	0.26 U	0.26 U	0.26 U	NA	0.16 U	0.16 U	0.15 U	NA
2,4'-DDE	0.51 U	0.51 U	0.52 U	NA	0.32 U	0.31 U	0.29 U	NA
Endosulfan I	0.35 U	0.35 U	0.36 U	NA	0.22 U	0.21 U	0.20 U	NA
a-Chlordane	0.19 U	0.19 U	0.19 U	NA	3.54	3.06	2.78	12
Trans Nonachlor	0.28 U	0.28 U	0.29 U	NA	0.61	0.39	0.32	34
4,4'-DDE	0.81	0.37 U	0.37 U	NA	5.66	5.28	4.61	10
Dieldrin	1.01 U	1.01 U	1.02 U	NA	3.96	3.79	3.43	7
2,4'-DDD	0.50 U	0.50 U	0.50 U	NA	5.45	4.75	4.45	11
2,4'-DDT	0.35 U	0.35 U	0.35 U	NA	0.22 U	0.21 U	0.20 U	NA
4,4'-DDD	0.51 U	0.51 U	0.52 U	NA	11.4	10.6	9.14	11
Endosulfan II	0.35 U	0.35 U	0.36 U	NA	0.22 U	0.21 U	0.20 U	NA
4,4'-DDT	0.30 U	0.30 U	0.30 U	NA	0.19 U	0.18 U	0.17 U	NA
Endosulfan Sulfate	0.35 U	0.35 U	0.36 U	NA	0.22 U	0.21 U	0.20 U	NA
PCB 8	0.82	1.26	0.94	23	0.51 U	0.48 U	0.46 U	NA
PCB 18	0.84 U	0.84 U	0.85 U	NA	0.53 U	0.90	0.48 U	NA
PCB 28	0.40 U	0.40 U	0.40 U	NA	1.33	1.17	1.03	13
PCB 52	0.70 U	0.70 U	0.71 U	NA	5.27	4.90	4.38	9
PCB 49	0.46 U	0.46 U	0.47 U	NA	1.83	1.58	1.41	13
PCB 44	0.32 U	0.32 U	0.33 U	NA	0.50	0.19 U	0.18 U	NA
PCB 66	0.19 U	0.30	0.32	NA	0.12 U	0.11 U	0.11 U	NA
PCB 101	0.29 U	0.29 U	0.29 U	NA	7.32	6.83	6.12	9
PCB 87	0.31 U	0.31 U	0.32 U	NA	3.21	3.00	2.64	10
PCB 118	0.58 U	0.58 U	0.58 U	NA	4.56	4.02	3.83	9
PCB 184	0.46 U	0.46 U	0.47 U	NA	0.29 U	0.28 U	0.26 U	NA
PCB 153	0.24 U	0.24 U	0.24 U	NA	2.53	2.19	2.04	11
PCB 105	0.22 U	0.22 U	0.22 U	NA	2.11	1.72	1.60	15
PCB 138	0.57 U	0.57 U	0.57 U	NA	3.19	2.82	2.59	11
PCB 187	0.25 U	0.25 U	0.25 U	NA	0.63	0.50	0.51	13
PCB 183	0.46 U	0.46 U	0.47 U	NA	0.31	0.28 U	0.26 U	NA
PCB 128	0.30 U	0.30 U	0.31 U	NA	0.73	0.59	0.56	14
PCB 180	0.36 U	0.36 U	0.37 U	NA	0.76	0.73	0.64	9
PCB 170	0.33 U	0.34	0.33 U	NA	0.39	0.36	0.34	7
PCB 195	0.20 U	0.20 U	0.20 U	NA	0.12 U	0.12 U	0.11 U	NA
PCB 206	0.22 U	0.22 U	0.22 U	NA	0.18	0.18	0.15	10
PCB 209	0.19 U	0.19 U	0.19 U	NA	0.12 U	0.11 U	0.11 U	NA
Surrogate Recoveries (%)								
PCB 103 (SIS)	89	79	88	NA	95	95	86	NA
PCB 198 (SIS)	144	125	141	NA	93	82	75	NA

(a) U Undetected at or above given concentration.
(b) NA Not applicable.
(c) NS Not spiked.
(d) Outside quality control range (30-150%) for SIS.
(e) Outside quality control criteria (50-120%) for matrix spike recovery.

TABLE F.8. Polynuclear Aromatic Hydrocarbons (PAHs) and 1,4-Dichlorobenzene (Wet Weight) in Tissue of M. nasuta

Treatment	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-B
Replicate	1	2	3	4	5	1
Batch	3	2	3	3	3	2
Units	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.54%	14.35%	15.09%	13.82%	14.77%	14.06%
1,4-Dichlorobenzene	1.83 U[a]	1.86 U	1.86 U	1.86 U	1.86 U	1.83 U
Naphthalene	3.63 [b]	2.71	2.78 [b]	2.49	2.74	4.03
Acenaphthylene	2.29 [b]	1.90 [b]	2.02 [b]	2.07 [b]	2.21 [b]	2.80 [b]
Acenaphthene	3.43	3.95	3.97	4.40	5.33	49.3
Fluorene	2.88	3.35	2.96	3.69	4.20	32.2
Phenanthrene	13.1	14.2	14.1	17.0	19.6	265
Anthracene	9.55	11.5	11.9	13.6	15.6	126
Fluoranthene	179	204	206	212 [b]	205	512
Pyrene	214	229	240	230	217	569
Benzo(a)anthracene	71.5	76.6	79.0	87.3	82.6	195
Chrysene	90.3	94.1	97.1	103	97.8	245
Benzo(b)fluoranthene	110	104	107	111	112	180 [c]
Benzo(k)fluoranthene	37.3	32.0	36.0	36.6	35.6 [b]	1.64 U
Benzo(a)pyrene	61.3	56.0	58.3	62.0	60.8	99.2
Indeno(123-cd)pyrene	22.7	19.5	20.4	21.9	21.9	23.9
Dibenzo(a,h)anthracene	5.23	4.75	4.74	5.37	5.11	5.04
Benzo(g,h,i)perylene	22.4	19.3	20.3	21.4	21.6	26.2
Surrogate Internal Standards (%)						
d4 1,4-Dichlorobenzene	34	56	40	59	61	60
d8 Naphthalene	38	68	47	70	69	70
d10 Acenaphthene	40	71	49	71	73	75
d12 Chrysene	36	74	49	70	88	79
d14 Dibenzo(a,h,i)anthracene	43	91	60	83	86	97

TABLE F.8. (contd)

Treatment	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B
Replicate	2	3	4	5-1	5-2	5-3
Batch	1	1	3	1	1	1
Units	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.58%	14.72%	14.06%	13.37%	13.37%	13.37%
1,4-Dichlorobenzene	1.86 U	1.86 U	1.86 U	3.73 U	3.73 U	3.73 U
Naphthalene	6.96	4.38	5.41	5.99	4.80	5.64
Acenaphthylene	3.14	2.78 (b)	3.98	3.26 (b)	3.21 (b)	3.24 (b)
Acenaphthene	42.6	29.7	38.6	40.0	41.5	41.8
Fluorene	29.5	21.3	24.8	25.8	26.2	25.9
Phenanthrene	248	202	198	210	213	213
Anthracene	112	93.6	96.7	103	106	106
Fluoranthene	477	427	505	453	464	475
Pyrene	522	475	519	466	476	484
Benzo(a)anthracene	227	208	211	183	188	190
Chrysene	290	261	266	226	233	234
Benzo(b)fluoranthene	191	176	208	139	139	146
Benzo(k)fluoranthene	41.5	34.1	1.67 U	31.7	34.1	32.7
Benzo(a)pyrene	127	115	110	88.9	91.4	94.4
Indeno(123-cd)pyrene	33.2	28.0	29.5	22.2	22.3	22.9
Dibenzo(a,h)anthracene	7.32	5.88	6.44	4.77	5.06	5.17
Benzo(g,h,i)perylene	35.8	31.2	31.2	24.1	24.4	25.0
Surrogate Internal Standards (%)						
d4 1,4-Dichlorobenzene	50	44	48	44	52	53
d8 Naphthalene	62	58	58	54	65	64
d10 Acenaphthene	67	65	59	58	74	70
d12 Chrysene	76	79	62	69	89	78
d14 Dibenzo(a,h,i)anthracene	89	95	78	79	102	89

TABLE F.8. (contd)

Treatment	R-MUD	R-MUD	R-MUD	R-MUD	R-MUD
Replicate	1	2	3	4	5
Batch	2	3	2	3	2
Wet Wt.	20.1	20.15	20.01	20.11	21.04
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.08%	18.71%	13.02%	11.83%	20.96%
1,4-Dichlorobenzene	1.86 U	1.86 U	1.86 U	1.86 U	1.71 U
Naphthalene	1.86 U	1.86 U	1.86 U	1.86 U	1.87 (b)
Acenaphthylene	0.72 U	0.72 U	0.72 U	0.72 U	0.67 U
Acenaphthene	1.30 U	1.30 U	1.30 U	1.30 U	1.20 U
Fluorene	1.24 U	1.24 U	1.24 U	1.24 U	1.14 U
Phenanthrene	2.56 U	2.56 U	2.56 U	2.56 U	2.35 U
Anthracene	2.24 U	2.24 U	2.24 U	2.24 U	2.06 U
Fluoranthene	5.36 U	5.36 U	5.36 U	5.36 U	4.94 U
Pyrene	4.57 U	4.57 U	4.57 U	4.57 U	4.20 U
Benzo(a)anthracene	2.16 (b)B(d)	2.38 (b)B	2.73 (b)B	2.34 (b)B	2.20 (b)B
Chrysene	2.27 U	2.27 U	2.27 U	2.27 U	2.09 U
Benzo(b)fluoranthene	2.98 (b)	3.25 (b)B	4.14 (c)	2.95 (b)B	3.54
Benzo(k)fluoranthene	2.05 (b)	2.12 (b)	1.67 U	2.17 (b)	1.96
Benzo(a)pyrene	1.49 U	1.49 U	1.54 (b)	1.62 (b)	1.41
Indeno(123-cd)pyrene	1.76 U	1.76 U	1.76 U	1.76 U	1.62 U
Dibenzo(a,h)anthracene	1.26 U	1.26 U	1.26 U	1.26 U	1.16 U
Benzo(g,h,i)perylene	1.40 U	1.40 U	1.46 (b)	1.40 U	1.41 (b)
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	58	51	55	43	60
d8 Naphthalene	66	60	65	51	71
d10 Acenaphthene	68	63	70	56	73
d12 Chrysene	73	61	72	61	73
d14 Dibenzo(a,h,i)anthracene	88	70	86	71	86

TABLE F.8. (contd)

Treatment Replicate Batch Units Percent Dry Weight	R-CLIS 1 1 ng/g 15.08%	R-CLIS 2 1 ng/g 14.45%	R-CLIS 3 1 ng/g 14.15%	R-CLIS 4 1 ng/g 14.06%	R-CLIS 5 1 ng/g 14.57%
1,4-Dichlorobenzene	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Naphthalene	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Acenaphthylene	1.19 (b)	0.955 (b)	0.877 (b)	0.845 (b)	1.08 (b)
Acenaphthene	1.30 U	1.30 U	1.30 U	1.30 U	1.30 U
Fluorene	1.24 U	1.24 U	1.24 U	1.24 U	1.24 U
Phenanthrene	3.32	4.53	2.56 U	3.66	3.67
Anthracene	3.13 (b)	3.28	2.83 (b)	3.05 (b)	2.95 (b)
Fluoranthene	9.13	11.2	7.20	9.82	8.54
Pyrene	10.4	14.2	9.46	12.2	11.8
Benzo(a)anthracene	5.66 B	5.93 B	4.25 B	5.52 B	4.78 B
Chrysene	5.50	5.92	3.87	5.75	4.91
Benzo(b)fluoranthene	13.2	14.6	11.0	14.0	13.3
Benzo(k)fluoranthene	5.91	5.91	4.97	5.94	5.49
Benzo(a)pyrene	6.41	6.96	4.88	6.48	5.17
Indeno(123-cd)pyrene	4.28	4.77	4.00	4.32	4.55
Dibenzo(a,h)anthracene	1.26 U	1.27	1.26 U	1.26 U	1.26 U
Benzo(g,h,i)perylene	4.39	4.97	3.88	4.35	4.49
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	53	53	58	58	29 (e)
d8 Naphthalene	65	65	71	72	36
d10 Acenaphthene	65	66	71	73	41
d12 Chrysene	76	75	81	80	51
d14 Dibenzo(a,h,i)anthracene	92	92	101	103	63

TABLE F.8. (contd)

		DUP	*TRIP*			
Treatment	C-SB	C-SB	C-SB	C-SB	C-SB	C-SB
Replicate	1-1	1-2	1-3	2	3	4
Batch	3	3	3	2	3	2
Units	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	12.86%	12.86%	12.86%	12.45%	13.90%	13.16%
1,4-Dichlorobenzene	3.65 U	3.65 U	3.69 U	1.86 U	1.86 U	1.86 U
Naphthalene	3.65 U	3.65 U	3.69 U	1.86 U	1.86 U	1.86 U
Acenaphthylene	1.42 U	1.42 U	1.44 U	0.72 U	0.72 U	0.72 U
Acenaphthene	2.56 U	2.56 U	2.58 U	1.30 U	1.30 U	1.30 U
Fluorene	2.42 U	2.42 U	2.45 U	1.24 U	1.24 U	1.24 U
Phenanthrene	5.02 U	5.02 U	5.07 U	2.56 U	2.56 U	2.56 U
Anthracene	4.39 U	4.39 U	4.43 U	2.24 U	2.74 (b)	2.24 U
Fluoranthene	10.5 U	10.5 U	10.6 U	5.36 U	5.76	5.92
Pyrene	8.95 U	8.95 U	9.05 U	4.57 U	4.57 U	4.57 U
Benzo(a)anthracene	4.54 (b)B	4.95 (b)B	4.65 (b)B	2.52 (b)B	2.57 (b)B	2.46 (b)B
Chrysene	4.45 U	4.45 U	4.49 U	2.27 U	2.27 U	2.27 U
Benzo(b)fluoranthene	6.41 (b)B	5.72 (b)B	6.18 (b)B	3.54	4.11 (b)B	4.35 (c)
Benzo(k)fluoranthene	3.27 U	3.93 (b)	3.31 U	2.09 (b)	1.67 U	1.67 U
Benzo(a)pyrene	2.92 U	2.93 U	2.96 U	1.49 U	1.49 U	1.49 U
Indeno(123-cd)pyrene	3.45 U	3.45 U	3.49 U	1.76 U	1.76 U	1.76 U
Dibenzo(a,h)anthracene	2.47 U	2.47 U	2.50 U	1.26 U	1.26 U	1.26 U
Benzo(g,h,i)perylene	2.75 U	2.75 U	2.78 U	1.40 U	1.40 U	1.48
<u>Surrogate Internal Standards (%)</u>						
d4 1,4-Dichlorobenzene	54	57	59	57	65	53
d8 Naphthalene	64	65	71	62	74	65
d10 Acenaphthene	67	66	76	64	73	69
d12 Chrysene	80	75	87	65	78	75
d14 Dibenzo(a,h,i)anthrace	83	77	91	76	89	87

TABLE F.8. (contd)

Treatment	C-SB	*DUP* C-SB	*TRIP* C-SB	*M. nasuta* Background	*M. nasuta* Background	*M. nasuta* Background
Replicate	5-1	5-2	5-3	1	2	3
Batch	2	2	2	7	7	7
Units	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.21%	13.21%	13.21%	15.16%	14.86%	14.87%
1,4-Dichlorobenzene	3.65 U	3.69 U	3.62 U	1.83 U	1.86 U	1.86 U
Naphthalene	3.65 U	3.69 U	3.62 U	2.31	2.51	3.18 (b)
Acenaphthylene	1.42 U	1.44 U	1.41 U	0.71 U	0.73 U	0.73 U
Acenaphthene	2.56 U	2.58 U	2.53 U	1.28 U	1.3 U	1.3 U
Fluorene	2.42 U	2.45 U	2.40 U	1.21 U	2.82 (b)	2.86 (b)
Phenanthrene	5.02 U	5.07 U	4.96 U	5.25	3.74	3.96
Anthracene	4.39 U	4.43 U	4.34 U	2.19 U	2.24 U	2.24 U
Fluoranthene	10.5 U	10.6 U	10.4 U	6.49 (b)	7.05 (b)	7.42 (b)
Pyrene	8.95 U	9.05 U	8.86 U	4.61 (b)	5.10	5.49
Benzo(a)anthracene	4.73	4.80 (b)B	4.53 (b)B	4.00 (b)	4.04 (b)	4.06 (b)
Chrysene	4.45 U	4.49 U	4.40 U	2.22 U	2.27 U	2.27 U
Benzo(b)fluoranthene	5.67	5.81 (b)	6.38	4.90	4.67 (b)	4.97 (b)
Benzo(k)fluoranthene	3.98	4.08 (b)	3.24 U	2.51 (b)	2.65 (b)	2.62 (b)
Benzo(a)pyrene	4.70	2.96 U	2.90 U	2.85 (b)	2.26 (b)	2.64 (b)
Indeno(123-cd)pyrene	3.45 U	3.49 U	3.42 U	3.31 (b)	3.48 (b)	3.44 (b)
Dibenzo(a,h)anthracene	2.47 U	2.50 U	2.45 U	1.24 U	1.26 U	1.26 U
Benzo(g,h,i)perylene	2.75 U	2.78 U	2.72 U	3.12 (b)	1.4 U	1.4 U
Surrogate Internal Standards (%)						
d4 1,4-Dichlorobenzene	58	59	53	11 (e)	45	31
d8 Naphthalene	67	67	61	18 (e)	59	44
d10 Acenaphthene	68	66	62	27 (e)	76	66
d12 Chrysene	68	63	63	70	75	75
d14 Dibenzo(a,h,i)anthracene	79	71	74	88	71	92

(a) U Undetected at or above given concentration.
(b) Ion ratio out or confirmation ion not detected.
(c) Benzo(b)fluoranthene is the sum of benzo(b)fluoranthene and benzo(k)fluoranthene. Benzo(k)fluoranthene is present but could not be quantified due to poor resolution.
(d) B Value is < 5 times concentration in blank.
(e) Outside quality control criteria (30-150%) for surrogate internal standards.

TABLE F.9. Polynuclear Aromatic Hydrocarbons (PAH) and 1,4-Dichlorobenzene (Dry Weight) in Tissue of *M. nasuta*

Sediment Treatment	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A
Replicate	1	2	3	4	5
Batch	3	2	3	3	3
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.54%	14.35%	15.09%	13.82%	14.77%
1,4-Dichlorobenzene	12.6 U[a]	13.0 U	12.3 U	13.5 U	12.6 U
Naphthalene	25.0 [b]	2.71	18.4 [b]	18.0	18.6
Acenaphthylene	15.7 [b]	1.90 [b]	13.4 [b]	15.0 [b]	15.0 [b]
Acenaphthene	23.6	27.5	26.3	31.8	36.1
Fluorene	19.8	23.3	19.6	26.7	28.4
Phenanthrene	90.1	99.0	93.4	123	133
Anthracene	65.7	80.1	78.9	98.4	106
Fluoranthene	1230	1420	1370	1530 [b]	1390
Pyrene	1470	1600	1590	1660	1470
Benzo(a)anthracene	492	534	524	632	559
Chrysene	621	656	643	103	662
Benzo(b)fluoranthene	757	725	709	803	758
Benzo(k)fluoranthene	257	223	239	265	241 [b]
Benzo(a)pyrene	422	390	386	449	412
Indeno(123-cd)pyrene	156	136	135	158	148
Dibenzo(a,h)anthracene	36.0	33.1	31.4	38.9	34.6
Benzo(g,h,i)perylene	154	134	135	155	146

TABLE F.9. (contd)

Sediment Treatment	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B
Replicate	1	2	3	4	5-1	5-2	5-3
Batch	2	1	1	3	1	1	1
Units	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.06%	14.58%	14.72%	14.06%	13.37%	13.37%	13.37%
1,4-Dichlorobenzene	13.0 U	12.8 U	12.6 U	13.2 U	27.9 U	27.9 U	27.9 U
Naphthalene	28.7	47.7	29.8	38.5	44.8	35.9	42.2
Acenaphthylene	19.9 (b)	21.5	18.9 (b)	28.3	24.4 (b)	24.0 (b)	24.2 (b)
Acenaphthene	351	292	202	275	299	310	313
Fluorene	229	202	145	176	193	196	194
Phenanthrene	1890	1700	1370	1410	1570	1590	1590
Anthracene	896	768	636	688	770	793	793
Fluoranthene	3640	3270	2900	3590	3390	3470	3550
Pyrene	4050	3580	3230	3690	3490	3560	3620
Benzo(a)anthracene	1390	1560	1410	1500	1370	1410	1420
Chrysene	1740	1990	1770	1890	1690	1740	1750
Benzo(b)fluoranthene	1280 (c)	1310	1200	1480	1040	1040	1090
Benzo(k)fluoranthene	11.7 U	285	232	11.9 U	237	255	245
Benzo(a)pyrene	706	127	115	110	665	684	706
Indeno(123-cd)pyrene	170	228	190	210	166	167	171
Dibenzo(a,h)anthracene	35.8	50.2	39.9	45.8	35.7	37.8	38.7
Benzo(g,h,i)perylene	186	246	212	222	180	182	187

TABLE F.9. (contd)

Treatment Replicate Batch Units Percent Dry Weight	R-MUD 1 2 ng/g 14.08%	R-MUD 2 3 ng/g 18.71%	R-MUD 3 2 ng/g 13.02%	R-MUD 4 3 ng/g 11.83%	R-MUD 5 2 ng/g 20.96%
1,4-Dichlorobenzene	13.2 U	9.94 U	14.3 U	15.7 U	8.16 U
Naphthalene	13.2 U	9.94 U	14.3 U	15.7 U	8.92 (b)
Acenaphthylene	5.1 U	3.8 U	5.5 U	6.1 U	3.2 U
Acenaphthene	9.23 U	6.95 U	9.98 U	11.0 U	5.73 U
Fluorene	8.81 U	6.63 U	9.52 U	10.5 U	5.44 U
Phenanthrene	18.2 U	13.7 U	19.7 U	21.6 U	11.2 U
Anthracene	15.9 U	12.0 U	17.2 U	18.9 U	9.83 U
Fluoranthene	38.1 U	28.6 U	41.2 U	45.3 U	23.6 U
Pyrene	32.5 U	24.4 U	35.1 U	38.6 U	20.0 U
Benzo(a)anthracene	15.3 (b)B(d)	12.7 (b)B	21.0 (b)B	19.8 (b)B	10.5 (b)B
Chrysene	16.1 U	12.1 U	17.4 U	19.2 U	9.97 U
Benzo(b)fluoranthene	21.2 (b)	17.4 (b)B	31.8 (c)	24.9 (b)B	16.9
Benzo(k)fluoranthene	14.6 (b)	11.3 (b)	12.8 U	18.3 (b)	9.35
Benzo(a)pyrene	10.6 U	7.96 U	11.8 (b)	13.7 (b)	6.73
Indeno(123-cd)pyrene	12.5 U	9.41 U	13.5 U	14.9 U	7.73 U
Dibenzo(a,h)anthracene	8.95 U	6.73 U	9.68 U	10.7 U	5.53 U
Benzo(g,h,i)perylene	9.94 U	7.48 U	11.2 (b)	11.8 U	6.73 (b)

TABLE F.9. (contd)

Treatment	R-CLIS	R-CLIS	R-CLIS	R-CLIS	R-CLIS
Replicate	1	2	3	4	5
Batch	1	1	1	1	1
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	15.08%	14.45%	14.15%	14.06%	14.57%
1,4-Dichlorobenzene	12.3 U	12.9 U	13.1 U	13.2 U	12.8 U
Naphthalene	12.3 U	12.9 U	13.1 U	13.2 U	12.8 U
Acenaphthylene	7.89 [b]	6.61 [b]	6.20 [b]	6.01 [b]	7.41 [b]
Acenaphthene	8.62 U	9.00 U	9.19 U	9.25 U	8.92 U
Fluorene	8.22 U	8.58 U	8.76 U	8.82 U	8.51 U
Phenanthrene	22.0	31.3	18.1 U	26.0	25.2
Anthracene	20.8 [b]	22.7	20.0 [b]	21.7 [b]	20.2 [b]
Fluoranthene	60.5	77.5	50.9	69.8	58.6
Pyrene	69.0	98.3	66.9	86.8	81.0
Benzo(a)anthracene	37.5 B	41.0 B	30.0 B	39.3 B	32.8 B
Chrysene	36.5	41.0	27.3	40.9	33.7
Benzo(b)fluoranthene	87.5	101	77.7	99.6	91.3
Benzo(k)fluoranthene	39.2	40.9	35.1	42.2	37.7
Benzo(a)pyrene	42.5	48.2	34.5	46.1	35.5
Indeno(123-cd)pyrene	28.4	33.0	28.3	30.7	31.2
Dibenzo(a,h)anthracene	8.36 U	8.79	8.90 U	8.96 U	8.65 U
Benzo(g,h,i)perylene	29.1	34.4	27.4	30.9	30.8

TABLE F.9. (contd)

Treatment	C-SB	C-SB	C-SB	C-SB	C-SB	C-SB
Replicate	1-1	1-2	1-3	2	3	4
Batch	3	3	3	2	3	2
Units	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	12.86%	12.86%	12.86%	12.45%	13.90%	13.16%
1,4-Dichlorobenzene	28.4 U	28.4 U	28.7 U	14.9 U	13.4 U	14.1 U
Naphthalene	28.4 U	28.4 U	28.7 U	14.9 U	13.4 U	14.1 U
Acenaphthylene	11.0 U	11.0 U	11.2 U	5.8 U	5.2 U	5.5 U
Acenaphthene	19.9 U	19.9 U	20.1 U	10.4 U	9.35 U	9.88 U
Fluorene	18.8 U	18.8 U	19.1 U	9.96 U	8.92 U	9.42 U
Phenanthrene	39.0 U	39.0 U	39.4 U	20.6 U	18.4 U	19.5 U
Anthracene	34.1 U	34.1 U	34.4 U	18.0 U	19.7 (b)	17.0 U
Fluoranthene	81.6 U	81.6 U	82.4 U	43.1 U	41.4	45.0
Pyrene	69.6 U	69.6 U	70.4 U	36.7 U	32.9 U	34.7 U
Benzo(a)anthracene	35.3 (b)B	38.5 (b)B	36.2 (b)B	20.2 (b)B	18.5 (b)B	18.7 (b)B
Chrysene	34.6 U	34.6 U	34.9 U	18.2 U	16.3 U	17.2 U
Benzo(b)fluoranthene	49.8 (b)B	44.5 (b)B	48.1 (b)B	28.4	29.6 (b)B	33.1 (c)
Benzo(k)fluoranthene	25.4 U	30.6 (b)	25.7 U	16.8 (b)	12.0 U	12.7 U
Benzo(a)pyrene	22.7 U	22.8 U	23.0 U	12.0 U	10.7 U	11.3 U
Indeno(123-cd)pyrene	26.8 U	26.8 U	27.1 U	14.1 U	12.7 U	13.4 U
Dibenzo(a,h)anthracene	19.2 U	19.2 U	19.4 U	10.1 U	9.06 U	9.57 U
Benzo(g,h,i)perylene	21.4 U	21.4 U	21.6 U	11.2 U	10.1 U	11.2

TABLE F.9. (contd)

Treatment	C-SB	C-SB	C-SB	*M. nasuta* Background	*M. nasuta* Background	*M. nasuta* Background
Replicate	5-1	5-2	5-3	1	2	3
Batch	2	2	2	7	7	7
Units	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.21%	13.21%	13.21%	15.16%	14.86%	14.87%
1,4-Dichlorobenzene	27.6 U	27.9 U	27.4 U	12.1 U	12.5 U	12.5 U
Naphthalene	27.6 U	27.9 U	27.4 U	15.2	16.9	21.4 (b)
Acenaphthylene	10.7 U	10.9 U	10.7 U	4.68 U	4.91 U	4.91 U
Acenaphthene	19.4 U	19.5 U	19.2 U	8.44 U	8.75 U	8.74 U
Fluorene	18.3 U	18.5 U	18.2 U	7.98 U	19.0 (b)	19.2 (b)
Phenanthrene	38.0 U	38.4 U	37.5 U	34.6	25.2	26.6
Anthracene	33.2 U	33.5 U	32.9 U	14.4 U	15.1 U	15.1 U
Fluoranthene	79.5 U	80.2 U	78.7 U	42.8 (b)	47.4 (b)	49.9 (b)
Pyrene	67.8 U	68.5 U	67.1 U	30.4 (b)	34.3	36.9
Benzo(a)anthracene	35.8	36.3 (b)B	34.3 (b)B	26.4 (b)	27.2 (b)	27.3 (b)
Chrysene	33.7 U	34.0 U	33.3 U	14.6 U	15.3 U	15.3 U
Benzo(b)fluoranthene	42.9	44.0 (b)	48.3	32.3	31.4 (b)	33.4 (b)
Benzo(k)fluoranthene	30.1	30.9 (b)	24.5 U	16.6 (b)	17.8 (b)	17.6 (b)
Benzo(a)pyrene	35.6	22.4 U	22.0 U	18.8 (b)	15.2 (b)	17.8 (b)
Indeno(123-cd)pyrene	26.1 U	26.4 U	25.9 U	21.8 (b)	23.4 (b)	23.1 (b)
Dibenzo(a,h)anthracer	18.7 U	18.9 U	18.5 U	8.18 U	8.48 U	8.47 U
Benzo(g,h,i)perylene	20.8 U	21.0 U	20.6 U	20.6 (b)	9.4 U	9.41 U

(a) U Undetected at or above given concentration.
(b) Ion ratio out or confirmation ion not detected.
(c) Benzo(b)fluoranthene is the sum of benzo(b)fluoranthene and benzo(k)fluoranthene. Benzo(k)fluoranthene is present but could not be quantified due to poor resolution.
(d) B Value is < 5 times concentration in blank.

TABLE F.10. Quality Control Summary for Polynuclear Aromatic Hydrocarbons (PAHs) and 1,4-Dichlorobenzene in Tissue of *M. nasuta* (Wet Weight)

Matrix Spike Results

		Matrix Spike		
Treatment:	COMP PC	COMP PC(MS)		
Replicate:	1	1		
Batch:	7	7	Amount	
Wet Wt.	20.84	20.18	Spiked	Percent
Units	ng/g	ng/g	ng/g	Recovery
1,4-Dichlorobenzene	1.79 U[a]	22.3	24.8	90
Naphthalene	3.19 [b]	30.6	24.8	111
Acenaphthylene	0.70 U	26.0	24.8	105
Acenaphthene	14.3	44.1	24.8	120
Fluorene	5.12 [b]	32.5	24.8	110
Phenanthrene	23.9	54.5	24.8	123 [c]
Anthracene	27.2	62.2	24.8	141 [c]
Fluoranthene	495	555	24.8	242 [c]
Pyrene	364	414	24.8	202 [c]
Benzo(a)anthracene	80.6	118	24.8	151 [c]
Chrysene	96.0	128	24.8	129 [c]
Benzo(b)fluoranthene	69.4	83.3	24.8	56
Benzo(k)fluoranthene	1.60 U	47.1	24.8	190 [c]
Benzo(a)pyrene	25.6	55.7	24.8	121 [c]
Indeno(123-cd)pyrene	9.45	34.9	24.8	103
Dibenzo(a,h)anthracene	2.97	30.9	24.8	113
Benzo(g,h,i)perylene	9.36	33.5	24.8	97
Surrogate Internal Standards (%)				
d4 1,4-Dichlorobenzene	49	57	NA[d]	NA
d8 Naphthalene	63	67	NA	NA
d10 Acenaphthene	73	74	NA	NA
d12 Chrysene	79	76	NA	NA
d14 Dibenzo(a,h,i)anthracene	96	93	NA	NA

TABLE F.10. (contd)

Matrix Spike Results

Treatment:	COMP HU-A	*Matrix Spike* COMP HU-A(MS)		
Replicate:	1	1		
Batch:	1	1	Amount	
Wet Wt.	20.12	20.12	Spiked	Percent
Units	ng/g	ng/g	ng/g	Recovery
1,4-Dichlorobenzene	1.86 U	37.1	37.8	98
Naphthalene	3.34	25.8	24.9	90
Acenaphthylene	2.20 (b)	24.4	24.9	89
Acenaphthene	7.45	31.8	24.9	98
Fluorene	8.07	31.9	24.9	96
Phenanthrene	90.2	112	24.9	92
Anthracene	42.8	68.2	24.9	102
Fluoranthene	232	251	24.9	76
Pyrene	278	291	24.9	52
Benzo(a)anthracene	144	167	24.9	92
Chrysene	155	173	24.9	72
Benzo(b)fluoranthene	86.6	110	24.9	94
Benzo(k)fluoranthene	24.1	49.8	24.9	103
Benzo(a)pyrene	69.7	94.1	24.9	98
Indeno(123-cd)pyrene	13.9	34.2	24.9	82
Dibenzo(a,h)anthracene	4.22	25.5	24.9	85
Benzo(g,h,i)perylene	14.4	34.8	24.9	82
Surrogate Internal Standards (%)				
d4 1,4-Dichlorobenzene	43	53	NA	NA
d8 Naphthalene	53	65	NA	NA
d10 Acenaphthene	62	69	NA	NA
d12 Chrysene	76	84	NA	NA
d14 Dibenzo(a,h,i)anthracene	84	95	NA	NA

TABLE F.10. (contd)

Analytical Replicate Results

		Dup	*Trip*	
Treatment:	COMP PC	COMP PC	COMP PC	
Replicate:	5-1	5-2	5-3	
Batch:	7	7	7	
Wet Wt.	16.10	16.99	17.88	NA
Units	ng/g	ng/g	ng/g	RSD%
1,4-Dichlorobenzene	2.31 U	2.20 U	2.09 U	NA
Naphthalene	4.65	4.68	4.39	3
Acenaphthylene	0.93 (b)	0.86 U	0.82 (b)	NA
Acenaphthene	20.2	18.4	17.5	7
Fluorene	6.90	6.56	5.99	7
Phenanthrene	34.0	30.5	28.1	10
Anthracene	36.7	34.0	30.8	9
Fluoranthene	627	587	533	8
Pyrene	453	425	383	8
Benzo(a)anthracene	106	96.8	85.5	11
Chrysene	122	112	99.5	10
Benzo(b)fluoranthene	69.3	81.1	57.6	17
Benzo(k)fluoranthene	17.6	1.97 U	13.7	NA
Benzo(a)pyrene	32.8	30.5	26.6	10
Indeno(123-cd)pyrene	12.2	11.4	10.1	9
Dibenzo(a,h)anthracene	3.88	3.64	3.25	9
Benzo(g,h,i)perylene	12.1	11.4	10.0	10
Surrogate Internal Standards (%)				
d4 1,4-Dichlorobenzene	62	68	50	NA
d8 Naphthalene	74	80	63	NA
d10 Acenaphthene	88	91	79	NA
d12 Chrysene	95	94	83	NA
d14 Dibenzo(a,h,i)anthracene	118	114	102	NA

TABLE F.10. (contd)

Analytical Replicate Results

Treatment:	COMP EC-B	*Dup* COMP EC-B	*Trip* COMP EC-B	
Replicate:	5-1	5-2	5-3	
Batch:	1	1	1	1
Wet Wt.	10.04	10.02	10.11	
Units	ng/g	ng/g	ng/g	RSD%
1,4-Dichlorobenzene	3.73 U	3.73 U	3.73 U	NA
Naphthalene	5.99	4.80	5.64	11
Acenaphthylene	3.26 (b)	3.21 (b)	3.24 (b)	1
Acenaphthene	40.0	41.5	41.8	2
Fluorene	25.8	26.2	25.9	1
Phenanthrene	210	213	213	1
Anthracene	103	106	106	2
Fluoranthene	453	464	475	2
Pyrene	466	476	484	2
Benzo(a)anthracene	183	188	190	2
Chrysene	226	233	234	2
Benzo(b)fluoranthene	139	139	146	3
Benzo(k)fluoranthene	31.7	34.1	32.7	4
Benzo(a)pyrene	88.9	91.4	94.4	3
Indeno(123-cd)pyrene	22.2	22.3	22.9	2
Dibenzo(a,h)anthracene	4.77	5.06	5.17	4
Benzo(g,h,i)perylene	24.1	24.4	25.0	2
Surrogate Internal Standards (%)				
d4 1,4-Dichlorobenzene	44	52	53	NA
d8 Naphthalene	54	65	64	NA
d10 Acenaphthene	58	74	70	NA
d12 Chrysene	69	89	78	NA
d14 Dibenzo(a,h,i)anthracene	79	102	89	NA

Analytical Replicate Results

Treatment:	C-SB	*Dup* C-SB	*Trip* C-SB	
Replicate:	5-1	5-2	5-3	
Batch:	2	2	2	
Wet Wt.	10.16	10.14	10.34	
Units	ng/g	ng/g	ng/g	RSD%
1,4-Dichlorobenzene	3.65 U	3.69 U	3.62 U	NA
Naphthalene	3.65 U	3.69 U	3.62 U	NA
Acenaphthylene	1.42 U	1.44 U	1.41 U	NA
Acenaphthene	2.56 U	2.58 U	2.53 U	NA
Fluorene	2.42 U	2.45 U	2.40 U	NA
Phenanthrene	5.02 U	5.07 U	4.96 U	NA
Anthracene	4.39 U	4.43 U	4.34 U	NA
Fluoranthene	10.5 U	10.6 U	10.4 U	NA
Pyrene	8.95 U	9.05 U	8.86 U	NA
Benzo(a)anthracene	4.73	4.80 (b)B(e)	4.53 (b)B	3
Chrysene	4.45 U	4.49 U	4.40 U	NA
Benzo(b)fluoranthene	5.67	5.81 (b)	6.38	7
Benzo(k)fluoranthene	3.98	4.08 (b)	3.24 U	NA
Benzo(a)pyrene	4.70	2.96 U	2.90 U	NA
Indeno(123-cd)pyrene	3.45 U	3.49 U	3.42 U	NA
Dibenzo(a,h)anthracene	2.47 U	2.50 U	2.45 U	NA
Benzo(g,h,i)perylene	2.75 U	2.78 U	2.72 U	NA
Surrogate Internal Standards (%)				
d4 1,4-Dichlorobenzene	58	59	53	NA
d8 Naphthalene	67	67	61	NA
d10 Acenaphthene	68	66	62	NA
d12 Chrysene	68	63	63	NA
d14 Dibenzo(a,h,i)anthracene	79	71	74	NA

TABLE F.10. (contd)

Analytical Replicate Results

		Dup	*Trip*	
Treatment:	C-SB	C-SB	C-SB	
Replicate:	1-1	1-2	1-3	
Batch:	3	3	3	
Wet Wt.	10.22	10.18	10.08	NA
Units	ng/g	ng/g	ng/g	RSD%
1,4-Dichlorobenzene	3.65 U	3.65 U	3.69 U	NA
Naphthalene	3.65 U	3.65 U	3.69 U	NA
Acenaphthylene	1.42 U	1.42 U	1.44 U	NA
Acenaphthene	2.56 U	2.56 U	2.58 U	NA
Fluorene	2.42 U	2.42 U	2.45 U	NA
Phenanthrene	5.02 U	5.02 U	5.07 U	NA
Anthracene	4.39 U	4.39 U	4.43 U	NA
Fluoranthene	10.5 U	10.5 U	10.6 U	NA
Pyrene	8.95 U	8.95 U	9.05 U	NA
Benzo(a)anthracene	4.54 (b)B	4.95 (b)B	4.65 (b)B	5
Chrysene	4.45 U	4.45 U	4.49 U	NA
Benzo(b)fluoranthene	6.41 (b)B	5.72 (b)B	6.18 (b)B	6
Benzo(k)fluoranthene	3.27 U	3.93 (b)	3.31 U	NA
Benzo(a)pyrene	2.92 U	2.93 U	2.96 U	NA
Indeno(123-cd)pyrene	3.45 U	3.45 U	3.49 U	NA
Dibenzo(a,h)anthracene	2.47 U	2.47 U	2.50 U	NA
Benzo(g,h,i)perylene	2.75 U	2.75 U	2.78 U	NA
Surrogate Internal Standards (%)				
d4 1,4-Dichlorobenzene	54	57	59	NA
d8 Naphthalene	64	65	71	NA
d10 Acenaphthene	67	66	76	NA
d12 Chrysene	80	75	87	NA
d14 Dibenzo(a,h,i)anthracene	83	77	91	NA

(a) U Undetected at or above given concentration.
(b) Ion ratio out or confirmation ion not detected.
(c) Outside quality control range (50-120%) for matrix spike recovery.
(d) NA Not applicable.
(e) B Value is less than 5 times concentration in associated blank.

TABLE F.11. Lipids in Tissue of *M. nasuta*

Sediment Treatment	Replicate	Sample Weight	% Dry Weight	% Lipids (wet weight)	% Lipids (dry weight)
Macoma Background	1	5.18	15.16	0.58	3.83
Macoma Background	2	5.07	14.86	0.59	3.97
Macoma Background	3	5.04	14.87	0.60	4.03

Appendix G

Nereis virens Tissue Chemical Analyses and Quality Assurance/Quality Control Data, Eastchester Project

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Metals

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Worm and Clam Tissue

QA/QC DATA QUALITY OBJECTIVES

	Reference Method	Range of Recovery	SRM Accuracy	Relative Precision	Detection Limit (µg/g dry wt)
Arsenic	ICP/MS	75-125%	≤20%	≤20%	1.0
Cadmium	ICP/MS	75-125%	≤20%	≤20%	0.1
Chromium	ICP/MS	75-125%	≤20%	≤20%	0.2
Copper	ICP/MS	75-125%	≤20%	≤20%	1.0
Lead	ICP/MS	75-125%	≤20%	≤20%	0.1
Mercury	CVAA	75-125%	≤20%	≤20%	0.02
Nickel	ICP/MS	75-125%	≤20%	≤20%	0.1
Silver	ICP/MS	75-125%	≤20%	≤20%	0.1
Zinc	ICP/MS	75-125%	≤20%	≤20%	1.0

METHOD

A total of nine (9) metals was analyzed for the New York Federal Projects-2 Program: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn). Hg was analyzed using cold-vapor atomic absorption spectroscopy (CVAA) according to the method of Bloom and Crecelius (1983). The remaining metals were analyzed by inductively coupled plasma mass spectrometry (ICP/MS) following a procedure based on EPA Method 200.8 (EPA 1991).

To prepare tissue for analysis, samples were freeze-dried and blended in a Spex mixer-mill. Approximately 5 g of mixed sample was ground in a ceramic ball mill. For ICP/MS and CVAA analyses, 0.2- to 0.5-g aliquots of dried homogenous sample were digested using a mixture of nitric acid and hydrogen peroxide following EPA Method 200.3 (EPA 1991).

HOLDING TIMES

A total of 68 worm and 68 clam samples was received on 6/15/94 in good condition. Samples were logged into Battelle's log-in system, frozen to -80°C and subsequently freeze dried within approximately 7 days of sample receipt. Samples were analyzed within 180 days of collection. Worms and clams were digested in two separate batches. The following table summarizes the analysis dates:

Task	Clams	Worms
Sample Digestion	8/9/94	9/9/94
ICP-MS	9/15/94	10/6/94
CVAA-Hg	8/17-8/24/94	8/17-8/24/94

QA/QC SUMMARY METALS (continued)

DETECTION LIMITS Four aliquots of a background clam tissue were analyzed as four separate replicates. The standard deviation of these results were multiplied by 4.541 to determine a method detection limits (MDL). Target detection limits were exceeded for all metals except Ag, Cd and Hg.

METHOD BLANKS One procedural blank was analyzed per 20 samples. No metals were detected in the blanks above the MDLs.

MATRIX SPIKES One sample was spiked with all metals at a frequency of 1 per 20 samples. All recoveries were within the QC limits of 75% -125% with the exception of Ag in one spiked worm sample and Zn in three of the four spiked worm samples. Zn was spiked at a level near the level found in the native samples and, in one case, Zn was spiked at a level below that detected in the native sample and no recovery was calculated.

REPLICATES One sample was analyzed in triplicate at a frequency of 1 per 20 samples. Precision for triplicate analyses is reported by calculating the relative standard deviation (RSD) between the replicate results. Only the RSDs for Zn in one of the four replicated worm analyses exceeded the QC limits of ±20%. RSDs for the rest of the metals were within the QC limits.

SRMs Standard Reference Material (SRM), 1566a (Oyster tissue from the National Institute of Standards and Technology, NIST), was analyzed for all metals. Results for all metals were within ±20 % of mean certified value with the exception of Cr and Ni. Cr values were below the lower QC limit in two of the five SRMs analyzed with the clams and for three of the four SRMs analyzed with the worms. The SRM certified value for Cr (1.43 µg/g) is close to the detection limit (1.46 µg/g). Ni was also recovered below or above the control limits in some samples.

REFERENCES

Bloom, N. S., and E.A. Crecelius. 1983. "Determination of Mercury in Seawater at Sub-Nanogram per Liter Levels." *Mar. Chem.* 14:49-59.

EPA (U.S. Environmental Protection Agency). 1991 Methods for the Determination of Metals in Environmental Samples. EPA-600/4-91-010. Environmental Services Division, Monitoring Management Branch, Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Chlorinated Pesticides/PCB Congeners

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Worm and Clam Tissue

QA/QC DATA QUALITY OBJECTIVES

Reference Method	Surrogate Recovery	Spike Recovery	Relative Precision	Detection Limit
GC/ECD	30-150%	50-120%	≤30%	0.4 ng/g wet wt.

SAMPLE CUSTODY

A total of 68 worm and 68 clam samples was received on 6/15/94 in good condition. Samples were logged into Battelle's log-in system and stored frozen until extraction.

METHOD

Tissues were homogenized wet using a stainless steel blade. An aliquot of tissue sample was extracted with methylene chloride using the roller technique under ambient conditions following a procedure which is based on methods used by the National Oceanic and Atmospheric Administration for its Status and Trends Program (Krahn et al. 1988). Samples were then cleaned using silica/alumina (5% deactivated) chromatography followed by HPLC cleanup (Krahn et al. 1988). Extracts were analyzed for 15 chlorinated pesticides and 22 PCB congeners using gas chromatography/electron capture detection (GC/ECD) following a procedure based on EPA Method 8080 (EPA 1986). The column used was a J&W DB-17 and the confirmatory column was a DB-1701, both capillary columns (30m x 0.25mm I.D.). All detections were quantitatively confirmed on the second column.

HOLDING TIMES

Samples were extracted in seven batches. All extracts were analyzed by GC/ECD. The following summarizes the extraction and analysis dates:

Batch	Species	Extraction	Analysis
1	*M. nasuta*	7/28/94	9/9-9/12/94
2	*M. nasuta*	8/3/94	9/13-9/15/94
3	*M. nasuta*	8/17/94	9/23-9/25/94
4	*N. virens*	8/19/95	9/26-9/30/94
5	*N. virens*	8/26/94	9/8-9/11/94
6	*N. virens*	9/6/94	9/17-9/19/94
7	*M. nasuta/N. virens*	9/26/94	9/15-9/17-94
8	*M. nasuta* MDL study	10/10/94	10/25/94

DETECTION LIMITS

Target detection limits of 0.4 ng/g wet weight were met for all pesticides and PCB congeners, with the exception of dieldrin, PCB 8 and PCB 18, and for the samples that were analyzed in triplicate. These elevated detection limits for the replicates were due to the limited amount of tissue available resulting in smaller aliquots used for extraction. Method detection limits (MDLs) reported were determined by multiplying the standard deviation of seven spiked replicates of clam tissue by the Student's t value (99 percentile). Actual pesticide MDLs ranged from approximately 0.1 to 1.1 ng/g wet weight and PCB congener MDLs ranged from approximately 0.1 to 0.9 ng/g wet weight, depending on the compound and the sample weight extracted. MDLs were reported corrected for individual sample wet weight extracted.

Method detection limit verification was performed by analyzing four replicates of a spiked clam sample and multiplying the standard deviation of the results by 3.5. All detection limits calculated in this way were below the target detection limit of 0.4 ng/g wet weight with the exception of 4,4'-DDD which had a DL of 0.467 ng/g.

METHOD BLANKS

One method blank was extracted with each extraction batch. No pesticides or PCBs were detected in any of the method blanks.

SURROGATES

Two compounds, PCB congeners 103 and 198, were added to all samples prior to extraction to assess the efficiency of the analysis. Sample surrogate recoveries were all within the QC guidelines of 30% - 150%, with the exception of one sample in Batch 3 and two samples in Batch 4. All of these incidents involved a high recovery of PCB 198. This was most likely due to matrix interferences with the internal Standard octachloronaphthalene (OCN) which is used to quantify the recovery of surrogate PCB 198. Since no sample data are corrected for the OCN, sample results should not be affected. One sample had low surrogate recoveries for both PCB 103 and 198. This sample was re-extracted once due to surrogate recoveries. Since the recoveries in the reextraction also exceeded control limits, the problem was determined to be matrix interferences and no additional extractions were performed. Sample results were quantified using the surrogate internal standard method.

MATRIX SPIKES

Ten out of the 15 pesticides and 5 of the 22 PCB congeners analyzed were spiked into one sample per extraction batch. Matrix spike recoveries were within the control limit range of 50-120% for all Pesticides and PCBs in Batches 1, 2, 3, 6 and 7 with the exception of PCB 138 in Batch six and three pesticides and 2 PCBs in Batch seven. In all cases, the recoveries were high and are most likely due to matrix interferences. Recoveries for the majority of pesticides and PCBs in Batches four and five exceeded control limits due to high native levels compared with the levels spiked. In most cases, the spiked concentrations were 2 to 10 times lower than the concentrations detected in the samples.

REPLICATES

One sample from each extraction batch was analyzed in triplicate. Precision was measured by calculating the relative standard deviation (RSD) between the replicate results. RSDs for all detectable values were below the target precision goal of ≤30% in Batches 1, 2, 3, 4 and 7. The RSD for Endosulfan Sulfate in Batch 5 was high due to comparison of very low concentrations, less than 1 ng/g in the replicates. RSDs for two pesticides and for two PCB congeners in Batch 6 were high due to matrix interferences associated with the first replicate sample.

QA/QC SUMMARY/PCBs and PESTICIDES (continued)

SRMs Not applicable.

MISCELLANEOUS All pesticide and PCB congener results are confirmed using a second dissimilar column. RPDs between the primary and confirmation values must be less than 75% to be considered a confirmed value.

REFERENCES

Krahn, M.M., C.A. Wigren, R.W. Pearce, L.K. Moore, R.G. Bogar, W.D. MacLeod, Jr., S-L Chan, and D.W. Brown. 1988. *New HPLC Cleanup and Revised Extraction Procedures for Organic Contaminants.* NOAA Technical Memorandum NMFS F/NWC-153. National Oceanic and Atmospheric Administration, National Marine Fisheries, Seattle, Washington.

EPA (U.S. Environmental Protection Agency). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* SW-846. U.S. Document No. 955-001-00000, U.S. Environmental Protection Agency, Washington D.C.

QA/QC SUMMARY

PROGRAM: New York/New Jersey Federal Projects-2

PARAMETER: Polynuclear Aromatic Hydrocarbons (PAH) and 1,4-Dichlorobenzene

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, Washington

MATRIX: Clam and Worm Tissue

QA/QC DATA QUALITY OBJECTIVES

Reference Method	MS Recovery	Surrogate Recovery	SRM Accuracy	Relative Precision	Detection Limit (wet wt)
GC/MS/SIM	50-120%	30-150%	≤30%	≤30%	4 ng/g

SAMPLE CUSTODY

A total of 68 worm and 68 clam samples was received on 6/15/94 in good condition. Samples were logged into Battelle's log-in system and stored frozen until extraction.

METHOD

Tissue samples were extracted with methylene chloride using a roller under ambient conditions following a procedure which is based on methods used by the National Oceanic and Atmospheric Administration for its Status and Trends Program (Krahn et al. 1988). Samples were then cleaned using silica/alumina (5% deactivated) chromatography followed by HPLC cleanup.

Extracts were quantified using gas chromatography/mass spectrometry (GC/MS) in the selected ion mode (SIM) following a procedure based on EPA Method 8270 (EPA 1986).

HOLDING TIMES

Samples were extracted in seven batches. All extracts were analyzed by GC/MS/SIM. The following summarizes the extraction and analysis dates:

Batch	Species	Extraction	Analysis
1	*M. nasuta*	7/28/94	9/9-9/12/94
2	*M. nasuta*	8/3/94	9/13-9/15/94
3	*M. nasuta*	8/17/94	9/23-9/25/94
4	*N. virens*	8/19/95	9/26-9/30/94
5	*N. virens*	8/26/94	9/8-9/11/94
6	*N. virens*	9/6/94	9/17-9/19/94
7	*M. nasuta/N. virens*	9/26/94	9/15-9/17-94
8	*M. nasuta* MDL study	10/10/94	10/25/94

DETECTION LIMITS

Target detection limits of 4 ng/g wet weight were met for all PAH compounds except for fluoranthene and pyrene, which had method detection limits (MDL) between 4 and 6 ng/g wet weight. MDLs were determined by multiplying the standard deviation of seven spiked replicates of a background clam sample by the Student's t value (99 percentile). These MDLs were based on a wet weight of 20 g of tissue sample.

QA/QC SUMMARY/PAHs (continued)

Aliquots of samples that were analyzed in triplicate, used for spiking, or were re-extracted, were generally less than 20 g due to limited quantities of tissue available. Because MDLs reported are corrected for sample weight, the MDLs reported for these samples appear elevated and in some cases may exceed the target detection limit.

In addition a method detection limit verification study was performed, which consisted of analyzing four spiked aliquots of a background clam sample received with this project. The standard deviation of the results of these replicate analyses was multiplied by 3.5. Detection limits calculated in this way were all less than the target detection limit of 4 ng/g wet wt.

METHOD BLANKS

One method blank was extracted with each extraction batch. Benz[a]anthracene was detected in blanks from all batches and benzo[b]fluoranthene was detected in the blank from Batch 3. Two method blanks were analyzed with Batch 7 and in addition to benz[a]anthracene, three other compounds were detected in at least one of the two blanks; naphthalene, benzo[a]pyrene and indeno(123-cd)pyrene. All blank levels were less than three times the target MDL of 4 ng/g wet wt. Sample values that were less than five times the value of the method blank associated with that sample were flagged with a "B."

SURROGATES

Five isotopically labeled compounds were added prior to extraction to assess the efficiency of the method. These were d8-naphthalene, d10-acenaphthene, d12-chrysene, d14-dibenz[a,h]anthracene and d4-1,4 dichlorobenzene. Recoveries of all surrogates were within the quality control limits of 30% -150% with the exception of low recoveries for d4-1,4 dichlorobenzene in one sample from Batch 1 and Batch 4 and two samples in Batch seven. In addition, d8-naphthalene recovery was low in two samples in Batch seven.

MATRIX SPIKES

One sample from each batch was spiked with all PAH compounds. Matrix spike recoveries were generally, within QC limits of 50% -120%, with some exceptions. The recoveries for benzo(b)- and benzo[k]fluoranthene were variable due to the poor resolution of these two compounds. Spike recoveries quantified as the sum of these two compounds were within QC limits. Spike recoveries for a number of PAH compounds in Batches 4 and 7 were out of control due to high native levels, relative to the levels spiked. Spike concentrations were from 2 to 20 times lower than native concentrations. Recoveries for a number of compounds in Batches 4 and 6 were slightly above the upper control limit. These recoveries were all between 120% and 140%.

REPLICATES

One sample from each batch was extracted and analyzed in triplicate. Precision was measured by calculating the relative standard deviation (RSD) between the replicate results. All RSDs were within ±30%.

SRMs

Not applicable.

MISCELLANEOUS

Some of the compounds are flagged to indicate that the ion ratio for that compound was outside of the QC range. This is due primarily to low levels of the compound of interest. Because the confirmation ion is present at only a fraction of the level of the parent ion, when the native level of the compound is low, the amount of error in the concentration measurement of the confirmation ion goes up. The compound is actually quantified from the parent ion only, so most likely this will not affect the quality of the data. For sample values that are relatively high (>5 times the MDL) it may be an indication of some sort of interference.

REFERENCES

Krahn, M.M., C.A. Wigren, R.W. Pearce, L.K. Moore, R.G. Bogar, W.D. MacLeod, Jr., S-L Chan, and D.W. Brown. 1988. *New HPLC Cleanup and Revised Extraction Procedures for Organic Contaminants*. NOAA Technical Memorandum NMFS F/NWC-153. National Oceanic and Atmospheric Administration, National Marine Fisheries, Seattle, Washington.

EPA (U.S. Environmental Protection Agency). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* SW-846. U.S. Document No. 955-001-00000, U.S. Environmental Protection Agency, Washington D.C.

TABLE G.1. Metals in Tissue of *N. virens* (Wet Weight)

				N. virens Metals (µg/g wet weight)								
Sed Code ID	Replicate	Batch	% Dry Weight	Ag ICP/MS	As ICP/MS	Cd ICP/MS	Cr ICP/MS	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn ICP/MS
COMP EC-A	1	1	14.61%	0.024 U[(a)]	2.206	0.072	0.213 U	1.782	0.010	0.192 U	0.465	8.459
COMP EC-A	2	1	13.54%	0.022 U	1.760	0.066	0.235	1.963	0.017	0.194	0.512	9.476
COMP EC-A	3-1	1	14.69%	0.024 U	1.998	0.069	0.214 U	1.419	0.009	0.193 U	0.379	22.92
COMP EC-A	3-2	1	14.69%	0.024 U	2.262	0.068	0.214 U	1.587	0.009	0.193 U	0.423	22.77
COMP EC-A	3-3	1	14.69%	0.024 U	2.218	0.072	0.214 U	1.513	0.009	0.193 U	0.426	24.24
COMP EC-A	4	1	13.51%	0.022 U	1.486	0.072	0.197 U	1.378	0.014	0.178 U	0.466	15.27
COMP EC-A	5	1	15.62%	0.026 U	2.140	0.061	0.228 U	1.953	0.010	0.206 U	0.847	17.65
COMP EC-B	1	1	14.90%	0.025 U	1.982	0.072	0.217 U	5.468	0.007	0.196 U	0.572	9.462
COMP EC-B	2	1	16.63%	0.028 U	2.195	0.061	0.243 U	1.317	0.008	0.219 U	0.534	8.847
COMP EC-B	3	1	13.59%	0.023 U	1.699	0.052	0.292	1.930	0.007	0.246	1.726	17.67
COMP EC-B	4	1	14.56%	0.024 U	2.038	0.065	0.212 U	1.660	0.010	0.192 U	0.462	8.736
COMP EC-B	5	1	13.92%	0.023 U	1.935	0.072	0.245	1.656	0.009	0.183 U	0.738	10.04
R-CLIS	1	1	13.70%	0.023 U	1.987	0.053	0.200 U	1.507	0.012	0.180 U	0.319	8.521
R-CLIS	2	1	16.08%	0.027 U	2.267	0.060	0.235 U	1.656	0.010	0.212 U	0.486	9.294
R-CLIS	3	1	15.15%	0.025 U	1.803	0.049	0.221 U	1.345	0.008	0.199 U	0.333	40.60
R-CLIS	4	1	14.02%	0.023 U	2.271	0.055	0.205 U	1.374	0.011	0.222	0.331	52.58
R-CLIS	5	1	14.53%	0.024 U	2.063	0.057	0.212 U	1.729	0.012	0.248	0.334	20.20
R-MUD	1	1	13.12%	0.022	1.863	0.063	0.191 U	1.640	0.011	0.173 U	0.321	8.462
R-MUD	2	1	14.94%	0.029	2.286	0.079	0.218 U	10.85	0.013	0.197 U	0.647	11.58
R-MUD	3	1	15.21%	0.025 U	2.175	0.053	0.222 U	1.106	0.010	0.200 U	0.304 U	10.39
R-MUD	4	1	14.00%	0.026	2.114	0.062	0.204 U	1.582	0.011	0.184 U	0.280 U	8.078
R-MUD	5	1	13.24%	0.022	1.907	0.053	0.193 U	1.337	0.015	0.174 U	0.297	17.74
C-NV	1	1	14.84%	0.025 U	2.374	0.056	0.217 U	1.226	0.011	0.195 U	0.297 U	7.732
C-NV	2	1	12.32%	0.020 U	1.712	0.048	0.180 U	1.020	0.010	0.162 U	0.247 U	27.10
C-NV	3	1	14.51%	0.024 U	2.017	0.077	0.212 U	1.509	0.016	0.191 U	0.315	8.198
C-NV	4	1	13.67%	0.023 U	2.160	0.062	0.199 U	1.348	0.012	0.180 U	0.325	16.40
C-NV	5	1	14.91%	0.025 U	2.028	0.085	0.218 U	1.759	0.014	0.196 U	0.416	9.870
N. virens Background	1	1	12.86%	0.021 U	1.839	0.051	0.247	1.608	0.011	0.240	0.257 U	9.748
N. virens Background	2	1	12.94%	0.021 U	2.019	0.045	0.189 U	1.240	0.016	0.170 U	0.259 U	8.139
N. virens Background	3	1	12.05%	0.020 U	1.567	0.055	0.180	1.783	0.018	0.172	0.241 U	9.965

(a) U Undetected at or above given concentration.

TABLE G.2. Metals in Tissue of *N. virens* (Dry Weight)

				N. virens Metals (μg/g dry weight)								
Sediment Treatment	Replicate	Batch	% Dry Weight	Ag ICP/MS	As ICP/MS	Cd ICP/MS	Cr ICP/MS	Cu ICP/MS	Hg CVAF	Ni ICP/MS	Pb ICP/MS	Zn ICP/MS
COMP EC-A	1	1	14.61%	0.166 U[a]	15.1	0.492	1.46 U	12.2	0.069	1.32 U	3.18	57.9
COMP EC-A	2	1	13.54%	0.166 U	13.0	0.484	1.73	14.5	0.122	1.43	3.78	70.0
COMP EC-A	3-1	1	14.69%	0.166 U	13.6	0.472	1.46 U	9.66	0.059	1.32 U	2.58	156
COMP EC-A	3-2	1	14.69%	0.166 U	15.4	0.466	1.46 U	10.8	0.061	1.32 U	2.88	155
COMP EC-A	3-3	1	14.69%	0.166 U	15.1	0.491	1.46 U	10.3	0.058	1.32 U	2.90	165
COMP EC-A	4	1	13.51%	0.166 U	11.0	0.535	1.46 U	10.2	0.104	1.32 U	3.45	113
COMP EC-A	5	1	15.62%	0.166 U	13.7	0.388	1.46 U	12.5	0.062	1.32 U	5.42	113
COMP EC-B	1	1	14.90%	0.166 U	13.3	0.483	1.46 U	36.7	0.046	1.32 U	3.84	63.5
COMP EC-B	2	1	16.63%	0.166 U	13.2	0.366	1.46 U	7.92	0.050	1.32 U	3.21	53.2
COMP EC-B	3	1	13.59%	0.166 U	12.5	0.379	2.15	14.2	0.053	1.81	12.7	130
COMP EC-B	4	1	14.56%	0.166 U	14.0	0.445	1.46 U	11.4	0.066	1.32 U	3.17	60.0
COMP EC-B	5	1	13.92%	0.166 U	13.9	0.518	1.76	11.9	0.063	1.32 U	5.30	72.1
R-CLIS	1	1	13.70%	0.166 U	14.5	0.385	1.46 U	11.0	0.085	1.32 U	2.33	62.2
R-CLIS	2	1	16.08%	0.166 U	14.1	0.372	1.46 U	10.3	0.061	1.32 U	3.02	57.8
R-CLIS	3	1	15.15%	0.166 U	11.9	0.324	1.46 U	8.88	0.050	1.32 U	2.20	268
R-CLIS	4	1	14.02%	0.166 U	16.2	0.395	1.46 U	9.80	0.078	1.58	2.36	375
R-CLIS	5	1	14.53%	0.166 U	14.2	0.393	1.46 U	11.9	0.082	1.71	2.30	139
R-MUD	1	1	13.12%	0.168	14.2	0.478	1.46 U	12.5	0.086	1.32 U	2.45	64.5
R-MUD	2	1	14.94%	0.196	15.3	0.531	1.46 U	72.6	0.089	1.32 U	4.33	77.5
R-MUD	3	1	15.21%	0.166 U	14.3	0.347	1.46 U	7.27	0.067	1.32 U	2.00 U	68.3
R-MUD	4	1	14.00%	0.186	15.1	0.444	1.46 U	11.3	0.075	1.32 U	2.00 U	57.7
R-MUD	5	1	13.24%	0.166	14.4	0.397	1.46 U	10.1	0.116	1.32 U	2.24	134
C-NV	1	1	14.84%	0.166 U	16.0	0.376	1.46 U	8.26	0.074	1.32 U	2.00 U	52.1
C-NV	2	1	12.32%	0.166 U	13.9	0.387	1.46 U	8.28	0.082	1.32 U	2.00 U	220
C-NV	3	1	14.51%	0.166 U	13.9	0.530	1.46 U	10.4	0.112	1.32 U	2.17	56.5
C-NV	4	1	13.67%	0.166 U	15.8	0.454	1.46 U	9.86	0.086	1.32 U	2.38	120
C-NV	5	1	14.91%	0.166 U	13.6	0.573	1.46 U	11.8	0.097	1.32 U	2.79	66.2
N. virens Background	1	1	12.86%	0.166 U	14.3	0.398	1.92	12.5	0.089	1.87	2.00 U	75.8
N. virens Background	2	1	12.94%	0.166 U	15.6	0.349	1.46 U	9.58	0.120	1.32 U	2.00 U	62.9
N. virens Background	3	1	12.05%	0.166 U	13.0	0.459	1.49	14.8	0.148	1.43	2.00 U	82.7

(a) U Undetected at or above given concentration.

TABLE G.3. Quality Control Summary for Metals in Tissue of *N. virens*

Sediment Treatment	Replicate	Batch	*N. virens* Metals (µg/g dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Method Blanks											
Blank-1		1	0.166 U[a]	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Blank-2		1	0.166 U	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Blank-3		1	0.166 U	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Blank-4		1	0.166 U	3.39 U	0.081 U	1.46 U	6.86 U	0.001 U	1.32 U	2.00 U	10.8 U
Matrix Spikes											
COMP BU	2	1	0.166 U	13.9	0.404	1.46 U	10.6	0.059	1.32 U	2.42	69
COMP BU, MS	2	1	1.90	61.6	4.34	9.63	57.6	1.02	10.3	6.66	183
Concentration Recovered			1.90	47.7	3.94	9.63	47.0	0.96	10.3	4.24	114.0
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	100
Percent Recovery			91%	92%	94%	93%	90%	92%	99%	102%	114%
COMP BU	4	1	0.191	14.3	0.385	1.46 U	8.4	0.068	1.32 U	2.19	93.8
COMP BU, MS	4	1	2.06	63.4	4.45	10.2	57.4	1.18	10.4	6.13	153
Concentration Recovered			1.87	49.1	4.07	10.2	49.0	1.11	10.4	4.75	59.2
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	100
Percent Recovery			90%	94%	97%	98%	94%	107%	100%	114%	59% [b]
COMP EC-A	3	1	0.178 U	14.7	0.476	1.46 U	10.2	0.059	1.32 U	2.79	NA [c]
COMP EC-A, MS	3	1	0.968	61.3	4.28	9.84	56.8	1.04	10.1	6.95	NA
Concentration Recovered			0.968	46.6	3.80	9.84	46.6	0.98	10.1	4.16	NA
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	NS [d]
Percent Recovery			47% [b]	89%	91%	95%	89%	94%	97%	100%	NA
COMP HU-A	5	1	0.173 U	15.8	0.5313	1.46 U	11.0	0.077	1.32 U	2.77	98.7
COMP HU-A, MS	5	1	1.91	63.8	4.56	9.78	58.7	1.05	10.3	7.13	160
Concentration Recovered			1.91	48.0	4.03	9.78	47.7	0.973	10.3	4.36	61.3
Amount Spiked			2.08	52.1	4.17	10.4	52.1	1.04	10.4	4.17	100
Percent Recovery			92%	92%	97%	94%	91%	94%	99%	105%	61% [b]

TABLE G.3. (contd)

Sed Code ID	Replicate	Batch	*N. virens* Metals (µg/g dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Standard Reference Material											
Certified value			1.68	14.0	4.15	1.43	66.3	0.0642	2.25	0.371	830
Range			±0.15	±1.2	±0.38	±0.46	±4.3	±0.0067	±0.44	±0.014	±57
SRM 1566a	1	1	1.62	13.2	4.25	1.23	63.6	0.064	2.13	0.369	854
SRM 1566a	2	1	1.54	12.5	4.01	1.00	58.3	0.057	3.05	0.389	778
SRM 1566a	3	1	1.47	11.9	4.00	0.921	57.9	0.058	1.86	0.369	764
SRM 1566a	4	1	1.51	11.9	4.01	0.948	60.4	0.061	1.65	0.363	792
Percent Difference	1		4	6	2	14	4	0	5	1	3
Percent Difference	2		8	11	3	30 [e]	12	11	36 [e]	5	6
Percent Difference	3		13	15	4	36 [e]	13	10	17	1	8
Percent Difference	4		10	15	3	34 [e]	9	5	27 [e]	2	5
Analytical Replicates											
COMP BU, Replicate 1	4	1	0.195	14.4	0.388	1.459 U	8.30	0.065	1.32 U	2.18	60.2
COMP BU, Replicate 2	4	1	0.195	14.0	0.362	1.459 U	8.34	0.074	1.32 U	2.19	59.1
COMP BU, Replicate 3	4	1	0.182	14.6	0.404	1.459 U	8.55	0.066	1.32 U	2.19	162
RSD			4%	2%	6%	NA	2%	7%	NA	0%	63% [f]
COMP EC-A, Replicate 1	3	1	0.166 U	13.6	0.472	1.459 U	9.66	0.059	1.32 U	2.58	156
COMP EC-A, Replicate 2	3	1	0.166 U	15.4	0.466	1.459 U	10.8	0.061	1.32 U	2.88	155
COMP EC-A, Replicate 3	3	1	0.166 U	15.1	0.491	1.459 U	10.3	0.058	1.32 U	2.90	165
RSD			NA	7%	3%	NA	6%	3%	NA	6%	3%
COMP BU, Replicate 1	2	1	0.166 U	13.5	0.396	1.459 U	10.3	0.055	1.32 U	2.30	87.2
COMP BU, Replicate2	2	1	0.166 U	14.1	0.401	1.459 U	10.8	0.064	1.32 U	2.43	61.8
COMP BU, Replicate 3	2	1	0.166 U	14.0	0.416	1.459 U	10.7	0.058	1.32 U	2.54	58.1
RSD			NA	2%	3%	NA	2%	8%	NA	5%	23% [f]
COMP HU-A, Replicate 1	5	1	0.166 U	16.3	0.568	1.459 U	11.4	0.071	1.32 U	2.84	98.9
COMP HU-A, Replicate 2	5	1	0.166 U	15.7	0.490	1.459 U	11.1	0.090	1.32 U	2.76	80.1
COMP HU-A, Replicate 3	5	1	0.166 U	15.5	0.536	1.459 U	10.6	0.069	1.32 U	2.70	117
RSD			NA	3%	7%	NA	4%	15%	NA	3%	19%

(a) U Undetected at or above given concentration.
(b) Outside quality control criteria (75-125%) for matrix spike recovery.
(c) NA Not applicable.
(d) NS Not spiked.
(e) Outside quality control criteria (± 20%) for SRMs.
(f) Outside quality control criteria (±20%) for RSD.

TABLE G.4. Pesticides and PCB Congeners (Wet Weight) in Tissue of *N. virens*

Treatment	EC-A	EC-A	EC-A	EC-A	EC-A
Replicate	1	2	3	4	5
Batch	5	6	5	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.61	13.54	14.69	13.51	15.62
Heptachlor	0.19 U[(a)]	0.19 U	0.91	0.19 U	0.21
Aldrin	2.08	0.87	0.92	0.98	2.30
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
a-Chlordane	1.29	1.63	1.72	1.66	1.24
Trans Nonachlor	1.40	1.72	1.33	1.83	1.36
4,4'-DDE	2.68	4.25	4.50	3.92	3.71
Dieldrin	1.58	2.27	4.31	2.32	2.21
2,4'-DDD	0.25 U	2.46	12.7	2.38	2.77
2,4'-DDT	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
4,4'-DDD	2.16	5.80	14.4	6.67	11.7
Endosulfan II	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
4,4'-DDT	0.15 U	0.48	0.50	0.82	0.16
Endosulfan Sulfate	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
PCB 8	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
PCB 18	1.58	4.20	6.38	4.32	4.10
PCB 28	3.24	5.82	7.47	5.14	5.25
PCB 52	5.08	10.2	11.5	10.2	8.56
PCB 49	3.10	5.51	5.79	4.96	4.55
PCB 44	1.28	2.90	3.03	2.40	2.69
PCB 66	0.09 U	9.49	0.09 U	0.09 U	0.09 U
PCB 101	5.24	6.38	8.20	6.01	4.89
PCB 87	0.48	0.69	0.79	0.92	0.79
PCB 118	2.84	4.33	5.07	2.86	2.53
PCB 184	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
PCB 153	5.61	5.35	6.41	4.08	3.35
PCB 105	1.33	1.94	2.77	1.94	1.41
PCB 138	4.40	4.38	5.77	3.29	2.70
PCB 187	1.56	1.75	1.65	1.68	1.16
PCB 183	0.74	0.82	0.81	0.76	0.53
PCB 128	0.69	0.76	1.02	0.66	0.53
PCB 180	2.34	2.16	4.06	2.51	1.98
PCB 170	1.13	1.03	1.11	1.13	0.82
PCB 195	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
PCB 206	0.50	0.66	0.55	0.89	0.61
PCB 209	0.21	0.32	0.30	0.42	0.35
Surrogate Recoveries (%)					
PCB 103 (SIS)	86	84	85	79	78
PCB 198 (SIS)	78	69	76	142	138

TABLE G.4. (contd)

Treatment	EC-B	EC-B	EC-B	EC-B	EC-B
Replicate	1	2	3	4	5
Batch	5	6	6	5	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.9	16.63	13.59	14.56	13.92
Heptachlor	0.26	1.04	0.20 U[(a)]	0.93	1.13
Aldrin	0.77	1.20	1.12	2.68	1.19
Heptachlor Epoxide	0.13 U	0.71	0.15 U	0.13 U	0.13 U
2,4'-DDE	0.26	0.26 U	0.29 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.20 U	0.18 U	0.18 U
a-Chlordane	2.56	6.23	3.54	5.09	6.66
Trans Nonachlor	2.78	3.74	4.30	4.36	4.23
4,4'-DDE	1.77	3.81	2.72	4.32	4.88
Dieldrin	2.14	3.34	1.99	3.97	3.34
2,4'-DDD	1.42	5.54	1.55	13.3	3.16
2,4'-DDT	0.18 U	0.18 U	0.20 U	0.18 U	0.18 U
4,4'-DDD	4.41	13.0	5.45	20.2	10.8
Endosulfan II	0.18 U	0.18 U	0.20 U	0.18 U	0.18 U
4,4'-DDT	0.53	0.35	0.86	0.71	0.98
Endosulfan Sulfate	0.18 U	0.18 U	0.20 U	0.18 U	0.81 U
PCB 8	0.41 U	0.40 U	0.45 U	0.41 U	0.41 U
PCB 18	3.08	7.95	2.84	5.57	8.47
PCB 28	2.79	7.99	3.64	5.91	8.73
PCB 52	5.65	13.9	6.51	14.4	13.4
PCB 49	2.43	7.09	3.37	5.52	7.26
PCB 44	1.34	3.25	1.61	2.75	4.60
PCB 66	0.09 U	0.09 U	0.10 U	0.09 U	11.8
PCB 101	3.28	11.7	5.54	15.2	8.09
PCB 87	0.30	0.77	0.63	1.47	1.17
PCB 118	1.57	7.79	3.74	11.8	4.82
PCB 184	0.24 U	0.24 U	0.26 U	0.24 U	0.24 U
PCB 153	3.78	9.43	4.78	11.2	6.62
PCB 105	1.21	4.30	2.21	5.97	2.76
PCB 138	2.70	8.81	4.12	11.2	5.70
PCB 187	1.38	2.91	1.98	2.48	2.68
PCB 183	0.61	1.46	0.95	1.33	1.25
PCB 128	0.48	1.69	0.74	2.13	1.04
PCB 180	3.06	5.87	5.28	6.31	5.88
PCB 170	0.82	1.85	1.22	1.94	1.51
PCB 195	0.22	0.10 U	0.11 U	0.36	0.10 U
PCB 206	0.54	0.73	0.61	0.76	0.77
PCB 209	0.21	0.15	0.16	0.25	0.22
Surrogate Recoveries (%)					
PCB 103 (SIS)	89	102	91	89	93
PCB 198 (SIS)	83	73	70	82	69

TABLE G.4. (contd)

Treatment	R-MUD	R-MUD	R-MUD	R-MUD	R-MUD
Replicate	1	2	3	4	5
Batch	4	5	6	7	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.12	14.94	15.21	14.00	13.24
Heptachlor	0.19 U	0.18 U	0.19 U	0.19 U	0.23 U
Aldrin	0.13 U	0.12 U	0.13 U	0.13 U	0.16 U
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U	0.13 U	0.16 U
2,4'-DDE	0.26 U	0.26 U	0.26 U	0.26 U	0.32 U
Endosulfan I	0.18 U	0.18 U	0.18 U	0.18 U	0.22 U
a-Chlordane	0.10 U	0.09 U	0.10 U	0.10 U	0.12 U
Trans Nonachlor	0.43	0.61	0.67	0.39	0.61
4,4'-DDE	0.19 U	0.18 U	0.35	0.19 U	0.23 U
Dieldrin	0.94	0.71	0.52 U	0.66	0.64 U
2,4'-DDD	0.25 U	0.35	0.25 U	0.25 U	0.31 U
2,4'-DDT	0.18 U	0.18 U	0.18 U	0.18 U	0.22 U
4,4'-DDD	1.00	0.39	0.26 U	0.85	0.32 U
Endosulfan II	0.18 U	0.18 U	0.18 U	0.18 U	0.22 U
4,4'-DDT	0.15 U	0.15 U	0.15 U	0.15 U	0.19 U
Endosulfan Sulfate	0.18 U	0.18 U	0.18 U	0.18 U	0.22 U
PCB 8	0.41 U	0.40 U	0.41 U	0.41 U	0.51 U
PCB 18	0.43 U	0.42 U	0.43 U	0.43 U	0.53 U
PCB 28	0.20 U	0.20 U	0.20 U	0.20 U	0.25 U
PCB 52	0.36 U	0.35 U	0.43	0.36 U	0.64
PCB 49	0.24 U	0.23 U	0.24 U	0.24 U	0.29 U
PCB 44	0.17 U	0.16 U	0.17 U	0.17 U	0.20 U
PCB 66	0.09 U	0.09 U	0.09 U	0.09 U	0.12 U
PCB 101	0.15 U	0.81	0.44	0.45	0.54
PCB 87	0.16 U	0.16 U	0.23	0.16 U	0.20 U
PCB 118	0.29 U	0.29 U	0.29 U	0.29 U	0.37 U
PCB 184	0.24 U	0.23 U	0.24 U	0.24 U	0.29 U
PCB 153	1.76	2.35	2.20	2.08	1.66
PCB 105	0.11 U	0.11 U	0.24	0.28	0.27
PCB 138	0.92	1.44	1.17	1.36	1.03
PCB 187	0.38	0.53	0.60	0.58	0.43
PCB 183	0.24 U	0.24	0.24	0.24 U	0.29 U
PCB 128	0.19	0.22	0.20	0.20	0.90 U
PCB 180	0.45	0.69	0.60	0.56	0.59
PCB 170	0.17 U	0.37	0.33	0.27	0.34
PCB 195	0.10 U	0.10 U	0.10 U	0.10 U	0.12 U
PCB 206	0.30	0.23	0.23	0.11 U	0.31
PCB 209	0.16	0.15	0.16	0.17	0.15
Surrogate Recoveries (%)					
PCB 103 (SIS)	77	93	83	58	84
PCB 198 (SIS)	118	82	66	57	64

TABLE G.4. (contd)

Treatment	R-CLIS	R-CLIS	R-CLIS	R-CLIS	R-CLIS
Replicate	1	2	3	4	5
Batch	6	5	4	6	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.70	16.08	15.15	14.02	14.53
Heptachlor	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U
Aldrin	1.04	0.79	0.77	0.80	0.68
Heptachlor Epoxide	0.27	0.13 U	0.13 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
a-Chlordane	0.10 U	0.17	0.11	0.20	0.10 U
Trans Nonachlor	0.76	0.69	0.59	0.80	0.23
4,4'-DDE	1.25	0.70	0.60	0.44	0.19 U
Dieldrin	1.62	0.92	1.08	0.51 U	0.61
2,4'-DDD	3.00	1.24	0.50	0.66	0.25 U
2,4'-DDT	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
4,4'-DDD	6.12	1.95	1.18	0.26 U	0.26 U
Endosulfan II	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
4,4'-DDT	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Endosulfan Sulfate	0.18 U	0.18 U	0.18 U	0.22	0.18 U
PCB 8	0.41 U	0.41 U	0.40 U	0.40 U	0.41 U
PCB 18	0.43 U	0.43 U	0.42 U	0.42 U	0.43 U
PCB 28	0.48	0.37	0.28	0.20 U	0.20 U
PCB 52	5.31	1.65	0.99	0.94	0.36 U
PCB 49	1.41	0.47	0.34	0.31	0.24 U
PCB 44	0.22	0.17 U	0.16 U	0.16 U	0.17 U
PCB 66	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
PCB 101	8.13	3.32	1.62	1.47	0.43
PCB 87	0.75	0.16 U	0.17	0.16 U	0.16 U
PCB 118	5.67	2.06	0.99	0.89	0.29 U
PCB 184	0.24 U	0.24 U	0.23 U	0.23 U	0.24 U
PCB 153	7.38	4.36	2.92	3.45	0.84
PCB 105	2.12	1.13	0.45	0.45	0.13
PCB 138	6.11	3.64	1.88	2.22	0.50
PCB 187	1.76	0.91	0.88	1.06	0.23
PCB 183	0.88	0.41	0.34	0.43	0.24 U
PCB 128	1.21	0.68	0.36	0.42	0.15 U
PCB 180	2.39	1.20	0.95	0.92	0.41
PCB 170	1.11	0.67	0.56	0.51	0.19
PCB 195	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
PCB 206	0.38	0.34	0.38	0.35	0.14
PCB 209	0.24	0.23	0.19	0.22	0.09 U
Surrogate Recoveries (%)					
PCB 103 (SIS)	89	97	52	80	89
PCB 198 (SIS)	70	75	85	65	155

TABLE G.4. (contd)

Treatment	C-NV	C-NV	C-NV	C-NV	C-NV
Replicate	1	2	3	4	5
Batch	6	6	7	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.84	12.32	14.51	13.67	14.91
Heptachlor	0.19 U	0.19 U	0.31 U	0.19 U	0.19 U
Aldrin	0.13 U	0.13 U	0.21 U	0.80	0.13 U
Heptachlor Epoxide	0.13 U	0.13 U	0.22 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.43 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.30 U	0.18 U	0.18 U
a-Chlordane	0.10 U	0.10 U	0.26	0.10 U	0.10 U
Trans Nonachlor	0.61	0.60	0.24 U	0.48	0.38
4,4'-DDE	0.22	0.29	0.31 U	0.47	0.19 U
Dieldrin	0.92	0.93	1.37	0.52 U	0.52 U
2,4'-DDD	0.42	0.40	3.25	1.67	0.25 U
2,4'-DDT	0.18 U	0.18 U	0.30 U	0.18 U	0.18 U
4,4'-DDD	0.71	0.83	10.5	5.21	0.26 U
Endosulfan II	0.18 U	0.18 U	0.30 U	0.18 U	0.18 U
4,4'-DDT	0.15 U	0.15 U	0.38	0.15 U	0.15 U
Endosulfan Sulfate	0.18 U	0.18 U	0.30 U	0.18 U	0.18 U
PCB 8	0.41 U	0.41 U	0.68 U	0.41 U	0.41 U
PCB 18	0.43 U	0.43 U	0.71 U	0.43 U	0.43 U
PCB 28	0.20 U	0.20 U	0.34 U	0.20 U	0.20 U
PCB 52	0.69	0.52	0.59 U	2.45	0.40
PCB 49	0.24 U	0.24 U	0.39 U	0.26	0.24 U
PCB 44	0.17 U	0.17 U	0.27 U	0.17 U	0.17 U
PCB 66	0.09 U	0.09 U	0.16 U	0.09 U	0.09 U
PCB 101	0.80	0.78	2.53	3.69	0.15 U
PCB 87	0.16 U	0.16 U	0.26 U	0.16 U	0.16 U
PCB 118	0.47	0.45	0.95	1.95	0.47
PCB 184	0.24 U	0.24 U	0.39 U	0.24 U	0.24 U
PCB 153	2.19	2.20	4.48	3.73	1.93
PCB 105	0.34	0.33	1.02	1.09	0.28
PCB 138	1.47	1.42	3.46	3.05	1.19
PCB 187	0.64	0.62	0.88	0.86	0.51
PCB 183	0.28	0.25	0.41	0.44	0.24 U
PCB 128	0.26	0.25	0.63	0.61	0.22
PCB 180	0.71	0.72	1.19	1.44	0.57
PCB 170	0.43	0.38	0.58	0.75	0.38
PCB 195	0.10 U	0.10 U	0.17 U	0.10 U	0.10 U
PCB 206	0.29	0.27	0.29	0.41	0.21
PCB 209	0.16	0.16	0.83	0.21	0.12
Surrogate Recoveries (%)					
PCB 103 (SIS)	83	87	81	71	41
PCB 198 (SIS)	68	69	84	124	63

TABLE G.4. (contd)

Treatment	*N. virens* Background	*N. virens* Background	*N. virens* Background
Replicate	1	2	3
Batch	7	7	7
Units	ng/g	ng/g	ng/g
Percent Dry Weight	12.86	12.94	12.05
Heptachlor	0.19 U	0.19 U	0.19 U
Aldrin	0.73	0.13 U	0.13 U
Heptachlor Epoxide	0.13 U	0.13 U	0.13 U
2,4'-DDE	0.26 U	0.26 U	0.26 U
Endosulfan I	0.18 U	0.18 U	0.18 U
a-Chlordane	0.10 U	0.10 U	0.10 U
Trans Nonachlor	0.44	0.15 U	0.46
4,4'-DDE	0.19 U	0.99	0.19 U
Dieldrin	0.52 U	1.01	0.65
2,4'-DDD	0.25 U	0.25 U	0.25 U
2,4'-DDT	0.18 U	0.18 U	0.18 U
4,4'-DDD	0.26 U	0.26 U	0.56
Endosulfan II	0.18 U	0.18 U	0.18 U
4,4'-DDT	0.18	0.15 U	0.15 U
Endosulfan Sulfate	0.18 U	0.18 U	0.18 U
PCB 8	0.41 U	0.41 U	0.41 U
PCB 18	0.43 U	0.43 U	0.43 U
PCB 28	0.21	0.20 U	0.20 U
PCB 52	0.36 U	0.36 U	0.36 U
PCB 49	0.24 U	0.24 U	0.24 U
PCB 44	0.17 U	0.17 U	0.17 U
PCB 66	0.73	0.09 U	0.55
PCB 101	0.58	0.45	0.44
PCB 87	0.16 U	0.62	0.16 U
PCB 118	0.29 U	0.29 U	0.29 U
PCB 184	0.24 U	0.24 U	0.24 U
PCB 153	2.24	1.97	1.72
PCB 105	0.26	0.23	0.25
PCB 138	1.60	1.35	1.19
PCB 187	0.63	0.54	0.41
PCB 183	0.24	0.24 U	0.24 U
PCB 128	0.24	0.20	0.17
PCB 180	0.49	0.43	0.43
PCB 170	0.17 U	0.21	0.19
PCB 195	0.10 U	0.10 U	0.10 U
PCB 206	0.11 U	0.11 U	0.11 U
PCB 209	0.10	0.09 U	0.09 U
<u>Surrogate Recoveries (%)</u>			
PCB 103 (SIS)	96	84	75
PCB 198 (SIS)	84	80	81

(a) U Undetected at or above given concentration.

TABLE G.5. Pesticides and PCB Congeners (Dry Weight) in Tissue of *N. virens*

Treatment	EC-A	EC-A	EC-A	EC-A	EC-A
Replicate	1	2	3	4	5
Batch	5	6	5	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.61	13.54	14.69	13.51	15.62
Heptachlor	1.30 U[(a)]	1.40 U	6.19	1.41 U	1.34
Aldrin	14.2	6.43	6.26	7.25	14.7
Heptachlor Epoxide	0.89 U	0.96 U	0.88 U	0.96 U	0.83 U
2,4'-DDE	1.78 U	1.92 U	1.77 U	1.92 U	1.66 U
Endosulfan I	1.23 U	1.33 U	1.23 U	1.33 U	1.15 U
a-Chlordane	8.83	12.0	11.7	12.3	7.94
Trans Nonachlor	9.58	12.7	9.05	13.5	8.71
4,4'-DDE	18.3	31.4	30.6	29.0	23.8
Dieldrin	10.8	16.8	29.3	17.2	14.1
2,4'-DDD	1.71 U	18.2	86.5	17.6	17.7
2,4'-DDT	1.23 U	1.33 U	1.23 U	1.33 U	1.15 U
4,4'-DDD	14.8	42.8	98.0	49.4	74.9
Endosulfan II	1.23 U	1.33 U	1.23 U	1.33 U	1.15 U
4,4'-DDT	1.03 U	3.55	3.40	6.07	1.02
Endosulfan Sulfate	1.23 U	1.33 U	1.23 U	1.33 U	1.15 U
PCB 8	2.81 U	3.03 U	2.79 U	3.03 U	2.62 U
PCB 18	10.8	31.0	43.4	32.0	26.2
PCB 28	22.2	43.0	50.9	38.0	33.6
PCB 52	34.8	75.3	78.3	75.5	54.8
PCB 49	21.2	40.7	39.4	36.7	29.1
PCB 44	8.76	21.4	20.6	17.8	17.2
PCB 66	0.62 U	70.1	0.61 U	0.67 U	0.58 U
PCB 101	35.9	47.1	55.8	44.5	31.3
PCB 87	3.29	5.10	5.38	6.81	5.06
PCB 118	19.4	32.0	34.5	21.2	16.2
PCB 184	1.64 U	1.77 U	1.63 U	1.78 U	1.54 U
PCB 153	38.4	39.5	43.6	30.2	21.4
PCB 105	9.10	14.3	18.9	14.4	9.03
PCB 138	30.1	32.3	39.3	24.4	17.3
PCB 187	10.7	12.9	11.2	12.4	7.43
PCB 183	5.07	6.06	5.51	5.63	3.39
PCB 128	4.72	5.61	6.94	4.89	3.39
PCB 180	16.0	16.0	27.6	18.6	12.7
PCB 170	7.73	7.61	7.56	8.36	5.25
PCB 195	0.68 U	0.74 U	0.68 U	0.74 U	0.64 U
PCB 206	3.42	4.87	3.74	6.59	3.91
PCB 209	1.44	2.36	2.04	3.11	2.24

TABLE G.5. (contd)

Treatment	EC-B	EC-B	EC-B	EC-B	EC-B
Replicate	1	2	3	4	5
Batch	5	6	6	5	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.9	16.63	13.59	14.56	13.92
Heptachlor	1.74	6.25	1.47 U	6.39	8.12
Aldrin	5.17	7.22	8.24	18.41	8.55
Heptachlor Epoxide	0.87 U	4.27	1.10 U	0.89 U	0.93 U
2,4'-DDE	1.74	1.56 U	2.13 U	1.79 U	1.87 U
Endosulfan I	1.21 U	1.08 U	1.47 U	1.24 U	1.29 U
a-Chlordane	17.2	37.5	26.0	35.0	47.8
Trans Nonachlor	18.7	22.5	31.6	29.9	30.4
4,4'-DDE	11.9	22.9	20.0	29.7	35.1
Dieldrin	14.4	20.1	14.6	27.3	24.0
2,4'-DDD	9.53	33.3	11.4	91.3	22.7
2,4'-DDT	1.21 U	1.08 U	1.47 U	1.24 U	1.29 U
4,4'-DDD	29.6	78.2	40.1	139	77.6
Endosulfan II	1.21 U	1.08 U	1.47 U	1.24 U	1.29 U
4,4'-DDT	3.56	2.10	6.33	4.88	7.04
Endosulfan Sulfate	1.21 U	1.08 U	1.47 U	1.24 U	5.82 U
PCB 8	2.75 U	2.41 U	3.31 U	2.82 U	2.95 U
PCB 18	20.7	47.8	20.9	38.3	60.8
PCB 28	18.7	48.0	26.8	40.6	62.7
PCB 52	37.9	83.6	47.9	98.9	96.3
PCB 49	16.3	42.6	24.8	37.9	52.2
PCB 44	8.99	19.5	11.8	18.9	33.0
PCB 66	0.60 U	0.54 U	0.74 U	0.62 U	84.8
PCB 101	22.0	70.4	40.8	104	58.1
PCB 87	2.01	4.63	4.64	10.1	8.41
PCB 118	10.5	46.8	27.5	81.0	34.6
PCB 184	1.61 U	1.44 U	1.91 U	1.65 U	1.72 U
PCB 153	25.4	56.7	35.2	76.9	47.6
PCB 105	8.12	25.9	16.3	41.0	19.8
PCB 138	18.1	53.0	30.3	76.9	40.9
PCB 187	9.26	17.5	14.6	17.0	19.3
PCB 183	4.09	8.78	6.99	9.13	8.98
PCB 128	3.22	10.2	5.45	14.6	7.47
PCB 180	20.5	35.3	38.9	43.3	42.2
PCB 170	5.50	11.1	8.98	13.3	10.8
PCB 195	1.48	0.60 U	0.81 U	2.47	0.72 U
PCB 206	3.62	4.39	4.49	5.22	5.53
PCB 209	1.41	0.90	1.18	1.72	1.58

TABLE G.5. (contd)

Treatment	R-MUD	R-MUD	R-MUD	R-MUD	R-MUD
Replicate	1	2	3	4	5
Batch	4	5	6	7	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.12	14.94	15.21	14.00	13.24
Heptachlor	1.45 U	1.20 U	1.25 U	1.36 U	1.74 U
Aldrin	0.99 U	0.80 U	0.85 U	0.93 U	1.21 U
Heptachlor Epoxide	0.99 U	0.87 U	0.85 U	0.93 U	1.21 U
2,4'-DDE	1.98 U	1.74 U	1.71 U	1.86 U	2.42 U
Endosulfan I	1.37 U	1.20 U	1.18 U	1.29 U	1.66 U
a-Chlordane	0.76 U	0.60 U	0.66 U	0.71 U	0.91 U
Trans Nonachlor	3.28	4.08	4.40	2.79	4.61
4,4'-DDE	1.45 U	1.20 U	2.30	1.36 U	1.74 U
Dieldrin	7.16	4.75	3.42 U	4.71	4.83 U
2,4'-DDD	1.91 U	2.34	1.64 U	1.79 U	2.34 U
2,4'-DDT	1.37 U	1.20 U	1.18 U	1.29 U	1.66 U
4,4'-DDD	7.62	2.61	1.71 U	6.07	2.42 U
Endosulfan II	1.37 U	1.20 U	1.18 U	1:29 U	1.66 U
4,4'-DDT	1.14 U	1.00 U	0.99 U	1.07 U	1.44 U
Endosulfan Sulfate	1.37 U	1.20 U	1.18 U	1.29 U	1.66 U
PCB 8	3.13 U	2.68 U	2.70 U	2.93 U	3.85 U
PCB 18	3.28 U	2.81 U	2.83 U	3.07 U	4.00 U
PCB 28	1.52 U	1.34 U	1.31 U	1.43 U	1.89 U
PCB 52	2.74 U	2.34 U	2.83	2.57 U	4.83
PCB 49	1.83 U	1.54 U	1.58 U	1.71 U	2.19 U
PCB 44	1.30 U	1.07 U	1.12 U	1.21 U	1.51 U
PCB 66	0.69 U	0.60 U	0.59 U	0.64 U	0.91 U
PCB 101	1.14 U	5.42	2.89	3.21	4.08
PCB 87	1.22 U	1.07 U	1.51	1.14 U	1.51 U
PCB 118	2.21 U	1.94 U	1.91 U	2.07 U	2.79 U
PCB 184	1.83 U	1.54 U	1.58 U	1.71 U	2.19 U
PCB 153	13.4	15.7	14.5	14.9	12.5
PCB 105	0.84 U	0.74 U	1.58	2.00	2.04
PCB 138	7.01	9.64	7.69	9.71	7.78
PCB 187	2.90	3.55	3.94	4.14	3.25
PCB 183	1.83 U	1.61	1.58	1.71 U	2.19 U
PCB 128	1.45	1.47	1.31	1.43	6.80 U
PCB 180	3.43	4.62	3.94	4.00	4.46
PCB 170	1.30 U	2.48	2.17	1.93	2.57
PCB 195	0.76 U	0.67 U	0.66 U	0.71 U	0.91 U
PCB 206	2.29	1.54	1.51	0.79 U	2.34
PCB 209	1.22	1.00	1.05	1.21	1.13

TABLE G.5. (contd)

Treatment	R-CLIS	R-CLIS	R-CLIS	R-CLIS	R-CLIS
Replicate	1	2	3	4	5
Batch	6	5	4	6	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.70	16.08	15.15	14.02	14.53
Heptachlor	1.39 U	1.18 U	1.19 U	1.28 U	1.31 U
Aldrin	7.59	4.91	5.08	5.71	4.68
Heptachlor Epoxide	1.97	0.81 U	0.86 U	0.93 U	0.89 U
2,4'-DDE	1.90 U	1.62 U	1.72 U	1.85 U	1.79 U
Endosulfan I	1.31 U	1.12 U	1.19 U	1.28 U	1.24 U
a-Chlordane	0.73 U	1.06	0.73	1.43	0.69 U
Trans Nonachlor	5.55	4.29	3.89	5.71	1.58
4,4'-DDE	9.12	4.35	3.96	3.14	1.31 U
Dieldrin	11.8	5.72	7.13	3.64 U	4.20
2,4'-DDD	21.9	7.71	3.30	4.71	1.72 U
2,4'-DDT	1.31 U	1.12 U	1.19 U	1.28 U	1.24 U
4,4'-DDD	44.7	12.1	7.79	1.85 U	1.79 U
Endosulfan II	1.31 U	1.12 U	1.19 U	1.28 U	1.24 U
4,4'-DDT	1.09 U	0.93 U	0.99 U	1.07 U	1.03 U
Endosulfan Sulfate	1.31 U	1.12 U	1.19 U	1.57	1.24 U
PCB 8	2.99 U	2.55 U	2.64 U	2.85 U	2.82 U
PCB 18	3.14 U	2.67 U	2.77 U	3.00 U	2.96 U
PCB 28	3.50	2.30	1.85	1.43 U	1.38 U
PCB 52	38.8	10.3	6.53	6.70	2.48 U
PCB 49	10.3	2.92	2.24	2.21	1.65 U
PCB 44	1.61	1.06 U	1.06 U	1.14 U	1.17 U
PCB 66	0.66 U	0.56 U	0.59 U	0.64 U	0.62 U
PCB 101	59.3	20.6	10.7	10.5	2.96
PCB 87	5.47	1.00 U	1.12	1.14 U	1.10 U
PCB 118	41.4	12.8	6.53	6.35	2.00 U
PCB 184	1.75 U	1.49 U	1.52 U	1.64 U	1.65 U
PCB 153	53.9	27.1	19.3	24.6	5.78
PCB 105	15.5	7.03	2.97	3.21	0.89
PCB 138	44.6	22.6	12.4	15.8	3.44
PCB 187	12.8	5.66	5.81	7.56	1.58
PCB 183	6.42	2.55	2.24	3.07	1.65 U
PCB 128	8.83	4.23	2.38	3.00	1.03 U
PCB 180	17.4	7.46	6.27	6.56	2.82
PCB 170	8.10	4.17	3.70	3.64	1.31
PCB 195	0.73 U	0.62 U	0.66 U	0.71 U	0.69 U
PCB 206	2.77	2.11	2.51	2.50	0.96
PCB 209	1.75	1.43	1.25	1.57	0.62 U

TABLE G.5. (contd)

Treatment	C-NV	C-NV	C-NV	C-NV	C-NV
Replicate	1	2	3	4	5
Batch	6	6	7	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.84	12.32	14.51	13.67	14.91
Heptachlor	1.28 U	1.54 U	2.14 U	1.39 U	1.27 U
Aldrin	0.88 U	1.06 U	1.45 U	5.85	0.87 U
Heptachlor Epoxide	0.88 U	1.06 U	1.52 U	0.95 U	0.87 U
2,4'-DDE	1.75 U	2.11 U	2.96 U	1.90 U	1.74 U
Endosulfan I	1.21 U	1.46 U	2.07 U	1.32 U	1.21 U
a-Chlordane	0.67 U	0.81 U	1.79	0.73 U	0.67 U
Trans Nonachlor	4.11	4.87	1.65 U	3.51	2.55
4,4'-DDE	1.48	2.35	2.14 U	3.44	1.27 U
Dieldrin	6.20	7.55	9.44	3.80 U	3.49 U
2,4'-DDD	2.83	3.25	22.4	12.2	1.68 U
2,4'-DDT	1.21 U	1.46 U	2.07 U	1.32 U	1.21 U
4,4'-DDD	4.78	6.74	72.6	38.1	1.74 U
Endosulfan II	1.21 U	1.46 U	2.07 U	1.32 U	1.21 U
4,4'-DDT	1.01 U	1.22 U	2.62	1.10 U	1.01 U
Endosulfan Sulfate	1.21 U	1.46 U	2.07 U	1.32 U	1.21 U
PCB 8	2.76 U	3.33 U	4.69 U	3.00 U	2.75 U
PCB 18	2.90 U	3.49 U	4.89 U	3.15 U	2.88 U
PCB 28	1.35 U	1.62 U	2.34 U	1.46 U	1.34 U
PCB 52	4.65	4.22	4.07 U	17.9	2.68
PCB 49	1.62 U	1.95 U	2.69 U	1.90	1.61 U
PCB 44	1.15 U	1.38 U	1.86 U	1.24 U	1.14 U
PCB 66	0.61 U	0.73 U	1.10 U	0.66 U	0.60 U
PCB 101	5.39	6.33	17.4	27.0	1.01 U
PCB 87	1.08 U	1.30 U	1.79 U	1.17 U	1.07 U
PCB 118	3.17	3.65	6.55	14.26	3.15
PCB 184	1.62 U	1.95 U	2.69 U	1.76 U	1.61 U
PCB 153	14.8	17.9	30.9	27.3	12.9
PCB 105	2.29	2.68	7.03	7.97	1.88
PCB 138	9.91	11.5	23.8	22.3	7.98
PCB 187	4.31	5.03	6.06	6.29	3.42
PCB 183	1.89	2.03	2.83	3.22	1.61 U
PCB 128	1.75	2.03	4.34	4.46	1.48
PCB 180	4.78	5.84	8.20	10.5	3.82
PCB 170	2.90	3.08	4.00	5.49	2.55
PCB 195	0.67 U	0.81 U	1.17 U	0.73 U	0.67 U
PCB 206	1.95	2.19	2.00	3.00	1.41
PCB 209	1.08	1.30	5.72	1.54	0.80

TABLE G.5. (contd)

Treatment	*N. virens* Background	*N. virens* Background	*N. virens* Background
Replicate	1	2	3
Batch	7	7	7
Units	ng/g	ng/g	ng/g
Percent Dry Weight	12.86	12.94	12.05
Heptachlor	1.5 U	1.5 U	1.6 U
Aldrin	5.7	1.0 U	1.1 U
Heptachlor Epoxide	1.0 U	1.0 U	1.1 U
2,4'-DDE	2.0 U	2.0 U	2.2 U
Endosulfan I	1.4 U	1.4 U	1.5 U
a-Chlordane	0.78 U	0.77 U	0.83 U
Trans Nonachlor	3.4	1.2 U	3.8
4,4'-DDE	1.5 U	7.7	1.6 U
Dieldrin	4.0 U	7.81	5.4
2,4'-DDD	1.9 U	1.9 U	2.1 U
2,4'-DDT	1.4 U	1.4 U	1.5 U
4,4'-DDD	2.0 U	2.0 U	4.6
Endosulfan II	1.4 U	1.4 U	1.5 U
4,4'-DDT	1.4	1.2 U	1.2 U
Endosulfan Sulfate	1.4 U	1.4 U	1.5 U
PCB 8	3.2 U	3.2 U	3.4 U
PCB 18	3.3 U	3.3 U	3.6 U
PCB 28	1.6	1.5 U	1.7 U
PCB 52	2.8 U	2.8 U	3.0 U
PCB 49	1.9 U	1.9 U	2.0 U
PCB 44	1.3 U	1.3 U	1.4 U
PCB 66	5.7	0.7 U	4.6
PCB 101	4.5	3.5	3.7
PCB 87	1.2 U	4.8	1.3 U
PCB 118	2.3 U	2.2 U	2.4 U
PCB 184	1.9 U	1.9 U	2.0 U
PCB 153	17.4	15.2	14.3
PCB 105	2.0	1.8	2.1
PCB 138	12.4	10.4	9.88
PCB 187	4.9	4.2	3.4
PCB 183	1.9	1.9 U	2.0 U
PCB 128	1.9	1.5	1.4
PCB 180	3.8	3.3	3.6
PCB 170	1.3 U	1.6	1.6
PCB 195	0.78 U	0.77 U	0.83 U
PCB 206	0.86 U	0.85 U	0.91 U
PCB 209	0.78	0.7 U	0.7 U

(a) U Undetected at or above given concentration.

TABLE G.6. Quality Control Summary for Pesticides and PCB Congeners in Tissue of *N. virens* (Wet Weight)

Blanks

Treatment	Blank	Blank	Blank	Blank
Replicate	1	1	1	1
Batch	4	5	6	7
Wet Wt.	NA	NA	NA	NA
Units	ng/g	ng/g	ng/g	ng/g
Heptachlor	0.20 U[a]	0.19 U	0.19 U	0.21 U
Aldrin	0.13 U	0.13 U	0.13 U	0.15 U
Heptachlor epoxide	0.14 U	0.14 U	0.14 U	0.15 U
2,4'-DDE	0.28 U	0.27 U	0.27 U	0.30 U
Endosulfan I	0.19 U	0.18 U	0.19 U	0.21 U
a-Chlordane	0.10 U	0.10 U	0.10 U	0.11 U
Trans Nonachlor	0.15 U	0.15 U	0.15 U	0.17 U
4,4'-DDE	0.20 U	1.90 U	0.20 U	0.22 U
Dieldrin	0.55 U	0.53 U	0.54 U	0.60 U
2,4'-DDD	0.27 U	0.26 U	0.26 U	0.29 U
2,4'-DDT	0.19 U	0.18 U	0.19 U	0.21 U
4,4'-DDD	0.28 U	0.27 U	0.27 U	0.30 U
Endosulfan II	0.19 U	0.18 U	0.19 U	0.21 U
4,4'-DDT	0.16 U	0.15 U	0.16 U	0.18 U
Endosulfan Sulfate	0.19 U	0.18 U	0.19 U	0.21 U
PCB 8	0.44 U	0.42 U	0.43 U	0.48 U
PCB 18	0.46 U	0.44 U	0.45 U	0.50 U
PCB 28	0.22 U	0.21 U	0.21 U	0.24 U
PCB 52	0.38 U	0.37 U	0.37 U	0.42 U
PCB 49	0.25 U	0.24 U	0.25 U	0.27 U
PCB 44	0.17 U	0.17 U	0.17 U	0.19 U
PCB 66	0.10 U	0.10 U	0.10 U	0.11 U
PCB 101	0.15 U	0.15 U	0.15 U	0.17 U
PCB 87	0.17 U	0.16 U	0.17 U	0.19 U
PCB 118	0.31 U	0.30 U	0.31 U	0.34 U
PCB 184	0.25 U	0.24 U	0.25 U	0.27 U
PCB 153	0.13 U	0.12 U	0.13 U	0.14 U
PCB 105	0.12 U	0.11 U	0.12 U	0.13 U
PCB 138	0.31 U	0.30 U	0.30 U	0.34 U
PCB 187	0.13 U	0.13 U	0.13 U	0.15 U
PCB 183	0.25 U	0.24 U	0.25 U	0.27 U
PCB 128	0.16 U	0.16 U	0.16 U	0.18 U
PCB 180	0.20 U	0.19 U	0.19 U	0.21 U
PCB 170	0.18 U	0.17 U	0.17 U	0.19 U
PCB 195	0.11 U	0.10 U	0.10 U	0.12 U
PCB 206	0.12 U	0.12 U	0.12 U	0.13 U
PCB 209	0.10 U	0.10 U	0.10 U	0.11 U
Surrogate Recoveries (%)				
PCB 103 (SIS)	68	82	86	104
PCB 198 (SIS)	106	79	79	110

TABLE G.6. (contd)

Matrix Spike Results

Treatment	COMP SB-A	*Matrix Spike* COMP SB-A			COMP EC-A	*Matrix Spike* COMP EC-A		
Replicate	1	1			1	1		
Batch	4	4	Amount	Percent	5	5	Amount	Percent
Wet Wt.	20.08	20.02	Spiked	Recovery	20.08	20.05	Spiked	Recovery
Units	ng/g	ng/g	ng/g		ng/g	ng/g	ng/g	
Heptachlor	1.39	2.45	2.50	42 (b)	0.19 U	3.10	2.50	124 (b)
Aldrin	1.57	3.16	2.50	64	2.08	2.72	2.50	116
Heptachlor epoxide	0.13 U	2.10	2.50	84	0.13 U	2.33	2.50	93
2,4'-DDE	0.26 U	NA (c)	NS (d)	NA	0.26 U	NA	NS	NA
Endosulfan I	0.18 U	1.96	2.50	78	0.18 U	2.23	2.50	89
a-Chlordane	0.84	NA	NS	NA	1.29	NA	NS	NA
Trans Nonachlor	0.83	NA	NS	NA	1.40	NA	NS	NA
4,4'-DDE	5.68	8.14	2.50	98	2.68	7.38	2.50	188 (b)
Dieldrin	2.56	4.63	2.50	83	1.58	6.23	2.50	186 (b)
2,4'-DDD	2.52	NA	NS	NA	0.25 U	NA	NS	NA
2,4'-DDT	0.18 U	NA	NS	NA	0.18 U	NA	NS	NA
4,4'-DDD	14.4	19.3	2.50	196 (b)	2.16	13.2	2.50	442 (b)
Endosulfan II	0.18 U	1.50	2.50	60	0.18 U	1.52	2.50	61
4,4'-DDT	0.15 U	2.59	2.50	104	0.15 U	2.55	2.50	102
Endosulfan Sulfate	0.18 U	1.95	2.50	78	0.18 U	1.72	2.50	69
PCB 8	0.41 U	NA	NS	NA	0.41 U	NA	NS	NA
PCB 18	11.8	NA	NS	NA	1.58	NA	NS	NA
PCB 28	14.5	21.1	3.18	208 (b)	3.24	9.65	3.18	202 (b)
PCB 52	17.0	30.4	6.65	202 (b)	5.08	19.5	6.65	217 (b)
PCB 49	10.0	NA	NS	NA	3.10	NA	NS	NA
PCB 44	6.29	NA	NS	NA	1.28	NA	NS	NA
PCB 66	14.3	NA	NS	NA	0.09 U	NA	NS	NA
PCB 101	10.6	17.7	4.51	157 (b)	5.24	18.2	4.51	287 (b)
PCB 87	1.71	NA	NS	NA	0.48	6.62	5.70	108
PCB 118	5.18	NA	NS	NA	2.84	NA	NS	NA
PCB 184	0.24 U	NA	NS	NA	0.24 U	NA	NS	NA
PCB 153	6.10	9.64	2.64	134 (b)	5.61	12.0	2.64	242 (b)
PCB 105	2.52	NS	NS	NS	1.33	NS	NS	NS
PCB 138	5.36	9.10	2.04	183 (b)	4.40	14.6	2.04	500 (b)
PCB 187	1.79	NA	NS	NA	1.56	NA	NS	NA
PCB 183	0.90	NA	NS	NA	0.74	NA	NS	NA
PCB 128	1.05	NA	NS	NA	0.69	NA	NS	NA
PCB 180	3.21	NA	NS	NA	2.34	NA	NS	NA
PCB 170	1.55	NA	NS	NA	1.13	NA	NS	NA
PCB 195	0.31	NA	NS	NA	0.10 U	NA	NS	NA
PCB 206	1.85	NA	NS	NA	0.50	NA	NS	NA
PCB 209	0.92	NA	NS	NA	0.21	NA	NS	NA
Surrogate Recoveries (%)								
PCB 103 (SIS)	73	49	NA	NA	86	94	NA	NA
PCB 198 (SIS)	131	83	NA	NA	78	87	NA	NA

TABLE G.6. (contd)

Matrix Spike Results

Treatment	C-NV	*Matrix Spike* C-NV			COMP HU-C	*Matrix Spike* COMP HU-C		
Replicate	2	2			1	1		
Batch	6	6			7	7		
Wet Wt.	20.08	20.17	Amount Spiked	Percent Recovery	12.96	12.71	Amount Spiked	Percent Recovery
Units	ng/g	ng/g			ng/g	ng/g	ng/g	
Heptachlor	0.19 U	2.71	2.50	108	0.28 U	4.76	3.95	121 (b)
Aldrin	0.13 U	2.23	2.50	89	1.77	4.88	3.95	79
Heptachlor epoxide	0.13 U	2.48	2.50	99	0.20 U	3.45	3.95	87
2,4'-DDE	0.26 U	NA	NS	NA	0.40 U	NA	NS	NA
Endosulfan I	0.18 U	2.40	2.50	96	0.28 U	2.93	3.95	74
a-Chlordane	0.10 U	NA	NS	NA	2.21	NA	NS	NA
Trans Nonachlor	0.60	NA	NS	NA	0.68	NA	NS	NA
4,4'-DDE	0.29	2.11	2.50	73	3.87	7.30	3.95	87
Dieldrin	0.93	2.96	2.50	81	2.50	6.10	3.95	91
2,4'-DDD	0.40	NA	NS	NA	0.39 U	NA	NS	NA
2,4'-DDT	0.18 U	NA	NS	NA	0.28 U	NA	NS	NA
4,4'-DDD	0.83	3.5	2.50	105	4.66	10.1	3.95	138
Endosulfan II	0.18 U	1.71	2.50	68	0.28 U	3.00	3.95	76
4,4'-DDT	0.15 U	2.31	2.50	92	0.23 U	4.23	3.95	107
Endosulfan Sulfate	0.18 U	2.23	2.50	89	0.28 U	3.71	3.95	94
PCB 8	0.41 U	NA	NS	NA	0.63 U	NA	NS	NA
PCB 18	0.43 U	NA	NS	NA	9.95	NA	NS	NA
PCB 28	0.20 U	3.98	3.19	118	14.30	21.78	5.04	148 (b)
PCB 52	0.52	7.4	6.65	104	19.31	31.6	10.51	117
PCB 49	0.24 U	NA	NS	NA	10.00	NA	NS	NA
PCB 44	0.17 U	NA	NS	NA	4.98	NA	NS	NA
PCB 66	0.09 U	NA	NS	NA	15.27	NA	NS	NA
PCB 101	0.78	5.7	4.51	109	9.92	19.7	7.13	137 (b)
PCB 87	0.16 U	NA	NS	NA	0.88	NA	NS	NA
PCB 118	0.45	NA	NS	NA	5.30	NA	NS	NA
PCB 184	0.24 U	NA	NS	NA	0.36 U	NA	NS	NA
PCB 153	2.20	4.5	2.64	88	7.80	11.3	4.17	83
PCB 105	0.33	NA	NS	NA	3.38	NA	NS	NA
PCB 138	1.42	5.6	2.04	202 (b)	7.19	10.4	3.22	99
PCB 187	0.62	NA	NS	NA	2.51	NA	NS	NA
PCB 183	0.25	NA	NS	NA	1.21	NA	NS	NA
PCB 128	0.25	NA	NS	NA	1.28	NA	NS	NA
PCB 180	0.72	NA	NS	NA	3.05	NA	NS	NA
PCB 170	0.38	NA	NS	NA	1.45	NA	NS	NA
PCB 195	0.10 U	NA	NS	NA	0.22	NA	NS	NA
PCB 206	0.27	NA	NS	NA	1.23	NA	NS	NA
PCB 209	0.16	NA	NS	NA	0.82	NA	NS	NA
Surrogate Recoveries (%)								
PCB 103 (SIS)	87	83	NA	NA	64	77	NA	NA
PCB 198 (SIS)	69	61	NA	NA	68	80	NA	NA

TABLE G.6. (contd)

Analytical Replicate Results

Treatment	COMP HU-A	*DUP* COMP HU-A	*TRIP* COMP HU-A		COMP SB-B	*DUP* COMP SB-B	*TRIP* COMP SB-B	
Replicate	5	5	5		2	2	2	
Batch	4	4	4		5	5	5	
Wet Wt.	14.57	13.76	13.79		17.11	17.25	17.13	
Units	ng/g	ng/g	ng/g	RSD%	ng/g	ng/g	ng/g	RSD%
Heptachlor	1.02	0.89	1.00	7	0.21 U	0.21 U	0.21 U	NA
Aldrin	3.64	3.48	3.65	3	1.67	1.72	1.64	2
Heptachlor epoxide	0.18 U	0.19 U	0.19 U	NA	0.15 U	0.24	0.15 U	NA
2,4'-DDE	0.36 U	0.38 U	0.38 U	NA	0.3 U	0.3 U	0.3 U	NA
Endosulfan I	0.25 U	0.26 U	0.26 U	NA	0.21 U	0.21 U	0.21 U	NA
a-Chlordane	0.13 U	0.14 U	0.14 U	NA	0.8	0.89	0.85	5.33
Trans Nonachlor	0.54	0.21 U	0.21 U	NA	0.86	0.96	0.94	5.75
4,4'-DDE	6.42	6.41	6.43	0	1.9	2.05	1.95	4
Dieldrin	2.00	1.69	1.85	8	1.80	1.9	1.81	3
2,4'-DDD	0.93	1.12	1.38	20	5.42	5.91	5.86	5
2,4'-DDT	0.25 U	0.26 U	0.26 U	NA	0.21 U	0.21 U	0.21 U	NA
4,4'-DDD	6.97	6.32	6.62	5	10.30	11.7	12	8
Endosulfan II	0.25 U	0.26 U	0.26 U	NA	0.21 U	0.21 U	0.21 U	NA
4,4'-DDT	0.21 U	0.22 U	0.22 U	NA	0.18 U	2.33	0.18 U	NA
Endosulfan Sulfate	0.25 U	0.26 U	0.44	34 [e]	0.65	0.45	0.3	38 [e]
PCB 8	0.57 U	0.60 U	0.60 U	NA	0.48 U	0.48 U	0.48 U	NA
PCB 18	8.28	8.45	8.44	1	1.18	1.34	1.21	7
PCB 28	8.87	8.92	9.03	1	2.39	2.46	2.30	3
PCB 52	9.39	9.06	9.43	2	4.22	4.32	3.85	6
PCB 49	5.31	5.21	5.38	2	2.23	2.27	2.07	5
PCB 44	3.08	3.02	3.05	1	0.79	0.86	0.86	5
PCB 66	0.13 U	0.14 U	0.14 U	NA	0.11 U	0.11 U	0.11 U	NA
PCB 101	5.04	4.93	5.10	2	4.37	4.52	4.09	5
PCB 87	0.91	0.99	0.82	9	0.19 U	0.28	0.33	27
PCB 118	2.51	2.44	2.54	2	2.79	2.72	2.23	12
PCB 184	0.33 U	0.34 U	0.34 U	NA	0.27 U	0.27 U	0.27 U	NA
PCB 153	4.40	4.40	4.47	1	5.28	5.19	4.11	13
PCB 105	1.25	1.11	1.18	6	1.42	1.41	1.16	11
PCB 138	2.92	2.91	2.91	0	4.06	4.1	3.41	10
PCB 187	1.39	1.32	1.36	3	1.32	1.29	1.03	13
PCB 183	0.65	0.54	0.60	9	0.62	0.6	0.48	13
PCB 128	0.60	0.50	0.56	9	0.69	0.69	0.56	12
PCB 180	1.71	1.69	1.65	2	1.94	2.01	1.78	6
PCB 170	0.23 U	0.24 U	0.24 U	NA	0.98	1.01	0.88	7.12
PCB 195	0.17	0.17	0.15 U	NA	0.17	0.12 U	0.12 U	NA
PCB 206	1.25	1.29	1.24	2	0.49	0.51	0.42	10
PCB 209	0.87	0.77	0.83	6	0.32	0.31	0.25	13
Surrogate Recoveries (%)								
PCB 103 (SIS)	75	74	66	NA	65	81	72	NA
PCB 198 (SIS)	116	115	102	NA	61	73	66	NA

TABLE G.6. (contd)

Analytical Replicate Results

Treatment	COMP HU-C	*DUP* COMP HU-C	*TRIP* COMP HU-C		COMP BU	*DUP* COMP BU	*TRIP* COMP BU	
Replicate	4	4	4		3	3	3	
Batch	6	6	6		7	7	7	
Wet Wt.	17.18	17.51	16.38		8.6	8.47	8.21	
Units	ng/g	ng/g	ng/g	RSD%	ng/g	ng/g	ng/g	RSD%
Heptachlor	2.5	2.43	2.33	4	0.43 U	0.44 U	0.45 U	NA
Aldrin	2.42	2.25	2.29	4	2.42	2.74	2.2	11
Heptachlor epoxide	0.15 U	0.15 U	0.16 U	NA	0.31 U	0.31 U	0.32 U	NA
2,4'-DDE	0.3 U	0.3 U	0.32 U	NA	0.61 U	0.62 U	0.64 U	NA
Endosulfan I	0.21 U	0.21 U	0.22 U	NA	0.42 U	0.42 U	0.44 U	NA
a-Chlordane	1.83	1.78	1.66	4.97	1.13	1.46	1.11	15.9
Trans Nonachlor	1.65	1.61	1.52	4.18	0.54	0.77	0.35 U	NA
4,4'-DDE	16.8	7.5	6.89	53 (e)	2.01	2.54	2.23	12
Dieldrin	0.60 U	4.31	4.16	69 (e)	1.43	1.84	1.58	13
2,4'-DDD	7.71	7.61	7.11	4	0.59 U	0.60 U	0.62 U	NA
2,4'-DDT	0.21 U	0.2 U	0.22 U	NA	0.42 U	0.42 U	0.44 U	NA
4,4'-DDD	26.00	22.5	21.3	10	2.24	2.56	1.85	16
Endosulfan II	0.21 U	0.21 U	0.22 U	NA	0.42 U	0.42 U	0.44 U	NA
4,4'-DDT	0.18 U	0.17 U	0.18 U	NA	0.35 U	0.36 U	0.37 U	NA
Endosulfan Sulfate	0.21 U	0.21 U	0.22 U	NA	0.42 U	0.75	0.44 U	NA
PCB 8	0.48 U	0.47 U	0.50 U	3	0.95 U	0.97 U	1.00 U	NA
PCB 18	19.8	19.3	18.5	3	1 U	1.01 U	1.05 U	NA
PCB 28	25.70	24.30	23.80	4	2.34	3.19	2.54	17
PCB 52	37.10	34.00	31.8	8	3.94	5.27	4.37	15
PCB 49	17.80	16.7	16.5	4	2.09	2.79	2.14	17
PCB 44	11.60	10.6	9.58	10	1.07	1.44	1.18	15
PCB 66	27.20	25.10	24.1	6.21	0.22 U	0.22 U	0.23 U	NA
PCB 101	20.80	19.3	18.70	6	3.09	4.17	3.26	17
PCB 87	20.60	2.04	1.82	132 (e)	0.37 U	0.41	0.39 U	NA
PCB 118	18.40	10.5	9.87	37 (e)	1.51	2.05	1.68	16
PCB 184	0.27 U	0.27 U	0.29 U	NA	0.55 U	0.56 U	0.58 U	NA
PCB 153	17.90	13.60	12.8	19	3.89	5.28	4.33	16
PCB 105	6.30	5.72	5.38	8	0.95	1.33	1.08	17
PCB 138	13.30	12	11.5	8	3.06	4.33	3.44	18
PCB 187	3.62	3.2	3	10	0.99	1.51	1.13	22
PCB 183	1.85	1.68	1.57	8	0.55 U	0.65	0.58 U	NA
PCB 128	2.64	2.46	2.27	8	0.52	0.68	0.56	14
PCB 180	3.77	4.79	4.46	12	1.39	1.97	1.55	18
PCB 170	2.44	2.44	2.25	4.62	0.73	0.96	0.79	14.4
PCB 195	0.25	0.39	0.12 U	NA	0.23 U	0.24 U	0.24 U	NA
PCB 206	1.53	1.24	1.14	16	0.42	0.57	0.45	17
PCB 209	0.92	0.90	0.88	2	0.23	0.31	0.26	15
Surrogate Recoveries (%)								
PCB 103 (SIS)	89	82	88	NA	81	66	74	NA
PCB 198 (SIS)	81	67	70	NA	83	67	79	NA

(a) U Undetected at or above given concentration.
(b) Outside Spike QC range (50-120%) for matrix spike recoveries
(c) NA Not applicable.
(d) NS Not spiked.
(e) Exceeds quality control criteria (±30%) for replicates.

TABLE G.7. MDL Verification Study for Pesticide/PCB Tissue Chemistry

Treatment	MDL	MDL	MDL	MDL	
Replicate	R1	R2	R3	R4	
Batch	8	8	8	8	
Wet Wt.	20.12	20.40	20.09	20.03	
Units	ng/g	ng/g	ng/g	ng/g	MDL[a]
Heptachlor	1.01	1.08	1.09	1.04	0.129
Aldrin	0.82	0.79	0.83	0.82	0.061
Heptachlor Epoxide	1.32	1.27	1.33	1.28	0.103
2,4'-DDE	1.18	1.2	1.24	1.19	0.092
Endosulfan I	NA [b]	NA	NA	NA	NA
a-Chlordane	0.94	0.96	0.95	1.1	0.264
Trans Nonachlor	1.43	1.49	1.46	1.61	0.276
4,4'-DDE	1.87	1.62	1.77	1.78	0.363
Dieldrin	2.27	2.38	2.39	2.32	0.196
2,4'-DDD	1.40	1.52	1.52	1.52	0.210
2,4'-DDT	1.07	1.02	1.17	1.18	0.273
4,4'-DDD	1.40	1.52	1.67	1.68	0.467
Endosulfan II	NA	NA	NA	NA	NA
4,4'-DDT	1.04	1.18	1.13	1.25	0.309
Endosulfan Sulfate	NA	NA	NA	NA	NA
PCB 8	0.56	0.57	0.54	0.56	0.044
PCB 18	0.84	0.80	0.85	0.84	0.078
PCB 28	1.04	1.01	1.07	1.10	0.136
PCB 52	1.20	1.20	1.27	1.31	0.191
PCB 49	0.24 U[c]	0.23 U	0.24 U	0.24 U	NA
PCB 44	0.96	0.90	0.93	0.94	0.088
PCB 66	1.47	1.42	1.47	1.44	0.086
PCB 101	1.59	1.54	1.62	1.55	0.129
PCB 87	0.79	0.81	0.79	0.97	0.305
PCB 118	1.02	1.00	1.05	1.10	0.152
PCB 184	0.24 U	0.23 U	0.24 U	0.24 U	NA
PCB 153	2.54	2.46	2.61	2.60	0.241
PCB 105	1.00	0.95	1.03	1.04	0.141
PCB 138	1.91	1.89	1.89	1.96	0.116
PCB 187	1.24	1.23	1.24	1.35	0.199
PCB 183	0.24 U	0.23 U	0.24 U	0.24 U	NA
PCB 128	0.87	0.87	0.88	0.92	0.083
PCB 180	1.18	1.34	1.22	1.17	0.273
PCB 170	0.98	0.93	1.01	1.03	0.152
PCB 195	0.82	0.80	0.84	0.89	0.135
PCB 206	1.03	1.01	1.09	1.13	0.193
PCB 209	1.00	0.95	1.03	1.06	0.164

(a) MDL Calculated by multiplying the standard deviation of the four replicates by Students-t (4.54).
(b) NA Not applicable.
(c) U Undetected at or above given concentration.

TABLE G.8. Polynuclear Aromatic Hydrocarbons (PAH) and 1,4-Dichlorobenzene (Wet Weight) in Tissue of *N. virens*

Treatment	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A
Replicate	1	2	3	4	5
Batch	5	6	5	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.61%	13.54%	14.69%	13.51%	15.62%
1,4-Dichlorobenzene	1.86 U[(a)]	1.86 U	1.86 U	1.86 U	1.86 U
Naphthalene	1.86 U	3.52	1.91	1.86 U	1.86 U
Acenaphthylene	1.58 [(b)]	2.34 [(b)]	1.13 [(b)]	1.01 [(b)]	0.99 [(b)]
Acenaphthene	6.17	4.42	5.82	3.33	2.46
Fluorene	1.90 [(b)]	2.72 [(b)]	1.50	1.24 U	1.24 U
Phenanthrene	6.07	3.35	3.04	2.56 U	2.56 U
Anthracene	4.07	3.23 [(b)]	3.65	3.33	3.05 [(b)]
Fluoranthene	45.0	50.0	110.	46.6	50.8
Pyrene	65.0	55.7	115	42.1	51.8
Benzo(a)anthracene	6.87	5.35 [(b)]B[(c)]	6.10 B	4.71 [(b)]B	3.93 [(b)]B
Chrysene	25.7	22.2	27.5	15.8	18.1
Benzo(b)fluoranthene	7.13	9.68	9.57	6.61	7.07
Benzo(k)fluoranthene	4.61	5.81	5.56	4.43	4.63
Benzo(a)pyrene	6.27 [(b)]	5.38 [(b)]	4.61 [(b)]	3.23 [(b)]	3.77 [(b)]
Indeno(123-cd)pyrene	1.76 U	3.88 [(b)]	2.04	1.76 U	1.79
Dibenzo(a,h)anthracene	1.26 U	2.08 [(b)]	1.26 U	1.26 U	1.26 U
Benzo(g,h,i)perylene	2.91	4.72	2.56	2.19	2.61
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	56	63	66	70	70
d8 Naphthalene	75	75	87	86	86
d10 Acenaphthene	86	81	90	91	90
d12 Chrysene	92	78	88	86	83
d14 Dibenzo(a,h,i)anthracene	101	88	94	93	92

TABLE G.8. (contd)

Treatment	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B
Replicate	1	2	3	4	5
Batch	5	6	6	5	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.90%	16.63%	13.59%	14.56%	13.92%
1,4-Dichlorobenzene	1.86 U	1.86 U	2.05 U	1.86 U	1.86 U
Naphthalene	2.18	14.8	8.57	5.94	4.36
Acenaphthylene	1.54 (b)	4.78 (b)	3.17 (b)	2.72	3.85 (b)
Acenaphthene	17.1	50.4	9.13	27.6	37.7
Fluorene	3.06	14.8	4.05	7.09	9.90
Phenanthrene	11.6	61.2	9.63	36.6	39.5
Anthracene	4.83	16.9	4.25 (b)	10.5	12.6
Fluoranthene	43.8	246	40.9	163	181
Pyrene	36.2	192	42.7	146	157
Benzo(a)anthracene	6.50 B	25.8	8.85 B	16.1	22.1
Chrysene	22.6	77.2	40.3	45.9	74.7
Benzo(b)fluoranthene	8.75	20.1	15.0 (b)	15.8	23.2
Benzo(k)fluoranthene	5.22	13.2	10.6	7.56	13.3
Benzo(a)pyrene	4.67 (b)	19.4	11.5	10.9	18.5
Indeno(123-cd)pyrene	1.89	6.42	6.73	4.09	7.27
Dibenzo(a,h)anthracene	1.26 U	3.28	3.10	1.49	2.94
Benzo(g,h,i)perylene	3.09	8.90	9.94	4.76	9.12
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	49	62	54	58	52
d8 Naphthalene	72	73	70	77	68
d10 Acenaphthene	86	79	80	86	77
d12 Chrysene	92	78	79	89	76
d14 Dibenzo(a,h,i)Anthracene	92	89	89	96	86

TABLE G.8. (contd)

Treatment	R-MUD	R-MUD	R-MUD	R-MUD	R-MUD
Replicate	1	2	3	4	5
Batch	4	5	6	7	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.12%	14.94%	15.21%	14.00%	13.24%
1,4-Dichlorobenzene	1.86 U	1.83 U	1.86 U	1.86 U	2.31 U
Naphthalene	1.86 U	1.83 U	2.71 (b)	6.00 (b)B	11.9
Acenaphthylene	0.73 U	0.71 U	0.73 U	0.73 U	2.93 (b)
Acenaphthene	1.30 U	1.28 U	2.28 (b)	3.24	3.29
Fluorene	1.24 U	1.21 U	1.24 U	3.31	4.07
Phenanthrene	2.56 U	2.51 U	2.56 U	4.04	7.21
Anthracene	2.24 U	2.19 U	2.24 U	2.24 U	2.77 U
Fluoranthene	5.36 U	5.26 U	5.36 U	5.36 U	6.65 U
Pyrene	4.57 U	4.48 U	4.57 U	5.54 (b)	6.97 (b)
Benzo(a)anthracene	2.43 (b)B	2.47 B	3.68 (b)B	4.05 (b)B	4.51 (b)B
Chrysene	2.27 U	2.22 U	2.27 U	2.27 U	2.81 U
Benzo(b)fluoranthene	2.51 (b)	1.61 U	4.09 (b)	1.64 U	5.09 (b)
Benzo(k)fluoranthene	1.92 (b)	1.64 U	1.67 U	1.67 U	2.07 U
Benzo(a)pyrene	1.49 U	1.46 U	1.49 U	1.49 U	1.85 U
Indeno(123-cd)pyrene	1.76 U	1.73 U	1.76 U	1.76 U	3.66 (b)
Dibenzo(a,h)anthracene	1.26 U	1.24 U	1.26 U	1.26 U	1.56 U
Benzo(g,h,i)perylene	1.40 U	1.37 U	1.40 U	1.40 U	3.57 (b)
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	69	63	64	12 (d)	66
d8 Naphthalene	82	85	76	28 (d)	76
d10 Acenaphthene	83	92	81	47	79
d12 Chrysene	72	93	77	54	78
d14 Dibenzo(a,h,i)anthracene	82	102	86	70	87

TABLE G.8. (contd)

Treatment	R-CLIS	R-CLIS	R-CLIS	R-CLIS	R-CLIS
Replicate	1	2	3	4	5
Batch	6	5	4	6	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.70%	16.08%	15.15%	14.02%	14.53%
1,4-Dichlorobenzene	1.86 U	1.86 U	1.83 U	1.83 U	1.86 U
Naphthalene	2.33 (b)	1.86 U	2.46	2.59 (b)	1.86 U
Acenaphthylene	0.73 U	0.73 U	0.71 U	0.71 U	0.73 U
Acenaphthene	2.47	1.30 U	1.28 U	2.60 (b)	1.30 U
Fluorene	1.24 U	1.24 U	1.21 U	1.21 U	1.24 U
Phenanthrene	2.56 U	2.56 U	2.51 U	2.64 (b)	2.56 U
Anthracene	2.24 U	2.24 U	2.19 U	2.19 U	2.24 U
Fluoranthene	5.36 U	5.36 U	5.26 U	5.26 U	5.36 U
Pyrene	6.36	4.57 U	4.48 U	5.54 (b)	4.57 U
Benzo(a)anthracene	3.32 (b)B	1.09 U	2.15 (b)B	1.07 U	2.11 (b)B
Chrysene	2.62	2.27 U	2.22	2.42	2.27 U
Benzo(b)fluoranthene	4.53 (b)	2.61 (b)	2.75	4.32	2.42 (b)
Benzo(k)fluoranthene	3.14 (b)	1.97 (b)	2.06 (b)	2.81 (b)	1.83 (b)
Benzo(a)pyrene	2.29 (b)	1.49 U	1.46 U	1.46 U	1.49 U
Indeno(123-cd)pyrene	3.01 (b)	1.76 U	1.73 U	2.86 (b)	1.76 U
Dibenzo(a,h)anthracene	1.26 U	1.26 U	1.24 U	1.24 U	1.26 U
Benzo(g,h,i)perylene	2.91 (b)	1.40 U	1.37 U	2.75 (b)	1.40 U
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	66	71	40	63	63
d8 Naphthalene	81	93	51	74	84
d10 Acenaphthene	88	99	55	79	95
d12 Chrysene	81	98	52	78	102
d14 Dibenzo(a,h,i)anthracene	93	103	55	85	103

TABLE G.8. (contd)

Treatment	C-NV	C-NV	C-NV	C-NV	C-NV
Replicate	1	2	3	4	5
Batch	6	6	4	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.84%	12.32%	14.51%	13.67%	14.91%
1,4-Dichlorobenzene	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Naphthalene	2.16 (b)	2.72 (b)	2.49	2.80	2.09 (b)
Acenaphthylene	2.04 (b)	0.73 U	0.73 U	0.73 U	0.73 U
Acenaphthene	1.30 U	2.34 (b)	1.30 U	1.40 (b)	1.30 U
Fluorene	1.24 U	2.76	1.24 U	1.24 U	1.24 U
Phenanthrene	2.56 (b)	2.76 (b)	2.56 U	2.56 U	2.56 U
Anthracene	2.24 U	2.24 U	2.24 U	2.24 U	2.24 U
Fluoranthene	7.87 (b)	6.80	11.1	5.46	5.36 U
Pyrene	9.30	7.20	14.7	4.95	5.01 (b)
Benzo(a)anthracene	3.95 B	1.09 U	2.45 (b)B	2.26 (b)B	1.09 U
Chrysene	3.21	2.87	3.77	2.27 U	2.27 U
Benzo(b)fluoranthene	5.00	4.44 (b)	3.53	2.60	2.70 (b)
Benzo(k)fluoranthene	3.19 (b)	2.81 (b)	2.48 (b)	2.02 (b)	2.05 (b)
Benzo(a)pyrene	2.64 (b)	1.49 U	1.49 U	1.49	1.49 U
Indeno(123-cd)pyrene	3.07 (b)	2.87 (b)	1.76 U	1.76 (b)	1.76 U
Dibenzo(a,h)anthracene	1.26 U	1.26 U	1.26 U	1.26	1.26 U
Benzo(g,h,i)perylene	2.96 (b)	2.78 (b)	1.40 U	1.40 (b)	1.40 U
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	68	71	46	55	27 (d)
d8 Naphthalene	82	85	58	71	35
d10 Acenaphthene	89	88	63	76	38
d12 Chrysene	78	80	58	71	41
d14 Dibenzo(a,h,i)anthracene	85	92	61	77	38

TABLE G.8. (contd)

Treatment	*N. virens* Background	*N. virens* Background	*N. virens* Background
Replicate	1	2	3
Batch	7	7	7
Units	ng/g	ng/g	ng/g
Percent Dry Weight	12.86%	12.94%	12.05%
1,4-Dichlorobenzene	1.86 U	1.86 U	1.86 U
Naphthalene	2.79	2.67	2.98
Acenaphthylene	0.73 U	2.79 U	0.73 U
Acenaphthene	2.12	2.24 (b)	2.09 (b)
Fluorene	1.24 U	1.24 U	1.24 U
Phenanthrene	2.56 U	2.56 U	2.67 (b)
Anthracene	3.49	2.24 U	2.24 U
Fluoranthene	5.36 U	5.36 U	5.36 U
Pyrene	4.57 U	4.57 U	4.57 U
Benzo(a)anthracene	4.22	3.86 (b)	3.77 (b)
Chrysene	2.27 U	2.27 U	2.27 U
Benzo(b)fluoranthene	1.64 U	1.64 U	4.49 (b)
Benzo(k)fluoranthene	1.67 U	1.67 U	1.67 U
Benzo(a)pyrene	1.49 U	2.59	1.49 U
Indeno(123-cd)pyrene	1.76 U	1.76 U	1.76 U
Dibenzo(a,h)anthracene	1.26 U	1.26 U	1.26 U
Benzo(g,h,i)perylene	1.40 U	1.40 U	1.40 U
Surrogate Internal Standards (%)			
d4 1,4-Dichlorobenzene	72	68	51
d8 Naphthalene	85	82	67
d10 Acenaphthene	91	89	84
d12 Chrysene	84	81	82
d14 Dibenzo(a,h,i)anthracene	105	103	104

(a) U Undetected at or above given concentration.
(b) Ion ratio out or confirmation ion not detected.
(c) B Value is < 5 times concentration in blank.
(d) Outside quality control criteria (30-150%) for surrogate internal standards.

TABLE G.9. Polynuclear Aromatic Hydrocarbons (PAH) and 1,4-Dichlorobenzene (Dry Weight) in Tissue of *N. virens*

Treatment	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A	COMP EC-A
Replicate	1	2	3	4	5
Batch	5	6	5	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.61%	13.54%	14.69%	13.51%	15.62%
1,4-Dichlorobenzene	12.7 U[(a)]	13.7 U	12.7 U	13.8 U	11.9 U
Naphthalene	12.7 U	26.0	13.0	13.8 U	11.9 U
Acenaphthylene	10.8 [(b)]	17.3 [(b)]	7.69 [(b)]	7.48 [(b)]	6.3 [(b)]
Acenaphthene	42.2	32.6	39.6	24.6	15.7
Fluorene	13.0 [(b)]	20.1 [(b)]	10.2	9.18 U	7.94 U
Phenanthrene	41.5	24.7	20.7	18.9 U	16.4 U
Anthracene	27.9	23.9 [(b)]	24.8	24.6	19.5 [(b)]
Fluoranthene	308	369	749	345	325
Pyrene	445	411	783	312	332
Benzo(a)anthracene	47.0	39.5 [(b)]B[(c)]	41.5 B	34.9 [(b)]B	25.2 [(b)]B
Chrysene	176	164	187	117	116
Benzo(b)fluoranthene	48.8	71.5	65.1	48.9	45.3
Benzo(k)fluoranthene	31.6	42.9	37.8	32.8	29.6
Benzo(a)pyrene	42.9 [(b)]	39.7 [(b)]	31.4 [(b)]	23.9 [(b)]	24.1 [(b)]
Indeno(123-cd)pyrene	12.0 U	28.7 [(b)]	13.9	13.0 U	11.5
Dibenzo(a,h)anthracene	8.62 U	15.4 [(b)]	8.58 U	9.33 U	8.07 U
Benzo(g,h,i)perylene	19.9	34.9	17.4	16.2	16.7

TABLE G.9. (contd)

Treatment	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B	COMP EC-B
Replicate	1	2	3	4	5
Batch	5	6	6	5	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	14.90%	16.63%	13.59%	14.56%	13.92%
1,4-Dichlorobenzene	12.5 U	11.2 U	15.1 U	12.8 U	13.4 U
Naphthalene	14.6	89.0	63.1	40.8	31.3
Acenaphthylene	10.3 (b)	28.7 (b)	23.3 (b)	18.7	27.7 (b)
Acenaphthene	115	303	67.2	190	271
Fluorene	20.5	89.0	29.8	48.7	71.1
Phenanthrene	77.9	368	70.9	251	284
Anthracene	32.4	102	31.3 (b)	72.1	90.5
Fluoranthene	294	1480	301	1120	1300
Pyrene	243	1160	314	1000	1130
Benzo(a)anthracene	43.6 B	155	65.1 B	111	159
Chrysene	152	464	297	315	537
Benzo(b)fluoranthene	58.7	121	110 (b)	109	167
Benzo(k)fluoranthene	35.0	79.4	78.0	51.9	95.5
Benzo(a)pyrene	31.3 (b)	117	84.6	74.9	133
Indeno(123-cd)pyrene	12.7	38.6	49.5	28.1	52.2
Dibenzo(a,h)anthracene	8.46 U	19.7	22.8	10.2	21.1
Benzo(g,h,i)perylene	20.7	53.5	73.1	32.7	65.5

TABLE G.9. (contd)

Treatment	R-MUD	R-MUD	R-MUD	R-MUD	R-MUD
Replicate	1	2	3	4	5
Batch	4	5	6	7	6
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.12%	14.94%	15.21%	14.00%	13.24%
1,4-Dichlorobenzene	14.2 U	12.2 U	12.2 U	13.3 U	17.4 U
Naphthalene	14.2 U	12.2 U	17.8 (b)	42.9 (b)B	89.9
Acenaphthylene	5.56 U	4.8 U	4.8 U	5.2 U	22.1 (b)
Acenaphthene	9.91 U	8.57 U	15.0 (b)	23.1	24.8
Fluorene	9.45 U	8.10 U	8.15 U	23.6	30.7
Phenanthrene	19.5 U	16.8 U	16.8 U	28.9	54.5
Anthracene	17.1 U	14.7 U	14.7 U	16.0 U	20.9 U
Fluoranthene	40.9 U	35.2 U	35.2 U	38.3 U	50.2 U
Pyrene	34.8 U	30.0 U	30.0 U	39.6 (b)	52.6 (b)
Benzo(a)anthracene	18.5 (b)B	16.5 B	24.2 (b)B	28.9 (b)B	34.1 (b)B
Chrysene	17.3 U	14.9 U	14.9 U	16.2 U	21.2 U
Benzo(b)fluoranthene	19.1 (b)	10.8 U	26.9 (b)	11.7 U	38.4 (b)
Benzo(k)fluoranthene	14.6 (b)	11.0 U	11.0 U	11.9 U	15.6 U
Benzo(a)pyrene	11.4 U	9.77 U	9.80 U	10.6 U	14.0 U
Indeno(123-cd)pyrene	13.4 U	11.6 U	11.6 U	12.6 U	27.6 (b)
Dibenzo(a,h)anthracene	9.60 U	8.30 U	8.28 U	9.00 U	11.8 U
Benzo(g,h,i)perylene	10.7 U	9.17 U	9.20 U	10.0 U	27.0 (b)

TABLE G.9. (contd)

Treatment	R-CLIS	R-CLIS	R-CLIS	R-CLIS	R-CLIS
Replicate	1	2	3	4	5
Batch	6	5	4	6	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
Percent Dry Weight	13.70%	16.08%	15.15%	14.02%	14.53%
1,4-Dichlorobenzene	13.6 U	11.6 U	12.1 U	13.1 U	12.8 U
Naphthalene	17.0 (b)	11.6 U	16.2	18.5 (b)	12.8 U
Acenaphthylene	5.3 U	4.5 U	4.7 U	5.1 U	5.0 U
Acenaphthene	18.0	8.08 U	8.45 U	18.5 (b)	8.95 U
Fluorene	9.05 U	7.71 U	7.99 U	8.63 U	8.53 U
Phenanthrene	18.7 U	15.9 U	16.6 U	18.8 (b)	17.6 U
Anthracene	16.4 U	13.9 U	14.5 U	15.6 U	15.4 U
Fluoranthene	39.1 U	33.3 U	34.7 U	37.5 U	36.9 U
Pyrene	46.4	28.4 U	29.6 U	39.5 (b)	31.5 U
Benzo(a)anthracene	24.2 (b)B	6.78 U	14.2 (b)B	7.63 U	14.5 (b)B
Chrysene	19.1	14.1 U	14.7	17.3	15.6 U
Benzo(b)fluoranthene	33.1 (b)	16.2 (b)	18.2	30.8	16.7 (b)
Benzo(k)fluoranthene	22.9 (b)	12.3 (b)	13.6 (b)	20.0 (b)	12.6 (b)
Benzo(a)pyrene	16.7 (b)	9.27 U	9.64 U	10.4 U	10.3 U
Indeno(123-cd)pyrene	22.0 (b)	10.9 U	11.4 U	20.4 (b)	12.1 U
Dibenzo(a,h)anthracene	9.20 U	7.84 U	8.18 U	8.84 U	8.67 U
Benzo(g,h,i)perylene	21.2 (b)	8.7 U	9.04 U	19.6 (b)	9.64 U

TABLE G.9. (contd)

Treatment	C-NV	C-NV	C-NV	C-NV	C-NV
Replicate	1	2	3	4	5
Batch	6	6	4	4	4
Units	ng/g	ng/g	ng/g	ng/g	ng/g
'ercent Dry Weight	14.84%	12.32%	14.51%	13.67%	14.91%
1,4-Dichlorobenzene	12.5 U	15.1 U	12.8 U	13.6 U	12.5 U
Naphthalene	14.6 (b)	22.1 (b)	17.2	20.5	14.0 (b)
Acenaphthylene	13.7 (b)	5.9 U	5.0 U	5.3 U	4.9 U
Acenaphthene	8.76 U	19.0 (b)	9.0 U	10.2 (b)	8.72 U
Fluorene	8.36 U	22.4	8.55 U	9.07 U	8.32 U
Phenanthrene	17.3 (b)	22.4 (b)	17.6 U	18.7 U	17.2 U
Anthracene	15.1 U	18.2 U	15.4 U	16.4 U	15.0 U
Fluoranthene	53.0 (b)	55.2	76.5	39.9	35.9 U
Pyrene	62.7	58.4	101	36.2	33.6 (b)
Benzo(a)anthracene	26.6 B	8.85 U	16.9 (b)B	16.5 (b)B	7.31 U
Chrysene	21.6	23.3	26.0	16.6 U	15.2 U
Benzo(b)fluoranthene	33.7	36.0 (b)	24.3	19.0	18.1 (b)
Benzo(k)fluoranthene	21.5 (b)	22.8 (b)	17.1 (b)	14.8 (b)	13.7 (b)
Benzo(a)pyrene	17.8 (b)	12.1 U	10.3 U	10.9	9.99 U
Indeno(123-cd)pyrene	20.7 (b)	23.3 (b)	12.1 U	12.9 (b)	11.8 U
Dibenzo(a,h)anthracene	8.49 U	10.2 U	8.68 U	9.22	8.45 U
Benzo(g,h,i)perylene	19.9 (b)	22.6 (b)	9.65 U	10.2 (b)	9.39 U

TABLE G.9. (contd)

Treatment	*N. virens* Background	*N. virens* Background	*N. virens* Background
Replicate	1	2	3
Batch	7	7	7
Units	ng/g	ng/g	ng/g
Percent Dry Weight	12.86%	12.94%	12.05%
1,4-Dichlorobenzene	14.5 U	14.4 U	15.4 U
Naphthalene	21.7	20.6	24.7
Acenaphthylene	5.7 U	21.6 U	6.1 U
Acenaphthene	16.5	17.3 (b)	17.3 (b)
Fluorene	9.64 U	9.58 U	10.3 U
Phenanthrene	19.9 U	19.8 U	22.2 (b)
Anthracene	27.1	17.3 U	18.6 U
Fluoranthene	41.7 U	41.4 U	44.5 U
Pyrene	35.5 U	35.3 U	37.9 U
Benzo(a)anthracene	32.8	29.8 (b)	31.3 (b)
Chrysene	17.7 U	17.5 U	18.8 U
Benzo(b)fluoranthene	12.8 U	12.7 U	37.3 (b)
Benzo(k)fluoranthene	13.0 U	12.9 U	13.9 U
Benzo(a)pyrene	11.6 U	20.0	12.4 U
Indeno(123-cd)pyrene	13.7 U	13.6 U	14.6 U
Dibenzo(a,h)anthracene	9.80 U	9.74 U	10.5 U
Benzo(g,h,i)perylene	10.9 U	10.8 U	11.6 U

(a) U Undetected at or above given concentration.
(b) Ion ratio out or confirmation ion not detected.
(c) B Value is < 5 times concentration in blank.

TABLE G.10. Quality Control Summary for Polynuclear Aromatic Hydrocarbons (PAHs) in Tissue of *N. virens* (Wet Weight)

	METHOD BLANKS				
Treatment	BLANK	BLANK	BLANK	BLANK	BLANK
Replicate	1	1	1	1	2
Batch	4	5	6	7	7
Wet Wt.	NA	NA	NA	NA	NA
Units	ng/g	ng/g	ng/g	ng/g	ng/g
1,4-Dichlorobenzene	1.98 U[a]	1.90 U	1.94 U	2.24 U	2.16 U
Naphthalene	1.98 U	1.90 U	1.94 U	2.24 U	2.24 [b]
Acenaphthylene	0.77 U	0.74 U	0.75 U	0.87 U	0.84 U
Acenaphthene	1.38 U	1.33 U	1.36 U	1.56 U	1.51 U
Fluorene	1.31 U	1.26 U	1.29 U	1.48 U	1.43 U
Phenanthrene	2.71 U	2.61 U	2.66 U	3.07 U	2.97 U
Anthracene	2.37 U	2.28 U	2.33 U	2.69 U	6.22 U
Fluoranthene	5.69 U	5.47 U	5.58 U	6.44 U	5.30 U
Pyrene	4.84 U	4.66 U	4.75 U	5.48 U	5.30 U
Benzo(a)anthracene	2.29	2.13 [b]	3.50 [b]	4.40 [b]	4.41 [b]
Chrysene	2.40 U	2.31 U	2.36 U	2.72 U	2.63 U
Benzo(b)fluoranthene	1.74 U	1.67 U	1.71 U	1.97 U	1.90 U
Benzo(k)fluoranthene	1.77 U	1.70 U	1.74 U	2.00 U	1.94 U
Benzo(a)pyrene	1.58 U	1.52 U	1.55 U	2.75	1.73 U
Indeno(123-cd)pyrene	1.87 U	1.80 U	1.83 U	4.02 [b]	2.04 U
Dibenzo(a,h)anthracene	1.34 U	1.29 U	1.31 U	1.51 U	1.46 U
Benzo(g,h,i)perylene	1.49 U	1.43 U	1.46 U	1.68 U	1.63 U
Surrogate Internal Standards (%)					
d4 1,4-Dichlorobenzene	59 [b]	76	78	89	59
d8 Naphthalene	70	91	84	91	65
d10 Acenaphthene	72	87	81	94	72
d12 Chrysene	81	75	83	105	77
d14 Dibenzo(a,h,i)anthracene	66	78	76	108	97

TABLE G.10. (contd)

	MATRIX SPIKES							
Treatment	COMP EC-A	COMP EC-A, MS			COMP HU-C	COMP HU-C, MS		
Replicate	1	1			1	1		
Batch	5	5	Amount		7	7	Amount	
Wet Wt.	20.08	20.05	Spiked	Percent	12.96	12.71	Spiked	Percent
Units	ng/g	ng/g	ng/g	Recovery	ng/g	ng/g	ng/g	Recovery
1,4-Dichlorobenzene	1.86 U	21.5	24.9	86	2.87 U	36.1	39.3	92
Naphthalene	1.86 U	23.5	24.9	94	7.42	47.9	39.3	103
Acenaphthylene	1.58 [b]	21.4	24.9	80	1.59	39.3	39.3	100
Acenaphthene	6.17	27.8	24.9	87	3.75	47.6	39.3	112
Fluorene	1.90 [b]	23.2	24.9	86	1.90 U	46.1	39.3	117
Phenanthrene	6.07	25.1	24.9	76	5.24	52.6	39.3	121 [c]
Anthracene	4.07	27.1	24.9	92	3.45 U	51.3	39.3	131 [c]
Fluoranthene	45.0	133	24.9	353 [c]	19.0	73.9	39.3	140 [c]
Pyrene	65.0	134	24.9	277 [c]	22.7	69.9	39.3	120
Benzo(a)anthracene	6.87	30.0	24.9	93	6.61 [b]	55.6	39.3	125 [c]
Chrysene	25.7	46.0	24.9	82	10.3	54.0	39.3	111
Benzo(b)fluoranthene	7.13	32.6	24.9	102	8.74	54.5	39.3	116
Benzo(k)fluoranthene	4.61	28.4	24.9	96	4.77 [b]	54.7	39.3	127 [c]
Benzo(a)pyrene	6.27 [b]	27.9	24.9	87	5.14	53.8	39.3	124 [c]
Indeno(123-cd)pyrene	1.76 U	23.0	24.9	85	5.85 [b]	47.6	39.3	106
Dibenzo(a,h)anthracene	1.26 U	22.8	24.9	87	1.94 U	47.8	39.3	122 [c]
Benzo(g,h,i)perylene	2.91	22.1	24.9	77	5.28 [b]	43.5	39.3	97
Surrogate Internal Standards (%)								
d4 1,4-Dichlorobenzene	56	70	NA	NA	41	52	NA	NA
d8 Naphthalene	75	90	NA	NA	53	63	NA	NA
d10 Acenaphthene	86	97	NA	NA	66	77	NA	NA
d12 Chrysene	92	96	NA	NA	67	81	NA	NA
d14 Dibenzo(a,h,i)anthracene	101	103	NA	NA	85	102	NA	NA

TABLE G.10. (contd)

	MATRIX SPIKES							
Treatment	COMP SB-A	COMP SB-A, MS			C-NV	C-NV, MS		
Replicate	1	1			2	2		
Batch	4	4	Amount		6	6	Amount	
Wet Wt.	20.08	20.02	Spiked	Percent	20.08	20.17	Spiked	Percent
Units	ng/g	ng/g	ng/g	Recovery	ng/g	ng/g	ng/g	Recovery
1,4-Dichlorobenzene	1.86 U	20.2	25.0	81	1.86 U	24.1	24.8	97
Naphthalene	3.79	27.5	25.0	95	2.72 (b)	30.5	24.8	112
Acenaphthylene	1.92 (b)	23.0	25.0	84	0.73 U	27.1	24.8	109
Acenaphthene	23.2	52.2	25.0	116	2.34 (b)	31.1	24.8	116
Fluorene	11.1	36.9	25.0	103	2.76	28.1	24.8	102
Phenanthrene	62.7	101	25.0	153 (c)	2.76 (b)	30.4	24.8	111
Anthracene	14.4	42.8	25.0	114	2.24 U	30.2	24.8	122 (c)
Fluoranthene	152	218	25.0	264 (c)	6.80	40.1	24.8	134 (c)
Pyrene	146	208	25.0	248 (c)	7.20	35.8	24.8	115
Benzo(a)anthracene	12.6	38.8	25.0	105	1.09 U	33.9	24.8	137 (c)
Chrysene	33.8	63.8	25.0	120	2.87	31.0	24.8	113
Benzo(b)fluoranthene	10.3 (b)	33.7	25.0	94	4.44 (b)	32.5	24.8	113
Benzo(k)fluoranthene	4.84	29.4	25.0	98	2.81 (b)	32.5	24.8	120
Benzo(a)pyrene	7.74	32.4	25.0	99	1.49 U	31.3	24.8	126 (c)
Indeno(123-cd)pyrene	2.45	24.1	25.0	87	2.87 (b)	29.1	24.8	106
Dibenzo(a,h)anthracene	1.26 U	24.1	25.0	96	1.26 U	29.8	24.8	120
Benzo(g,h,i)perylene	3.53	25.4	25.0	87	2.78 (b)	27.4	24.8	99
Surrogate Internal Standards (%)								
d4 1,4-Dichlorobenzene	60	37	NA	NA	71	59	NA	NA
d8 Naphthalene	76	46	NA	NA	85	69	NA	NA
d10 Acenaphthene	82	50	NA	NA	88	77	NA	NA
d12 Chrysene	80	49	NA	NA	80	73	NA	NA
d14 Dibenzo(a,h,i)anthracene	87	53	NA	NA	92	83	NA	NA

TABLE G.10. (contd)

	ANALYTICAL REPLICATES							
Treatment	COMP HU-A	COMP HU-A Dup	COMP HU-A Trip		COMP HU-C	COMP HU-C Dup	COMP HU-C Trip	
Replicate	5-1	5-2	5-3		4-1	4-2	4-3	
Batch	4	4	4		6	6	6	
Wet Wt.	14.57	13.76	13.79		17.18	17.51	16.38	
Units	ng/g	ng/g	ng/g	RSD%	ng/g	ng/g	ng/g	RSD%
1,4-Dichlorobenzene	2.57 U	2.72 U	2.72 U	NA	2.16 U	2.12 U	2.27 U	NA
Naphthalene	4.51	3.53	3.67	14	3.01 (b)	3.22	3.50 (b)	8
Acenaphthylene	2.97 (b)	3.18 (b)	2.79 (b)	7	2.59 (b)	2.84 (b)	2.71 (b)	5
Acenaphthene	23.5	22.8	23.6	2	4.77	4.59	4.75	2
Fluorene	9.15	9.0	9.20	1	3.39 (b)	3.40 (b)	3.96	9
Phenanthrene	53.3	53.7	55.1	2	6.43	5.66	5.74	7
Anthracene	17.6	17.4	18.0	2	4.34 (b)	4.12 (b)	3.75 (b)	7
Fluoranthene	263	258	264	1	46.1	44.8	43.5	3
Pyrene	295	289	292	1	59.7	57.6	56.3	3
Benzo(a)anthracene	34.7	34.4	34.6	0	7.37 B	7.18 B	7.30 B	1
Chrysene	79.1	76.9	79.2	2	20.7	19.8	19.2	4
Benzo(b)fluoranthene	24.5	34.1	24.6	20	9.45	9.35	9.07	2
Benzo(k)fluoranthene	10.1 (b)	2.44 U	11.1	NA	5.05	4.69	5.29	6
Benzo(a)pyrene	19.2	19.5	20.1	2	5.87	5.72	5.79	1
Indeno(123-cd)pyrene	5.01	5.09	5.03	1	3.95	3.77 (b)	4.12	4
Dibenzo(a,h)anthracene	1.98 (b)	1.84 U	2.07	NA	2.14 (b)	2.14 (b)	2.23 (b)	2
Benzo(g,h,i)perylene	6.20	6.44	6.52	3	4.23	4.09	4.28	2
Surrogate Internal Standards (%)								
d4 1,4-Dichlorobenzene	63	60	52	NA	63	62	68	NA
d8 Naphthalene	77	77	67	NA	74	77	81	NA
d10 Acenaphthene	80	82	70	NA	79	81	86	NA
d12 Chrysene	73	75	65	NA	76	79	81	NA
d14 Dibenzo(a,h,i)anthracene	82	85	73	NA	82	88	90	NA

TABLE G.10. (contd)

	ANALYTICAL REPLICATES							
Treatment	COMP SB-B	COMP SB-B Dup	COMP SB-B Trip		COMP BU	COMP BU Dup	COMP BU Trip	
Replicate	2-1	2-2	2-3		3-1	3-2	3-3	
Batch	5	5	5		7	7	7	
Wet Wt.	17.11	17.25	17.13		8.60	8.47	8.21	
Units	ng/g	ng/g	ng/g	RSD%	ng/g	ng/g	ng/g	RSD%
1,4-Dichlorobenzene	2.24 U	2.24 U	2.24 U	NA	4.32 U	4.40 U	4.55 U	NA
Naphthalene	2.33 (b)	2.31 (b)	2.33	0	10.8	11.2	10.2	5
Acenaphthylene	1.76 (b)	1.62 (b)	1.40 (b)	11	1.68 U	1.85 (b)	1.77 U	NA
Acenaphthene	7.39	6.96	6.72	5	5.01	5.63	5.95 (b)	9
Fluorene	2.21	2.02 (b)	1.83	9	6.39	2.92 U	6.84 (b)	NA
Phenanthrene	6.73	7.08	6.61	4	7.61	8.28	7.52	5
Anthracene	4.76	4.92	4.99	2	7.93 (b)	5.28 U	5.46 U	NA
Fluoranthene	49.4	50.7	45.6	5	16.3	19.6	17.6	9
Pyrene	69.5	70.2	63.8	5	21.1	24.8	22.1	8
Benzo(a)anthracene	7.72 B	7.14 B	6.68 B	7	2.54 U	9.61 (b)	2.67 U	NA
Chrysene	21.1	21.7	19.1	7	10.2	10.8	10.9	4
Benzo(b)fluoranthene	7.70	7.49 (b)	6.76	7	11.9	12.6	12.5	3
Benzo(k)fluoranthene	4.59	4.44	3.98	7	6.60 (b)	6.85 (b)	6.78 (b)	2
Benzo(a)pyrene	6.38 (b)	5.52 (b)	5.18	11	6.06	6.67	6.38	5
Indeno(123-cd)pyrene	2.11 U	2.11 U	2.11 U	NA	8.11 (b)	8.18	8.54 (b)	3
Dibenzo(a,h)anthracene	1.51 U	1.51 U	1.51 U	NA	2.92 U	2.97 U	3.08 U	NA
Benzo(g,h,i)perylene	2.82	2.68	2.53	5	7.71	8.09	7.98	2
Surrogate Internal Standards (%)								
d4 1,4-Dichlorobenzene	44	61	53	NA	50	41	50	NA
d8 Naphthalene	60	80	71	NA	60	50	60	NA
d10 Acenaphthene	64	83	76	NA	78	65	74	NA
d12 Chrysene	64	83	75	NA	83	67	77	NA
d14 Dibenzo(a,h,i)anthracene	71	92	82	NA	104	85	99	NA

(a) U Undetected at or above given concentration.
(b) Ion ratio out or confirmation ion not detected.
(c) Outside quality control range (50-120%) for matrix spike recovery.
(d) NA Not applicable.

TABLE G.11. Lipids in Tissue of *N. virens*

Sediment Treatment	Replicate	Sample Weight	% Dry Weight	% Lipids (wet weight)	% Lipids (dry weight)
Nereis Background	1	5.04	12.86	1.98	15.4
Nereis Background	2	5.07	12.94	2.17	16.8
Nereis Background	3	5.13	12.05	2.14	17.8